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Antecedents and Consequences of Exploration and Exploitation Decisions: Evidence from Corporate Venture Capital Investing

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Composition du Jury :

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"But we have this treasure in earthen vessels,

that the excellency of the power may be of God, and not of us."

2 Corinthians 4:7

ABSTRACT

This dissertation addresses unexplored issues on the antecedents, management, and outcomes of corporate venture capital (CVC). More specifically, I examine how negative performance feedback and corporate governance influence the direction of organizational change - in terms of exploration and exploitation - and how balancing such change over time influences firm performance in the CVC context. I first review the extant literature on CVC and lay out the unique contributions of my research. Then, in the first essay, I theorize on how poor firm performance influences the resource allocation decisions on exploration and exploitation and how such decisions are affected by the concentration of dedicated and transient shareholders and by the board of directors' monitoring and advising intensities. In the second essay, I empirically examine how the resource allocation decisions on exploration and exploitation are influenced by dedicated and transient shareholders in the context of CVC investing. In the third essay, I examine how balancing exploration and exploitation over time and the characteristics of oscillation impact firm performance. The empirical analysis in the latter two essays is based on CVC investments made by 286 companies during 1993-2013. This dissertation contributes to the Behavioral Theory of the Firm and Corporate Governance research by introducing how shareholders and boards influence managerial decision-making in search and change, Ambidexterity research by studying how continuous change and organizational inertia impact temporal spillover between exploration and exploitation, and CVC research by examining the antecedents and consequences of explorative and exploitative initiatives in CVC investing.

Keywords: Exploration, Exploitation, Behavioral Theory of the Firm, Corporate Governance, Ambidexterity, Corporate Venture Capital.

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CHAPTER 1. FRENCH SUMMARY

Les investissements au sein des sociétés de “venture capital” (CVC) – des investissements minoritaires directs réalisés par des entreprises établies, détenues par des startup entrepreneuriales – ont atteint un niveau sans précédent au cours de ces dernières années et l'adoption de programmes CVC a été répandue parmi les entreprises américaines (Global Corporate Venturing, 2015; 2016). Parallèlement à son importance pratique en tant que source d’avantages financiers et stratégiques, les CVC sont devenues un centre d’intérêts académique croissant, générant un grand nombre d’études sur ses motivations, ses antécédents, sa gestion et ses résultats. Ces intérêts viennent de l’évidence que les relations entre les CVC et des entreprises établies (ci-après appeléesinvestisseur d'entreprise) et des startup augmentent de façon importante leurs innovations et leur performance financière (e.g. Dushnitsky & Lenox, 2005a, Dushnitsky & Lenox, 2006). Malgré l’intérêt académique déjà croissant pour les CVC au cours de ces quatre dernières décennies, il existe toujours d’importantes opportunités pour améliorer notre compréhension de l’histoire, de la gestion et de la performance des CVC.

Tout d’abord les recherches sur les CVC ont apporté très peu d’éclairage sur comment les décisions d’investissement de CVC sont faites. Des chercheurs reconnaissent que les CVC investisseur représentent un outil efficace en termes d’apprentissage organisationnel (Keil et al., 2008), qui ont deux motivations opposées aussi bien au niveau de l’exploration que de l’exploitation (Schildt et al., 2005; Wadhwa & Basu, 2013). Pendant que les investisseurs d'entreprise font leurs investissements d’exploitation dans des startups avec des connaissances similaires et familières, ils réalisent leurs investissements d’exploration dans des startups avec des connaissances nouvelles et non familières (Wadhwa & Basu, 2013). Dans la littérature consacrée aux corporate venturing (CV), des travaux de recherches ont démontré un meilleur alignement entre les initiatives d'exploitation et celles d'exploration et la manière dont les entités CV sont organisées qui conduisent à une plus grande performance financière et stratégique (Hill & Birkinshaw, 2008). De plus, les travaux de recherches ont démontré que plus les investissements sont orientés exploitation plus le taux de défaillance des entités CV est faible (Hill & Birkinshaw, 2008). Cependant malgré son importance dans l'élévation du niveau de performance et de la longévité des firmes, la littérature n'a curieusement pas examiné comment les décisions d'exploitation et d'exploration des CV sont prises.

En particulier, les recherches sur les CVC ont bien apporté de la lumière sur les mécanismes conduisant à la mise en œuvre des programmes d'investissement des CVC (Gaba & Bhattacharya, 2012), mais elles n'ont pas apporté d'éclairage sur la manière dont sont réparties les ressources entre les investissements d'exploitation et ceux d'exploration. Afin de mieux comprendre la manière sur la manière dont les ressources de CVC sont allouées, en plus des mécanismes de recherche problématique, j'introduis comment la variation de risque découle de la gestion de préférences aux risques (Kacperczyk et al., 2015). Comme les retours sur investissement d'exploitation se produisent plus rapidement et sont moins fluctuants que ceux d'investissement d'exploration (March, 1991), les investissements d'exploitation sont moins risqués que ceux d'exploration, je m'attends à ce que l'exploitation soit préférée par les gestionnaires ayant une aversion au risque et que l'exploration soit préférée par des gestionnaires préférant le risque. Sans tenir compte des effets de la recherche problématique et des préférences au risque managérial, il est difficile de comprendre comment les organisations allouent des ressources CVC à l'investissement d'exploitation et à ceux de l'exploration.

D'une part, les recherches sur les CVC se sont focalisées essentiellement sur la manière dont les dirigeants seniors, les startups, les sociétés de capital venture prennent part dans le processus de décision and partagent la valeur créée conjointement (e.g. Basu, Phelps, & Kotha, 2016; Keil et al., 2008). D'autre part, beaucoup moins d'attention a été accordée à la manière comment les entités de la gouvernance d'entreprise comme les actionnaires et les membres du conseil d'administration peuvent influencer les décisions d'investissement des CVC (Anokhin et al. (2016a) et Sahaym et al. (2016) sont des exceptions récentes). Les connaissances tirées de la littérature sur la gouvernance d'entreprise suggèrent que les intérêts des hauts dirigeants d'une entreprise dans la prise de décisions stratégiques peuvent entrer en conflit avec ceux des actionnaires et que le but de la gouvernance d'entreprise est d'influencer la prise de décision stratégique d'une entreprise en l'alignant sur les intérêts des actionnaires (Monks & Minow, 2008). Conformément à cette perspective, la recherche montre que les actionnaires et le conseil d'administration cherchent souvent à influencer un ensemble de décisions de stratégie d'entreprise (Kochhar & David, 1996; Hoskisson et al., 2002; Kim et al., 2008; Tuggle et al., 2010), en particulier lorsque les entreprises réalisent des performances en deçà de leurs attentes (McCahery, Sautner & Starks, 2016). Bien que ces résultats suggèrent que les actionnaires et le conseil d'administration peuvent influencer la façon dont les entreprises prennent des décisions d'exploitation et d'exploration, les recherches antérieures n'ont pas exploré cette proposition. En intégrant les points de vue de la gouvernance d'entreprise et de la recherche sur les risques de décision au mécanisme de recherche problématique, nous pouvons améliorer notre compréhension de la façon dont les organisations allouent des ressources CVC à l'exploitation et à l'exploration.

Deuxièmement, la recherche CVC fournit peu de renseignements sur les résultats de l'adoption d'initiatives d'exploitation et d'exploration. En particulier, il a été démontré dans la littérature de l'ambidexterité que l'on trouve un juste équilibre entre l'exploitation et l'exploration est essentiel pour la performance et la survie de l'entreprise (March, 1991; Levinthal & March, 1993; Junni et al., 2013). Une recherche antérieure a révélé que lorsque les entités de CV exercent des niveaux élevés d'exploitation et d'exploration, cela entraîne une survie plus longue (Hill & Birkinshaw, 2014). Cependant, cette recherche repose largement sur l'hypothèse statique selon laquelle la tension résultant de l'exploitation et de l'exploration est persistante et invariable dans le temps (Raisch & Birkinshaw, 2008). En revanche, les éléments de preuve de la littérature sur les changements organisationnels suggèrent que les entreprises se séparent temporellement et oscillent entre l'exploitation et l'exploration en changeant les contraintes de ressources (e.g. Brown & Eisenhardt, 1997). Il est important de tenir compte de l'effet de l'oscillation car l'exploitation et l'exploration sont complémentaires au fil du temps en ce qui concerne l'augmentation de la performance de l'entreprise parce que l'exploitation devient une contribution à l'exploration et vice versa (Boumgarden et al., 2012; Gilsing and Nooteboom, 2006). Sans une compréhension suffisante de la nature dynamique de l'exploitation et de l'exploration dans l'investissement de CVC, il est difficile de comprendre comment les organisations peuvent équilibrer les deux activités avec le temps et augmenter leur performance.

En outre, la recherche CVC n'a pas examiné les coûts potentiels d'oscillation entre l'exploitation et l'exploration et les limites potentielles des retombées temporelles résultant d'une telle oscillation. En particulier, on a accordé peu d'attention à la nature «continue» de l'oscillation entre l'exploitation et l'exploration, ce qui est important à considérer car elle influe sur les avantages et les coûts des oscillations. D'une part, les connaissances de l'évolution du temps et de la littérature de la complexité montrent que la capacité d'une entreprise à changer continuellement conduit à une performance réussie de l'entreprise grâce à une meilleure coordination, une attention ciblée et un alignement amélioré avec les changements environnementaux (e.g. Miller & Chen, 1994; Brown & Eisenhardt, 1997; Klarner & Raisch, 2013). D'autre part, les informations de la littérature sur l'inertie organisationnelle indiquent que la transition entre l'exploitation et l'exploration entraîne une perturbation des routines et des structures et, par conséquent, augmente le coût de la transition et la probabilité d'échec (Hannan & Freeman, 1984; Barnett & Freeman, 2001; Swift, 2015). En conséquence, les changements continus peuvent soit créer (Brown & Eisenhardt, 1997) soit détruire le « spill over » temporel (Swift, 2015). La recherche CVC n'a pas encore considéré cet effet. Sans une compréhension suffisante de l'effet du changement continu, il est difficile de comprendre comment l'oscillation crée ou détruit les spillover temporelles et donc, la valeur de l'entreprise. En intégrant les idées de l'ambidexterité et de la recherche sur les changements continus, nous pouvons améliorer notre compréhension des résultats d'oscillation entre l'exploitation et l'exploration des CVC dans le temps.

Pour répondre aux limitations précédentes de la recherche sur les CVC, cette thèse s'articule autour de trois essais. Dans le premier essai, en partant du contexte empirique de CVC et en adoptant une perspective plus large, je décris la façon dont la mauvaise performance de l'entreprise influence la prise de décision managériale en ce qui a trait à l'allocation des ressources à l'exploitation et à l'exploration et à la manière dont ces décisions sont affectées par les actionnaires et le conseil d'administration. En m'appuyant sur la théorie comportementale de l'entreprise (BTF), je prédis que la mauvaise performance de l'entreprise fait que les entreprises s'engagent dans un changement organisationnel accru (P1). En m'appuyant sur les connaissances du BTF et de la recherche sur les risques de décision, je prédis que cette modification vise l'exploitation plutôt que l'exploration lorsque les gestionnaires ont une aversion au risque (P2) et sont dirigés vers l'exploration plutôt que l'exploitation lorsque les gestionnaires ont une préférence au risque (P3). En outre, en m'appuyant sur les idées de la recherche sur la gouvernance d'entreprise, en supposant que les gestionnaires typiques sont averses au risque, je prédis que lorsque la concentration de la propriété dédiée dans une entreprise peu performante augmente, l'entreprise modifie sa trajectoire de recherche en explorant plus et en exploitant moins (P4). En outre, je prédis que lorsque la concentration de la propriété transitoire dans une entreprise peu performante augmente, l'entreprise modifie sa trajectoire de recherche en exploitant davantage et en explorant moins (P5). Je prédis également qu'au fur et à mesure que le niveau d'intensité de surveillance du conseil augmentera dans une entreprise peu performante, les entreprises réduiront leur part d'exploration (P6) et, à mesure que le niveau d'intensité de conseil augmentera dans une entreprise à faible rendement, les entreprises augmenteront leur part d'exploration (P7). Cet essai contribue à la recherche sur le BTF et la gouvernance d'entreprise en théorisant sur la façon dont la direction du changement organisationnel, comme l'indique l'allocation des ressources des entreprises à l'exploration et à l'exploration, en réponse aux retours négatifs sur le rendement, est influencée par la concentration des actionnaires transitoires et les intensités de suivi du conseil d'administration.

Dans le deuxième essai, je teste les propositions développées dans le premier essai sur la façon dont les décisions de gestion des ressources sont prises pour l'exploration et l'exploitation et la façon dont ces décisions sont influencées par les actionnaires dédiés et passagers dans le contexte CVC. En analysant les données sur le caractère exploratoire et exploitatoire de 10,261 investissements CVC réalisés par 286 entreprises américaines au cours de la période 1993-2013, je constate que la mauvaise performance de l'entreprise motive les entreprises à accroître leur intensité d'investissement CVC et que cette modification vise des investissements d'exploitation. Je trouve également que lorsque la concentration de la propriété dédiée augmente dans une entreprise à faible performance, l'entreprise modifie sa trajectoire de recherche en explorant davantage et en exploitant moins. Cet essai contribue à la recherche sur le BTF et le CVC en montrant comment la direction du changement organisationnel, telle qu'indiquée par l'endroit où les entreprises investissent CVC, en réponse à une rétroaction négative sur le rendement, est influencée par la concentration de la propriété dédiée.

Dans le troisième essai, en tirant parti des idées de l'ambidextrie et de la recherche sur les changements organisationnels, j'examine comment et dans quelles conditions les performances d'une entreprise dans le contexte CVC oscillent entre l'exploitation et l'exploration au fil du temps. En analysant les données sur la nature ambidextre de 10,261 investissements CVC réalisés par 286 entreprises américaines au cours de la période 1993-2013, je trouve que l'ambidextrie simultanée et séquentielle dans CVC augmente la Q de Tobin d'une entreprise. En outre, je trouve que la durée du changement a une in relation de type U inversé avec le Tobin Q l'entreprise. Cette étude contribue à la recherche sur l'ambidextrie et CVC en montrant comment l'ambidextrie séquentielle et sa durée de changement influencent la performance de l'entreprise.

Dans l'ensemble, cette thèse contribue à la théorie comportementale de l'entreprise (Behavioral Theory of the Firm) en examinant la façon dont la structure du capital et l'actionnariat influe sur la prise de décisions en matière d'innovation et de changement. En étudiant la façon dont l'inertie organisationnelle et les phases de changement affectent les activités d'exploitation et d'exploration, cette thèse contribue aussi à la recherche sur l'ambidextrie organisationnelle. Pour finir, ce travail participe à la recherche sur le corporate venture capital au travers de l'étude des antécédents et des conséquences des activités d'exploration et d'exploitation dans le cadre de l'investissement CVC.

CHAPTER 2. INTRODUCTION

Global investments in corporate venture capital (CVC) - direct minority equity investments made by established firms in privately held entrepreneurial start-up firms - have reached unprecedented levels in the recent years, surging to 65 billion US dollars (KPMG, 2017) invested by 1,501 CVC units in 2016 (Global Corporate Venturing, 2016).[1] Adoption of CVC programs has been prevalent among U.S. companies such that half of the Fortune 100 companies and 20% of the Fortune 500 companies are running CVC programs (Global Corporate Venturing, 2015). Along with its practical importance, in providing both financial and strategic benefits, CVC has increasingly become a focus of academic interest, generating a large number of studies on its motivations, antecedents, management, and outcomes. This interest arises from the evidence that the CVC relationships between established firms (hereafter corporate investor) and start-up firms significantly increase their innovation and financial performances (e.g. Dushnitsky & Lenox, 2005a, Dushnitsky & Lenox, 2006). Despite the increase in scholarship on CVC has been observed over the past four decades, substantial opportunities exist to expand our understanding of the antecedents, management, and outcomes of CVC investing.

First, CVC research provides little insight into how exploitative and explorative CVC investing decisions are made. Scholars recognize that CVC investing is an effective tool for organizational learning (Keil et al., 2008), which has primarily two opposite motivations, exploitation and exploration (Schildt et al., 2005; Wadhwa & Basu, 2013). While corporate investors make exploitative investments in start-up firms with similar and therefore familiar knowledge, they conduct explorative investments in start-up firms with relatively novel and

[1] Count based on any active CVC unit that participated in at least one CVC deal in a given year

thus unfamiliar knowledge (Wadhwa & Basu, 2013). In related literature on corporate venturing (CV)[2], research has found that establishing a better alignment between exploitation and exploration initiatives and how CV units are organized leads to greater financial and strategic performance (Hill & Birkinshaw, 2008). Moreover, research has found that a CV unit's greater exploitation-orientation leads to longer survival (Hill & Birkinshaw, 2008). However, despite its importance in raising the firm's performance and longevity, surprisingly, the literature has not yet examined how exploitative and explorative CVC investing decisions are carried out.

In particular, CVC research has discussed how CVC investing can be understood as a decision-making process that is led by problemistic search mechanisms, which suggests that performance shortfall relative to the expected performance (i.e. negative performance feedback) triggers the firms to engage in search for solutions to resolve the problem (Gaba & Bhattacharya, 2012). Accordingly, research has found that actual performance relative to expected performance influences the decisions to establish or terminate CVC programs (Gaba & Bhattacharya, 2012). While this research provides insights on whether and when CVC investing is made, it lacks the insight on how resources are allocated between exploitation and exploration. To shed light on how resources are allocated, in addition to the problemistic search mechanism, it may be useful to take managerial risk preferences into account. As the returns to exploitation are typically realized sooner and are less variable than those of exploration (March, 1991), exploitation is less risky than exploration, which will be preferred

[2] Corporate venturing refers to "the set of organizational systems, processes and practices that focus on creating businesses in existing or new fields, markets or industries - using internal and external means (Narayanan et al., 2009)." Depending on whether the locus of the venturing activities takes place at the inside or outside of the organization, corporate venturing is classified as either internal or external corporate venturing. While internal corporate venturing refers to venturing activities that are kept inside the organization, external corporate venturing refers to venturing activities that result in creating semi-autonomous or autonomous entities residing outside the organization (Keil, 2000). Governance modes for external corporate venturing encompass corporate venture capital investing, alliances, joint ventures, and acquisitions (Schildt et al., 2005).

by risk-averse managers. Moreover, recent research on decision risk suggests that considering managerial risk preferences in CVC investing decisions is important because the mechanisms of when CVC investing takes place and the extent to which such investing will be risky have often been confounded (Kacperczyk et al., 2015). Without considering the effects of both problemistic search and managerial risk preferences, it is difficult to understand how organizations allocate CVC resources to exploitation and exploration.

Furthermore, CVC research has mostly focused on how the various stakeholders of the CVC program, such as the established firm's senior executives, business units, the start-up firms, and the venture capitals (VCs), take part in the CVC decision-making process and share the jointly created value (e.g. Basu, Phelps, & Kotha, 2016; Keil et al., 2008). On the other hand, CVC scholars have paid much less attention to how influential constituencies, such as shareholders or board of directors, might affect CVC investing decisions (Anokhin et al. (2016a) and Sahaym et al. (2016) are recent exceptions). Insights from the corporate governance literature suggest that the interests of a firm's top managers in making strategic decisions may conflict with those of the firm's shareholders and that the purpose of corporate governance is to influence a firm's strategic decision-making by aligning it with the shareholders' interests (Monks & Minow, 2008). Consistent with this perspective, research shows that shareholders and board of directors often seek to influence a variety of corporate strategy decisions (Kochhar & David, 1996; Hoskisson et al., 2002; Kim et al., 2008; Tuggle et al., 2010), particularly when firms perform below expectations (McCahery, Sautner & Starks, 2016). While these findings suggest that shareholders and board of directors may influence how firms make exploitation and exploration decisions in CVC investing, prior research has not explored this proposition. By integrating insights from corporate governance and decision risk research to the problemistic search mechanism, we can improve our understanding of how organizations allocate CVC resources to exploitation and exploration.

Secondly, CVC research provides little insight into the outcomes of taking exploitation and exploration initiatives in CVC investing. In particular, it has been well evidenced in the ambidexterity literature that striking the right balance between exploitation and exploration is critical for firm performance and survival (March, 1991; Levinthal & March, 1993; Junni et al., 2013). Prior research found that when CV units conduct high levels of both exploitation and exploration, it results in longer survival (Hill & Birkinshaw, 2014). However, this research largely built upon the static assumption that the tension arising from executing both exploitation and exploration is persistent and time invariant (Raisch & Birkinshaw, 2008). In contrast, evidence from the organizational change literature suggests that firms temporally separate, and oscillate between exploitation and exploration under changing resource constraints (e.g. Brown & Eisenhardt, 1997). It is important to consider the effect of oscillation because exploitation and exploration are complementary over time with regards to increasing firm performance as exploitation becomes an input to exploration and vice versa over time (Boumgarden et al., 2012; Gilsing and Nooteboom, 2006). Without a sufficient understanding of the dynamic nature of exploitation and exploration in CVC investing, it is difficult to understand how organizations can achieve a balance of the two activities over time and increase their performance.

Moreover, CVC research has not examined the potential costs of oscillating between exploitation and exploration and the potential limits to temporal spillovers resulting from such oscillation. In particular, little attention has been paid to the 'continuous' nature of oscillating between exploitation and exploration, which is important to consider because it impacts the benefits and costs of oscillating. On the one hand, insights from time-paced evolution and complexity literature show that a firm's ability to continuously change leads to successful firm performance through better coordination, focused attention, and enhanced alignment with the environmental changes (e.g. Miller & Chen, 1994; Brown & Eisenhardt, 1997; Klarner & Raisch, 2013). On the other hand, insights from the organizational inertia literature indicate that transitioning between exploitation and exploration results in disruption of routines and structures and thus, increases the cost of transitioning and the likelihood of failure (Hannan & Freeman, 1984; Barnett & Freeman, 2001; Swift, 2015). Accordingly, while continuous change can either create (Brown & Eisenhardt, 1997) or destruct temporal spillover (Swift, 2015), CVC research has not yet considered this effect. Without a sufficient understanding of the effect of continuous change, it is difficult to understand how oscillation creates or destructs temporal spillover and thus, firm value. By integrating insights from ambidexterity and continuous change research, we can improve our understanding on the outcomes of oscillating between exploitation and exploration in CVC investing over time.

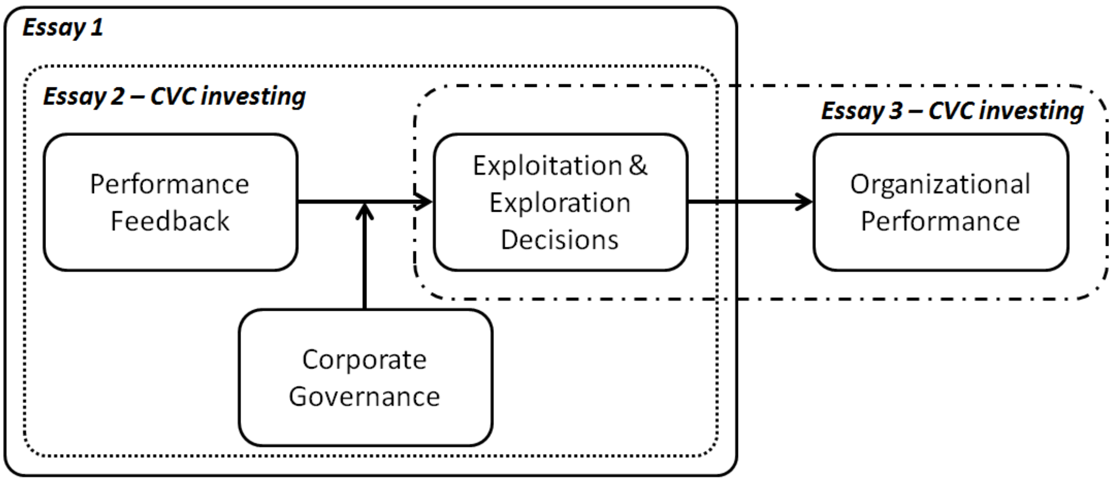


Figure 1. Dissertation Structure

Figure 1 shows the overall model of this dissertation. Each essay in this dissertation discusses each part of the model. In the first essay, by breaking away from the empirical context of CVC investing and taking a broader perspective, I theorize on how poor firm performance (i.e. negative performance feedback) influences the managerial decision-making with regards to allocating resources to exploitation and exploration and how such decisions are affected by shareholders and board of directors. In the second essay, I test the propositions developed in the first essay on how the managerial decision-making with regards to allocating resources to exploitation and exploration is influenced by shareholders in the CVC context. In the third essay, I examine how and under what conditions oscillating between exploitation and exploration over time impacts a firm's performance also, in the CVC context. Next, I briefly summarize the three essays of this dissertation.

2.1. Summary of Essay 1

Performance Feedback, Corporate Governance, and the Direction of Organizational Change

As discussed previously, CVC research provides little insight into how exploitative and explorative CVC investing decisions are made, in particular, under the influence of shareholders and board of directors. In the first essay, by breaking away from the CVC context and aiming to uncover the underlying mechanism, I theorize on how poor firm performance (i.e. negative performance feedback) influences the managerial decision-making with regards to allocating resources to exploitation and exploration and how such decisions are affected by shareholders and board of directors. I build on the behavioral theory of the firm (BTF) because it is useful to explain whether and when organizational change will take place as a result of the managerial decision-making process. This essay is motivated by integrating the BTF with the insights from corporate governance and decision risk research.

BTF has been extremely useful in explaining how organizational change takes place (Gavetti et al., 2012). BTF predicts that boundedly rational decision makers simplify organizational performance evaluation by setting discrete targets or “aspiration levels” and, when realized performance falls below such levels, engage in problemistic search to identify satisfactory solutions that are expected to reverse the performance shortfall (Cyert & March, 1963). This insight that poor performance predicts organizational changes has been evidenced from a variety of strategic actions (Shinkle, 2012), including acquisitions, divestitures, market entry, competitive positioning, and R&D investments (Iyer & Miller, 2008; Shimizu, 2007; Greve, 2003). Despite the enormous influence the BTF has had on organizational theory and strategy research, substantial opportunity exists to expand our understanding of how performance relative to aspiration levels leads to organizational change.

First, BTF research provides little insight into how influential external constituencies, such as shareholders and board of directors, might affect managerial decision-making during times of poor performance (Gavetti et al., 2012). Instead, this research typically assumes an organization is composed of a dominant coalition of managers that reigns over the strategic decision-making process, reflecting its own interests and preferences (Desai, 2016). This assumption stands in stark contrast with a fundamental insight from corporate governance research. The governance literature recognizes that the interests of a firm's top managers in making strategic decisions may conflict with those of the firm's shareholders and that the purpose of corporate governance is to influence a firm's strategic decision-making by aligning it with the shareholders' interests (Hoskisson et al., 2002). Consistent with this perspective, research shows that shareholders and board of directors often seek to influence a variety of corporate strategy decisions (e.g. Hoskisson et al., 2002), particularly when firms perform below expectations (Zhang & Gimeno, 2016).

On the one hand, corporate governance research often distinguished between *dedicated shareholders* who have relatively long-term investment horizons, take large positions in a few firms, and are thus concerned about their ability to liquidate their positions, and *transient shareholders* who have short-term horizons, take small positions in a large number of firms, and are thus less concerned about liquidity (Porter, 1992; Bushee, 1998; Hoskisson et al., 2002; Zhang & Gimeno, 2016). Studies have shown that poor performance triggers dedicated shareholders to encourage top management to maintain or increase investments in projects that have long-term payoffs such as R&D and discourage managers from allocating resources to projects with short-term payoffs, whereas transient shareholders display opposite preferences (Bushee, 1998; Zhang & Gimeno, 2016). While these findings suggest shareholders may influence how firms respond to negative performance feedback, prior research has not explored this proposition.

On the other hand, corporate governance research has discussed the two main roles of the board as monitoring and advising (e.g. Faleye et al., 2011; Dalton et al., 1998). As the fiduciary of the shareholders, the board monitors the managers to prevent them from pursuing perks and instead encourage them to work for the best interests of the shareholders (Johnson, Daily & Ellstrand, 1996; Jensen & Meckling, 1976). Additionally, the board advises the managers by providing expert advice and counsel for the success of the firm (Lorsch & MacIver, 1989; Pfeffer & Salancik, 1978). Studies have shown that when firms are under the influence of inside board members, who typically carry out strong advising roles, the firms are likely to decrease their R&D investments, whereas when they are under the influence of outside board members, who generally take monitoring roles, they are likely to increase their R&D investments (e.g. Faleye et al., 2011; Baysinger et al., 1991). While these findings suggest boards may influence how firms respond to negative performance feedback, prior research has not explored this proposition. By integrating insights from corporate governance research with the BTF we can improve our understanding of how and why organizations change in response to poor performance.

Secondly, BTF research provides little insight into how negative performance feedback influences where firms search for solutions and thus, the direction of organizational change (Greve & Zhang, 2016; Kuusela et al., 2016). Although Cyert and March (1963) proposed that problemistic search is initially myopic – organizations begin searching for solutions in the neighborhood of the problem and will only search more broadly if no satisfactory solutions are found – empirical research has almost entirely focused on whether and when firms make a particular type of change rather than the direction of change (Kuusela et al., 2016 and Greve & Zhang, 2016 are recent exceptions). For example, while research shows negative performance feedback increases R&D intensity (Chen & Miller, 2007), it does not consider where such R&D expenditures are allocated. Firms may allocate R&D resources to ongoing projects in areas of technology in which they have established competence or to new projects in unfamiliar areas (Dosi, 1988). In other words, firms may search for solutions locally (i.e., exploit) or distantly (i.e., explore) (March, 1991; Nelson & Winter, 1982). As the returns to local search efforts (exploitation) are typically realized sooner and are less variable than those of distant search (exploration) (March, 1991), local search is less risky than distant search. In general, in responding to negative performance feedback, firms may choose particular types of solutions to performance problems and then choose where to search within the chosen domains for particular solutions. The BTF lacks a mechanism to predict how problemistic search affects decision-making in the direction of change (Greve & Zhang, 2016). One of the reasons may be because BTF does not consider the influence of risk on organizational change and the related empirical research rarely distinguishes between organizational change and the risk of such change (Kacperczyk et al. (2015). Insights from decision risk research suggest that where firms search for solutions, and thus the direction of organizational change, will depend on the risk preferences of managers implementing the change (Kacperczyk et al., 2015). By focusing on managerial risk preferences, we can improve our understanding of where organizations search for solutions to solve the problem of poor performance.

To address these limitations of the BTF literature, I theorize on how poor organizational performance and managerial risk preferences affect where firms search for solutions within a particular domain of change and how this relationship is influenced by different types of shareholders – dedicated and transient – and different roles of board of directors – monitoring and advising. More specifically, by drawing on BTF, I predict that poor firm performance triggers firms to engage in increased organizational change (P1). By drawing on decision risk research, I predict that this change is directed at exploitation rather than exploration when managers are risk-averse (P2) and it is directed at exploration rather than exploitation when managers are risk-seeking (P3). By drawing on insights from corporate governance and decision risk research and assuming that typical managers are risk-averse, I predict that as the concentration of dedicated ownership increases in a poorly performing firm, the firm alters its search trajectory by exploring more and exploiting less (P4). Also, I predict that as the concentration of transient ownership increases in a poorly performing firm, the firm alters its search trajectory by exploiting more and exploring less (P5). By drawing on insights from corporate governance and organizational control research, I predict that as the level of the board's monitoring intensity increases in a poorly performing firm, the firm alters its search trajectory by exploiting more and exploring less (P6). Furthermore, I expect that as the level of the board's advising intensity increases in a poorly performing firm, the firm alters its search trajectory by exploring more and exploiting less (P7).

This essay contributes to research on the Behavioral Theory of the Firm and corporate governance by showing how the direction of organizational change, as indicated by a firm's resource allocation decisions to exploration and exploitation, in response to negative performance feedback, is influenced by the concentration of dedicated and transient shareholders and by the board's monitoring and advising intensities.

2.2. Summary of Essay 2

Performance Feedback, Shareholder Influence and the Direction of Organizational Change: Evidence from Corporate Venture Capital Investing

In the second essay, I test the four propositions that were developed in the first essay (i.e. Propositions 1, 2, 4, 5). More specifically, I test the propositions on the relationship between poor firm performance and the direction of change and how this relationship is moderated by dedicated and transient shareholders in the context of CVC investing (refer to Appendix E for the list of propositions).

CVC investing is an appropriate setting to test my theory for the following reasons. First, CVC is a means of external search for innovations that can help solve performance problems and is sensitive to organizational performance feedback (Gaba & Bhattacharya, 2012). Secondly, CVC exhibits substantial variation in terms of their exploitative/explorative nature within and across firms (Wadhwa & Basu, 2013). Explorative CVC relationships represent the commitment of financial resources by corporate investors to start-up firms with relatively novel knowledge, exploitative relationships represent investments made in start-up firms with relatively familiar knowledge (Wadhwa & Basu, 2013). Finally, research suggests institutional shareholders influence a firm’s CVC investing decisions (Anohkin et al., 2016). Moreover, my interviews with Investor Relations Managers from eight firms revealed that senior executives carefully consider the views of institutional shareholders regarding their firm's CVC investments.

I build on the BTF and draw on insights from decision risk and corporate governance research to explain how dedicated and transient ownership affects the direction of a firm's CVC investing. As a baseline, I argue that negative performance feedback results in increased CVC activity. I then examine how poor firm performance and managerial risk preferences influence the direction of change in CVC activity. I argue that CVC program managers are typically risk averse because the vast majority are not paid incentive compensation, leading to systematic risk aversion in their investments (Dushnitsky & Shapira, 2010), and therefore prefer exploitation over exploration (March 1991). Consequently, when the need to change is triggered by negative performance feedback, CVC program managers will search locally by investing in start-ups from nearby sectors. Finally, I argue that shareholder composition will moderate this relationship. Specifically, because dedicated shareholders value long-term growth and are more inclined to voice their interests when firm performance misses expectations (Bushee, 1998; Zhang & Gimeno, 2016), I predict that as the concentration of dedicated ownership increases in a poorly performing firm, the firm will alter its search trajectory by exploring more and exploiting less. In contrast, because transient shareholders prefer short-term returns, they are more inclined to voice their interests when firm performance misses expectations and have the credible threat of exiting their positions if performance does not recover quickly (Bushee, 1998; Zhang & Gimeno, 2016). Thus, I hypothesize that as the concentration of transient ownership increases in a poorly performing firm, the firm will increase its investments in exploitative start-ups. I tested my predictions on a sample of 286 companies that made 10,261 CVC investments during 1993-2013 and found support for all but one prediction – I did not find a moderating effect of transient ownership on the direction of firm search.

This essay contributes to both the BTF and CVC literature. While BTF traditionally examined when and how firms will change, this essay moves beyond this focus and explores the direction of such changes (Kuusela et al., 2016). In doing so, I integrate insights from corporate governance research and show how the direction of organizational change in response to negative performance feedback is influenced by the concentration of dedicated ownership. I contribute to research on CVC by showing that poor firm performance, in addition to influencing the adoption and termination of CVC programs (Gaba & Bhattacharya, 2012), also motivates the firm to increase its CVC investment activity. This study is also one of the first to explore the influence of corporate governance on CVC investing (see also Anokhin et al. (2016a) and Sahaym et al. (2016)) and the first to show that corporate ownership structure influences where firms invest CVC.

2.3. Summary of Essay 3

Performance Implication of Oscillating between Exploitation and Exploration: Evidence from Corporate Venture Capital Investing

As discussed previously, CVC research provides little insight into the outcomes of taking exploitation and exploration initiatives in CVC investing. In the third essay, by drawing on ambidexterity and continuous change research, I examine how and under what conditions oscillating between exploitation and exploration over time impacts a firm's performance.

Striking the right balance between exploitation and exploration is critical for firm performance and survival (March, 1991; Levinthal & March, 1993). While organizations exploit their existing knowledge to enhance efficiency and maximize current cash flows, they explore new knowledge as a means to adapt to the changing competitive conditions and create future cash flows (March, 1991). While past research has shown that there is complementarity of pursuing both exploitation and exploration in generating greater returns (Junni et al., 2013), it also recognized the difficulty of designing an organization that delivers both exploitation and exploration because the structure to achieve exploitation is completely different from that to achieve exploration (Tushman & O'Reilly, 1996). Organizations that successfully manage this tension of executing both exploitation and exploration have been said to be ambidextrous (Tushman & O'Reilly, 1996). Despite a substantial body of research, opportunity exists to expand our understanding of how and under what conditions ambidexterity can be achieved.

First, the ambidexterity literature advises firms to establish dual structures (e.g. Duncan, 1976) or temporally separate exploitation and exploration to achieve ambidexterity (e.g. Nickerson & Zenger, 2002). Yet this literature provides little insight into how temporal separation impacts firm performance (Raisch & Birkinshaw, 2008). The ambidexterity literature largely builds upon the static assumption that the tension arising from executing both exploitation and exploration is persistent and time invariant (Raisch & Birkinshaw, 2008). However, evidence from the organizational change literature suggests that firms temporally separate, and oscillate between exploitation and exploration under changing resource constraints (e.g. Brown & Eisenhardt, 1997). It is important to consider the effect of oscillation because exploitation and exploration are complementary over time with regards to increasing firm performance as today's exploitation becomes the input of tomorrow's exploration and vice versa (Gilsing & Nooteboom, 2006; Boumgarden et al., 2012). Although the oscillation has been discussed by case studies or anecdotal evidence (e.g. Brown & Eisenhardt, 1997; Boumgarden et al., 2012), evidence based on extensive longitudinal data is not yet well established (recent examinations are Luger (2014), Goossen et al. (2012), Venkatraman et al. (2007)). Without a sufficient understanding of the dynamic nature of exploration and exploitation, it is difficult to understand how organizations can achieve a balance of the two activities over time and increase their performance.

Secondly, the ambidexterity literature provides little insight into the costs of oscillating between exploitation and exploration and the potential limits to temporal spillovers resulting from such oscillation. While there is a growing literature that examines the benefits (e.g. Luger, 2014; Goossen et al., 2012; Venkatraman et al., 2007), as of yet, we do not know under what conditions the positive or negative temporal spillover will arise. In particular, little attention has been paid to the 'continuous' nature of oscillating between exploitation and exploration, which is important to consider because it provides insights on the benefits and costs of oscillating. On the one hand, insights from time-paced evolution and complexity literature show that a firm's ability to continuously change leads to successful firm performance through better coordination, focused attention, and enhanced alignment with the environmental changes (e.g. Brown & Eisenhardt, 1997; Weick & Quinn, 1999). On the other hand, insights from the organizational inertia literature indicate that oscillation results in disruption of routines and structures, and thus, increases the cost of transitioning and the likelihood of failure (Hannan & Freeman, 1984; Barnett & Freeman, 2001; Swift, 2015). Accordingly, while continuous change can either create (Brown & Eisenhardt, 1997) or destruct temporal spillover (Swift, 2015), the ambidexterity literature has not yet considered the effect of continuous change. To take into account the impact of continuous change, I focus on how long the change takes place (i.e. duration) and how large it is (i.e. amplitude). Without a sufficient understanding of the effects of continuous change, it is difficult to understand how oscillation creates or destructs temporal spillover and eventually, firm value.

To address these limitations of the literature, I investigate how and under what conditions oscillating between exploitation and exploration over time impacts a firm's performance. I examine this research question in the context of CVC investing. CVC investing is an appropriate setting to investigate the research question because it has substantial impact in increasing a firm's market valuation and innovation performance (Dushnitsky & Lenox, 2006; Wadhwa et al., 2016). Moreover, CVC investing exhibits substantial variation with regards to exploitation and exploration initiatives within and across firms (Wadhwa & Basu, 2013). Also, past research noted that CV units striking the right balance between exploitation and exploration achieve greater performance and survival (Hill & Birkinshaw, 2014). These aspects of CVC investing allow us to observe substantial variation in a firm’s execution of ambidexterity over time and its impact on performance.

To explain how and under what conditions oscillating between exploitation and exploration over time impact firm performance, I draw upon the ambidexterity literature (March, 1991) and continuous change research (Brown & Eisenhardt, 1997). As a baseline hypothesis, I argue that synchronous pursuit of both exploitation and exploration (in the same period) leads to greater performance. Also, I argue that oscillating between exploitation and exploration over time increases a firm's performance by creating positive temporal spillovers. Furthermore, by building on continuous change (e.g., Brown & Eisenhardt, 1997) and organizational inertia research (e.g., Hannan & Freeman, 1984; Barnett & Freeman, 2001), I argue that the duration of change has an inverted-U shaped relationship with firm performance. Also, I argue that amplitude of change has a negative relationship with firm performance. By analyzing a sample of 286 companies that made 10,261 CVC investments during 1993-2013, I found support for all but one prediction – I did not find the negative effect of change amplitude.

This essay makes three contributions to the ambidexterity and CVC literature. First, while the ambidexterity literature has examined the idea that striking the right balance between exploitation and exploration in the same period improves firm performance (Raisch & Birkinshaw, 2008), I focus on the idea that striking the right balance between the two activities over time is essential. By removing potential selection biases arising from resource allocation decisions, I show that oscillating between exploitation and exploration increases a firm's Tobin's Q. Secondly, while the ambidexterity literature has examined how transitioning from one activity to another results in organizational change (Romanelli & Tushman, 1994), by building on continuous change and organizational inertia research (Brown & Eisenhardt, 1997; Barnett & Freeman, 2001), I examine how the continuous change influences the benefits and risks of transitioning. Instead of focusing on the incremental interaction between exploitation and exploration over time but by examining the continuous change as the unit of analysis, I find that change duration has an inverted-U shaped relationship with a firm's Tobin's Q. Thirdly, while the CV literature has examined how simultaneous ambidexterity increases the legitimacy and thus, the survival of the CV program (Hill & Birkinshaw, 2014), I show that both simultaneous and sequential ambidexterity in CVC investing increases a firm's Tobin's Q.

2.4. Dissertation Overview

Table 1 shows the overview of this dissertation, including the theoretical background, method, and main findings of each essay. The remainder of the dissertation is organized as follows. In Chapter 3, I review the literature on CVC, including the motivation, antecedent, management, and outcome of CVC investing. From Chapters 4 to 6 corresponds to the three essays that I briefly discussed in this chapter. Lastly, in Chapter 7, I conclude the dissertation by discussing the main findings, contributions, limitations, and avenues for future research.

Table 1. Dissertation Overview

		Essay 1 (Chapter 4)	Essay 2 (Chapter 5)	Essay 3 (Chapter 6)
Title		• Performance Feedback, Corporate Governance and the Direction of Organizational Change	• Performance Feedback, Shareholder Influence and the Direction of Organizational Change: Evidence from Corporate Venture Capital Investing	• Performance Implication of Oscillating between Exploitation and Exploration: Evidence from Corporate Venture Capital Investing
Research Question		• How does negative performance feedback affect the direction of organizational change and how is this relationship moderated by the board of directors and shareholders?	• How does negative performance feedback affect the direction of CVC investing (i.e. exploration and exploitation) and how is this relationship moderated by dedicated and transient ownership?	• How and under what conditions does oscillating between exploitation and exploration over time in CVC investing influence firm performance?
Theoretical Background		• Behavioral Theory of the Firm • Corporate Governance Research • Decision Risk Research • Organizational Control Theory	• Behavioral Theory of the Firm • Corporate Governance Research	• Ambidexterity Theory • Organizational Change Research
Method	**Level of Analysis**	• N.A. (refer to Appendix E for the list of Propositions)	• Firm-level	• Firm-level
	Sample		• 286 firms' 10,261 CVC investing during 1993-2013 (see Appendix B for sample firms)	
	Data Source		• VentureXpert, 13F, I/B/E/S, Compustat, Lexis Nexis Corporate Affiliations, SEC 10-K, Factiva, Bushee Classification, Dow Jones Classification, S&P Classification • Interviews with CVC Managers, Investor Relations Managers, Institutional Shareholders	
	Estimation		• Generalized Estimating Equations (GEE) Fractional Probit • Panel Linear Regression	• Two-stage least squares (GEE, Panel Linear)
Main Findings			• Poor firm performance motivates firms to increase their CVC investment intensity, and this change is directed at exploitative investments. • As the concentration of dedicated ownership increases in a poorly performing firm, the firm alters its search trajectory by exploring more and exploiting less.	• Simultaneous and sequential pursuit of ambidexterity in CVC investing leads to positive firm performance. • Change duration of exploitation and exploration in CVC investing has an inverted-U shape relationship with firm performance.

CHAPTER 3. CORPORATE VENTURE CAPITAL: A REVIEW AND FUTURE RESEARCH AGENDA

ABSTRACT

In this chapter, I review the literature on corporate venture capital (CVC) under four broad themes. Based on 106 articles during 1981-2017, I review the literature on (1) why firms engage in CVC, (2) how and under what conditions firms undertake CVC, (3) how CVC is managed inside and outside the firm, and (4) the financial and strategic outcomes of CVC. Furthermore, I suggest fruitful avenues for future research and among these avenues, I point out the topics I cover in the three essays of this dissertation.

Keywords: Corporate Venture Capital, Motivation, Antecedent, Management, Outcome

3.1. INTRODUCTION

Global investments in corporate venture capital (CVC) - direct minority equity investments made by established firms to privately held entrepreneurial start-up firms - have reached unprecedented levels in the recent years, surging to 65 billion US dollars (KPMG, 2017) invested by 1,501 CVC units in 2016 (Global Corporate Venturing, 2016).[3] Adoption of CVC programs has been prevalent among U.S. companies to such an extent that half of the Fortune 100 companies and 20% of the Fortune 500 companies are managing their CVC programs (Global Corporate Venturing, 2015). Along with its practical importance, in providing both financial and strategic benefits, CVC has increasingly become a focus of academic interest, generating a large number of studies on its motivations, antecedents, management, and outcomes. To date, the number of articles from the Social Sciences Citation Index (SSCI) database that discusses CVC as the main topic is in excess of 90 articles since 1981. Figure 2 shows the number of SSCI articles on CVC published each year since 1981. It indicates that the academic interest has been growing since 2005 with a significant surge in 2016.

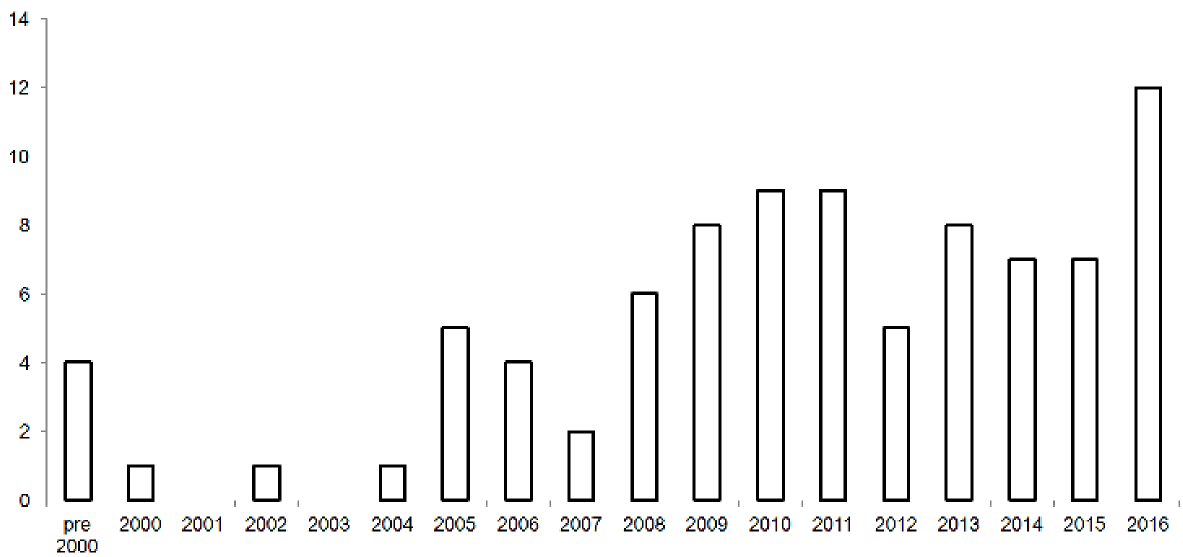


Figure 2. Number of Publications (by year)

[3] Count based on any active CVC unit that participated in at least one CVC deal in a given year

The academic interest arises from the evidence that CVC provides not only financial but also strategic benefits to the established firms (hereafter corporate investor) and also, to the start-up firms (Basu et al., 2016). Through CVC investing, corporate investors obtain strategic benefits such as filling in technology gaps (Kann, 2000), scanning the market environment (Dushnitsky & Lenox, 2006), generating demands that will support their core products (Riyanto & Schwienbache, 2006), building options for future licensing, alliance, and acquisition opportunities (Ceccagnoli, Higgins, & Kang, 2015; Wadhwa & Phelps, 2011; Benson & Ziedonis, 2010), building options for new market and business opportunities (Kann, 2000), networking with the startup and venture capital (VC) community (Keil, Maula, & Wilson, 2010; Hill et al., 2009; Dushnitsky & Shapira, 2010), and leveraging underutilized resources (Campbell et al., 2003). From the startup's perspective, by CVC-backing, it obtains strategic benefits such as gaining access to complementary resources (Katila et al., 2008) and endorsement effects (Maula, 2001).

CVC investing has been understood as one of the strategic vehicles for external corporate venturing. Corporate venturing refers to “the set of organizational systems, processes, and practices that focus on creating businesses in existing or new fields, markets or industries - using internal and external means.” (Narayanan et al., 2009). Corporate venturing is classified as either internal or external corporate venturing depending on whether the locus of the venturing activities is inside or outside the organization. While internal corporate venturing refers to venturing activities that are kept inside the organization, external corporate venturing refers to venturing activities that result in creating semi-autonomous or autonomous entities residing outside the organization (Keil, 2000). Thus, external corporate venturing refers to established corporations creating new businesses by leveraging external interorganizational relationships. Common governance modes for external corporate venturing include CVCs, strategic alliances, joint ventures, and acquisitions of entrepreneurial startups (Schildt et al., 2005). Research has found that CVC is an effective tool to achieve corporate growth and innovation (Maula, 2007; Basu, Phelps, & Kotha, 2011). Also, research has found that CVCs complement alliances and acquisitions with regards to enhancing firm innovation (Van de Vrande et al., 2011a). Accordingly, CVC investing can be understood as one of the strategic vehicles for external corporate venturing.

Also, CVC has often been understood in contrast with the independent venture capitals (IVCs). IVCs invest in private, entrepreneurial startups to achieve high financial returns. IVC investing undergoes a process of opportunity identification, due diligence, investing, monitoring, value-adding to their startups, and exiting from their investments by IPOs or acquisitions (Dushnitsky & Shapira, 2010). IVCs are different from the CVCs with regards to their governance structures, incentives, and the benefits they add to the startups (Dushnitsky & Shapira, 2010; Maula, 2001). First, IVCs are limited partnerships that pool and manage capitals provided by entities such as pension funds or wealthy individuals (Dushnitsky & Shapira, 2010). Secondly, IVCs provide high-powered incentives to the fund managers in the form of carried interests, which are 20 percent of the generated profit (Dushnitsky & Shapira, 2010). Thirdly, IVCs add value to their portfolio startups by providing specialized knowledge, managerial advice, and external networks (Hellmann & Puri, 2000).

On the other hand, established corporations transplanted the IVC model to the corporate context to obtain various strategic advantages (Gaba & Meyer, 2008). Accordingly, CVCs are different from the IVCs with regards to their governance structures, incentives, and the benefits they add to the startups (Gompers & Lerner, 2000). First, CVCs can be housed under the parent firm in the form of an internal unit that makes direct investments to startups, separated as a wholly-owned subsidiary, or set up as a dedicated fund or a pooled fund where the IVCs co-manage (Dushnitsky, 2006; Maula, 2007). The parent firms are the sole capital providers to the CVC programs. Secondly, the majority of the CVC managers are paid with fixed salaries, whereas only a small proportion of CVC programs adopt high-powered incentives with carried interests or annual bonuses based on financial and strategic performance (Dushnitsky & Shapira, 2010). Thirdly, similar to IVCs, CVCs provide value-added services such as knowledge, advice, and networks to the startups. In contrast to IVCs, CVCs provide the startups with access to complementary resources (e.g. R&D, marketing channels, manufacturing facilities) and endorsement effects in the market (Dushnitsky & Shapira, 2010).

In this chapter, I aim to contribute to the CVC review literature[4] in the following two ways. First, while the extant reviews focused mostly on the corporate investor's perspective (Maula, 2007; Dushnitsky, 2006) or the start-up firm's perspective (Basu et al., 2016), I expand the scope of the review to include the dyad between the corporate investor and the startup, stakeholders of CVC decision-making, and how CVC is organized and practiced. Recently, important streams of literature have developed with respect to the stakeholders of CVC that participate in the CVC decisions and jointly share the outcomes (e.g. Basu, Phelps, & Kotha, 2016), how CVC is organized within the firm (e.g. Souitaris, Zerbinati, & Liu, 2012; Gaba & Dokko, 2016), and how investments are carried out (e.g. Souitaris & Zerbinati, 2014). Thus, in this chapter, I take a broader approach than the previous reviews and encompass the perspectives of the corporate investors, startups, dyads between the corporate investor and the startup, interaction of corporate investor with its stakeholders, and organizations and

[4] For recent reviews on the CVC literature, refer to Basu et al. (2016), Maula (2007), and Dushnitsky (2006). Also, CVC literature has been discussed as part of the broader literature such as the entrepreneurial equity financing literature (Drover et al., 2017), venture capital (VC) literature (Da Rin et al., 2011), or corporate venturing (CV) literature (Narayanan et al., 2009).

practices of CVC.

Secondly, while the CVC research largely progressed from various disciplines and has thus been segmented, in this chapter, I encompass these disciplines and provide an integrated perspective. On the one hand, the Economics and Finance literature focused on examining the performance outcomes of CVC from the investor's and the startup's perspectives (e.g. Gompers & Lerner, 2000), how CVC and IVC are different (e.g. Chemmanur et al., 2011), and the antecedents of CVC (e.g. Fulghieri & Sevilir, 2009). On the other hand, the Management, Entrepreneurship and Innovation literature focused on examining what motivates CVC (Dushnitsky & Lenox, 2006), how CVC is structured and incentivized within the firm (e.g. Dushnitsky & Shapira, 2010), and the financial and strategic outcomes of CVC (e.g. Maula et al., 2009). While the CVC literature has been segmented across such various disciplines, in this chapter, I encompass the literature from Management, Entrepreneurship and Innovation, Economics, Finance, and Information Systems. Figure 3 shows the number of publications by each discipline (1981-2017) that are covered in this review.

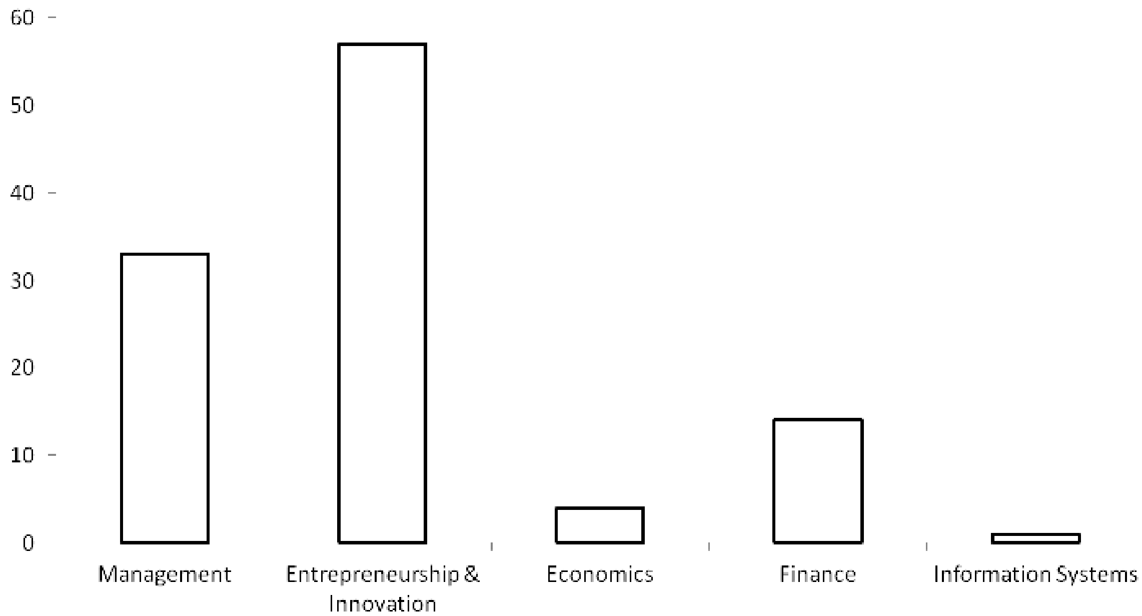


Figure 3. Number of Publications (by discipline)

To carry out the literature review on CVC, I searched for the terms such as "Corporate Venture Capital", "Corporate Entrepreneurship", "Corporate Investor", and "External Corporate Venturing" from the Web of Science Social Sciences Citation Index (SSCI) database to pick up the relevant articles that were published between 1981-2017. This search resulted in 90 SSCI articles. In addition to these articles, I included important working papers, books, and dissertations in the corpus, which resulted in a total of 106 articles that I cover in this review. I then coded the sample, dependent variable, independent variables, main findings, and theoretical background of each article (see Appendix F for detail). Based on the coded articles, I categorized them under four broad themes: (1) motivations, why firms engage in CVC (2) antecedents, how and under what conditions firms undertake CVC; (3) management, how CVC is managed inside and outside the firm; (4) outcomes, the financial and strategic outcomes of CVC (summarized in Figure 4). Next, I present the full review of this literature, using this framework to discuss the current state of knowledge regarding CVC. Building on this review, I then conclude this chapter by highlighting some of the limitations of the current CVC literature and outlining several directions for future research.

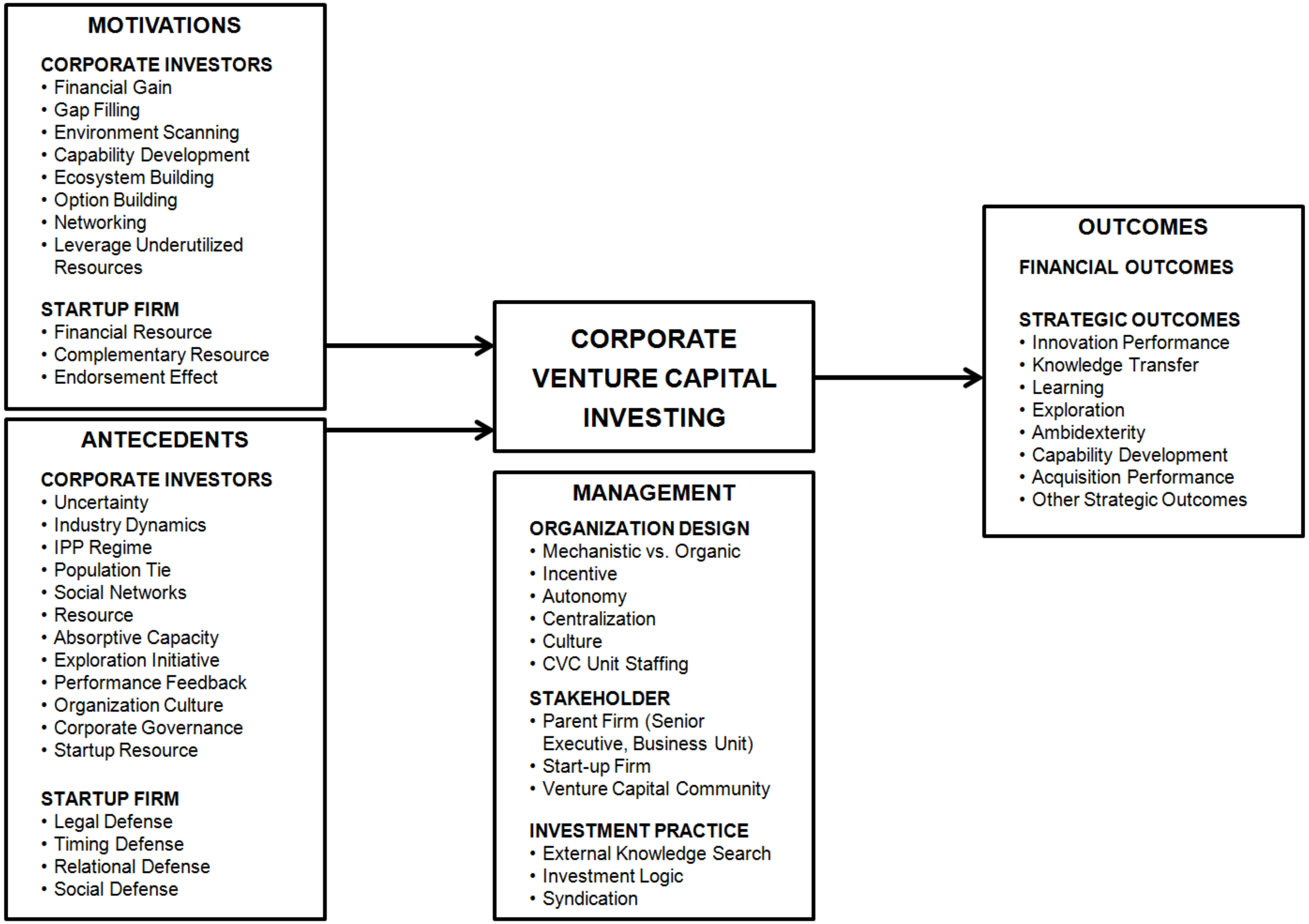


Figure 4. Corporate Venture Capital Literature Overview

3.2. MOTIVATIONS OF CVC

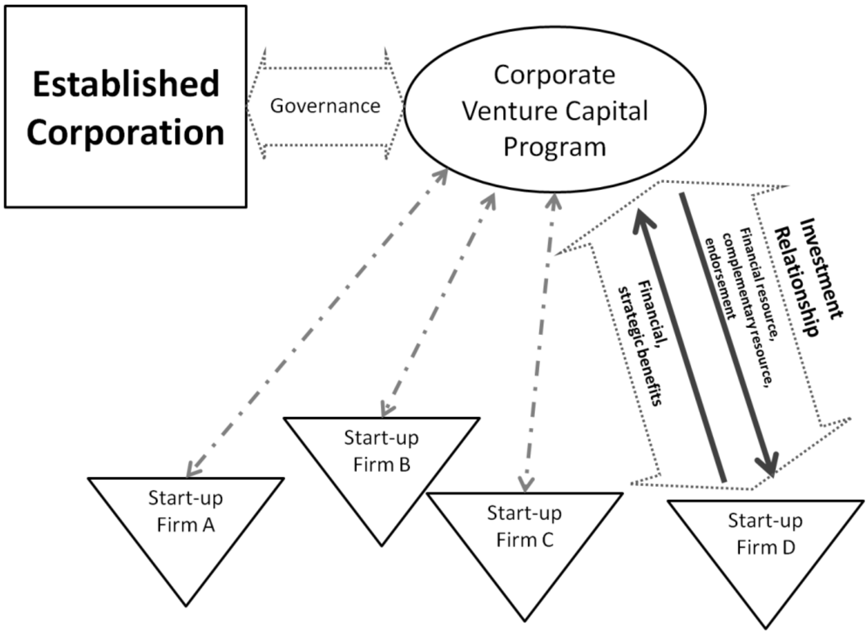


Figure 5. Corporate Venture Capital Relationship (adopted from Dushnitsky (2006))

Corporate investors make minority equity investments in privately held entrepreneurial startups via CVC programs. As shown in Figure 5, corporate investors and start-up firms establish investment relationships to exchange necessary resources. Through such CVC relationships, corporate investors provide financial and complementary resources and endorsement to the start-up firms, whereas the start-up firms provide financial and strategic benefits to the corporate investors. In the following, I elaborate on the motivations of setting up a CVC relationship from the corporate investors' and start-up firms' perspectives.

Corporate Investor's Motivation

Scholars examined why corporate investors engage in CVC investing. The literature provides evidence that corporate investors engage in CVC investing to obtain financial returns or strategic advantages (Maula, 2001). Survey results show that corporate investors' pursuit of financial returns and strategic value substantially vary across firms (MacMillan et al., 2008). For instance, based on surveys of 48 corporate investors, MacMillan and colleagues (2008) found that 50% invests primarily for strategic value with financial return as a requirement, 20% invests primarily for financial return with strategic value as a requirement, 15% invests only for strategic value, and 15% invests only for financial return.

On the one hand, corporate investors aim for financial returns that are greater than the corporate hurdle rates to ensure survival (Allen & Hevert, 2007). On the other hand, they invest in startups to obtain strategic value such as filling the gaps in their technology portfolios (Kann, 2000), scanning the environment to obtain market intelligence (Dushnitsky & Lenox, 2005a), learning to select and value lucrative investment and acquisition targets (Yang et al., 2009; Benson & Ziedonis, 2009), building ecosystems of complementary products and technologies (Basu et al., 2011), building options for future licensing, alliance, acquisition opportunities (Ceccagnoli et al., 2015; Wadhwa & Phelps, 2011; Benson & Ziedonis, 2010), building options to enter new markets and businesses (Kann, 2000), networking with startup and venture capital (VC) communities (Keil, Maula, & Wilson, 2010; Hill et al., 2009; Dushnitsky & Shapira, 2010), and leveraging underutilized technologies, platforms, and complementary resources (Maula et al., 2006; Keil, 2000). I elaborate on the corporate investor's strategic motivations for CVC investing in detail as follows.

- **Gap Filling**

Corporate investors seek to invest in startups with entrepreneurial technologies to increase their R&D capabilities and to fill in the gaps of their technology portfolios (Kann, 2000). This motivation relates to sourcing in the startup's technologies or ideas to support the corporate investor's current business units or to create new business units (Holman et al., 2014). Research showed that corporate investor's internal R&D and CVC investing activities are complements because combining internal knowledge with the startup's innovation capabilities result in greater innovation performance (Dushnitsky & Lenox, 2005b).

According to the gap filling purpose, corporate investors choose to invest in startups with greater innovation capabilities compared to independent VCs (IVCs) (Park & Steensma, 2013). However, this stream of literature has not yet examined how CVC investing complements the corporate investor's technology portfolio by sourcing knowledge from the startups.

- **Environment Scanning**

Survey results on CVC programs indicate that one of the major reasons why corporate investors engage in CVC is "to gain exposure to new technologies and markets (Siegel et al., 1988)", "to secure market intelligence (Global Corporate Venturing, 2015)", "to map emerging innovations and technical developments (Ernst & Young, 2008)", and "to gain windows on new market opportunities (Ernst & Young, 2008)." Through CVC investing, corporate investors can gain windows on the startups' new technologies and practices (Dushnitsky & Lenox, 2006). Exposure to such novel and pioneering technologies helps the corporate investors to identify new business opportunities (Dushnitsky, 2006) and be aware of future technological discontinuities (Maula et al., 2013). For instance, Maula and colleagues (2013) found that corporate investors' syndication ties with IVCs, in particular, those with high-status, enable them to attend to technological discontinuities earlier. Furthermore, gaining windows on new technologies via CVC leads the corporate investors to achieve greater innovation (Dushnitsky & Lenox, 2005a).

- **Capability Development**

Through CVC investing, corporate investors can develop capabilities to select and value potential portfolio startups (Yang, Narayanan, & Zahra, 2009). While selection capabilities are based on whether corporate investors can select target startups that will generate financial and strategic returns, valuation capabilities are relevant to whether corporate investors can take a fair proportion of the startup's equity. Yang, Narayanan, and Zahra (2009) found that intense, diverse, and syndicated CVC investing experience leads the corporate investors to select portfolio startups with greater strategic potential.

Also, the literature found that the corporate investors can use the information gained through CVC investing to select lucrative acquisition targets (Benson & Ziedonis, 2009). Through CVC investing, corporate investors gain capabilities that enable them to identify and evaluate valuable, unique, and synergistic target firms, for acquisition (Benson & Ziedonis, 2009). Benson and Ziedonis (2009) found that greater CVC investment intensity leads to corporate investors' increased performance of acquiring technology startups at a diminishing rate.

- **Ecosystem Building**

A recent survey of corporate investors showed that the top reason for adopting CVC is to "form an ecosystem" (Global Corporate Venturing, 2015). Corporate investors engage in CVC investing to generate demands for their core products and technologies (Riyanto & Schwienbache, 2006). Through formal modeling, Riyanto and Schwienbarch (2006) elucidated that CVC investing allows the corporate investor to influence the degree of complementarity between the products of the corporate investor and that of the startups. Such complementarity allows the corporate investor to steal demand from its competitors that have substitute products. Furthermore, corporate investors can promote standards and shape the market by investing in startups that develop and launch complementary products, technologies, and services (Maula, 2007; Kann, 2000). Kann (2000) argued that firms operating in industries that are characterized by early-stage technologies, emerging standards, and saturated demands are likley to engage in CVC investing to build ecosystems. For example, Intel Capital, the CVC program of Intel Corporation, pursues the objective of ecosystem building by investing in startups that will grow and become future customers of their semiconductors (Kann, 2000). While there are many pieces of anecdotal evidence, empirical literature has not yet examined how CVC investing can help build ecosystems.

- **Option Building**

CVC investing can be used as (1) options to ally, acquire, and license or (2) options to enter new markets and businesses (Maula, 2001).

(1) Building Options to Ally, Acquire, License

A group of scholars evidenced that CVC investing can be used as stepping stones for future licensing, alliance, and acquisition opportunities (Ceccagnoli, Higgins, & Kang, 2015; Wadhwa & Phelps, 2011; Van de Vrande & Vanhaverbeke, 2013; Benson & Ziedonis, 2010; Maula & Murray, 2000). According to the real options perspective, by making CVC investments, corporate investors have the right but not the obligation to engage in subsequent licensing, alliance, or acquisition with their portfolio startups. Making a CVC investment can be analogically understood as *creating a call option* because it limits the cost by making minority equity investment in startups but it also, preserves the future opportunity of the corporate investor to ally with or acquire its portfolio startups when uncertainty subsides (Laamanen, 1999; Maula & Murray, 2000). Subsequent to the CVC relationship, corporate investors' setting up relationships with their portfolio startups through licensing, alliance, or acquisition can be understood as *exercising a call option* once the uncertainty subsides and the startup's technology becomes useful to the corporate investor (e.g. Ceccagnoli, Higgins, & Kang, 2015; Wadhwa & Phelps, 2011; Maula & Murray, 2000).

By taking the real options perspectives, a few studies examined how a CVC relationship leads to forming a subsequent alliance (Van de Vrande & Vanhaverbeke, 2013; Wadhwa & Phelps, 2011). For instance, Van de Vrande and Vanhaverbeke (2013) examined how prior CVC relationships and the resolution of various types of uncertainties impact future alliance formation based on a sample of global pharmaceutical firms during 1990-2000. They found that greater levels of prior CVC investments, the technological proximity between the corporate investor and the startup, and the maturity of the startup increase the likelihood of forming subsequent alliances from CVC relationships. Contrary to their prediction, they found that the resolution of partner uncertainty decreases the likelihood of subsequent alliance formation. In a related vein, Wadhwa and Phelps (2011) examined how the resolution of uncertainty influences the likelihood of CVC relationships leading to subsequent alliances between the corporate investors and the startups. More specifically, they examined how the resolution of uncertainty arising from the startups, startups' technologies, and risk of competitors' preemptive exercise increase the likelihood and rate of alliance formation, and how these relationships are moderated by the corporate investor's technological resources. By analyzing the dyads between large telecommunication equipment manufacturers and startups, they found that the resolution of various types of uncertainties increases the likelihood and rate of alliance formation. Furthermore, they found that the corporate investor's technological resources strengthen the positive relationship between the risk of competitors' preemptive exercise and alliance formation.

Another stream of research discussed how CVC investing is followed by acquisition (Benson & Ziedonis, 2009; Benson & Ziedonis, 2010; Maula & Murray, 2000). Many studies suggest that one of the motivations of CVC investing is to find potential acquisition target firms (e.g. Sykes, 1990). However, empirical evidence indicates that the acquisition events arising from CVC investments are rare and their performance is negative. For instance, Benson & Ziedonis (2010) noted that among the 530 startup acquisitions conducted by U.S. firms during 1987-2003, 89 startups were acquired by the original corporate investors, whereas 441 were acquired by third-party firms (Benson & Ziedonis, 2010). Similarly, Maula and Murray (2000) found that among the 206 startup acquisitions during 1990-1999, only 12 acquisitions (i.e. 5.8%) were conducted by the original corporate investor, whereas 194 events (i.e. 94.2%) were made by third-party firms. Furthermore, when the original corporate investor acquires its portfolio startup, Benson and Ziedonis (2010) showed that acquisition performance is negative. On the other hand, scholars found that acquisitions of portfolio startups by third-party firms are common events and such acquisitions result in greater performance, particularly when there is a greater strategic fit between the acquirer and the targets (Benson & Ziedonis, 2009; Ivanov & Xie, 2010; Masulis & Nahata, 2011; Maula & Murray, 2000).

Lastly, research showed that CVC investing can lead to subsequent licensing deals. Based on a sample of pharmaceutical firms during 1985-2007, Ceccagnoli and colleagues (2015) found that the resolution of exogenous uncertainty arising from the startups' technologies increases the likelihood that the CVC relationship is stepped up to technology-licensing or acquisition events.

(2) Building Options to Enter New Markets and Businesses

A stream of literature provides evidence that CVC investing can be used as stepping stones for entering new markets and businesses (Kann, 2000; Maula, 2001). Corporate investors invest in startups that are operating in distant industry sectors to learn about the new market, the necessary skills, and the right timing for entry (Kann, 2000; Maula, 2001). By investing in startups, the corporate investors can learn about the emerging technological platforms and be prepared for the rising dominant design (Keil, 2000). Based on multiple case studies, Keil (2000) showed that CVC investing allows the corporate investors to access complementary resources of the startups and rapidly enter new businesses. In a related vein, Lee and Kang

(2015) conceptualized CVC investing as creating diverse options that can be exercised to enter new markets in the future when uncertainty is resolved. They found that greater level of CVC investing increases the corporate investor's technological diversification at a diminishing rate.

- **Networking with the Startup and VC Community**

A recent survey of corporate investors showed that one of the reasons for CVC investing is "to understand high-growth companies and venture capitalists (Global Corporate Venturing 2015)", "to develop new relationships with startups and IVCs (Ernst & Young, 2008), and "to learn how to do venture capital (Sykes, 1990)." Corporate investors learn from the relationships with the startup and IVC networks. By accessing startup networks, corporate investors can generate new business opportunities. By engaging with VC networks, corporate investors can gain access to deal flow of investment opportunities (Keil, Maula, & Wilson, 2010; Skyes, 1990). Furthermore, through relationships with the IVCs, corporate investors learn about the investment practices of IVCs such as syndicating, staging, specializing in an area of expertise, setting incentive schemes, autonomous governance structures, and carrying out due diligence of startups (Hill et al., 2009; Dushnitsky & Shapira, 2010; Keil, Autio, & George, 2008).

- **Leveraging Underutilized Resources**

Research suggests that corporate investors can exploit their underutilized slack resources and technologies by investing in startups and allowing them to use these resources (Campbell et al., 2003; Chesbrough, 2000). For instance, Campbell and colleagues (2003) suggested that the portfolio startups can access corporate investors' underutilized intellectual property, production capacities, assets, managerial skills, and brands.

The motivations of CVC investing from the corporate investor's perspective are summarized in Table 2. While most of these motivations were evidenced in surveys and anecdotes, we lack empirical evidence based on the analysis of extensive data.

Table 2. Corporate Investor's Motivations for CVC

	Examples
Financial Motivation	• Financial return (Siegel et al., 1988)
Strategic Motivation	• Gap Filling (Kann, 2000) • Environment Scanning (Dushnitsky & Lenox, 2006) • Investing and Acquisition Capability Development (Yang, Narayanan, & Zahra, 2009; Benson & Ziedonis, 2009) • Ecosystem Building (Riyanto & Schwienbache, 2006; Kann, 2000) • Building Options to Ally, Acquire, License (Ceccagnoli, Higgins, & Kang, 2015; Wadhwa & Phelps, 2011; Van de Vrande & Vanhaverbeke, 2013; Benson & Ziedonis, 2010; Maula & Murray, 2000) • Building Options to Enter New Markets/Businesses (Kann, 2000; Maula, 2001; Keil, 2000; Lee & Kang, 2015) • Networking with Startup and VC community (Keil, Maula, & Wilson, 2010; Hill et al., 2009; Dushnitsky & Shapira, 2010) • Leveraging Underutilized Resources (Campbell et al., 2003; Chesbrough, 2000)

Start-up Firm's Motivation

Scholars also examined why startups seek CVC-backing. Past literature suggests that the startups are motivated to enter a CVC relationship because corporate investors provide them with access to financial and complementary resources and endorsement effects (Chesbrough, 2002; Katila et al., 2008; Maula, 2001). First, similar to IVC, CVC provides financial resources to the startups. CVC is particularly useful to the startups because it has long-term investment horizons and corporate investors often invest up to multiple rounds (Chesbrough, 2002). Corporate investors have long-term horizons because they are interested in meeting their long-term strategic goals (Pahnke, Katila, & Eisenhardt, 2015). Secondly, CVC provides complementary resources to startups. By CVC-backing, startups gain access to distribution, manufacturing, and marketing resources as well as customers (Katila et al., 2008). Moreover, CVC-backing encourages the startups to enter into foreign markets (LiPuma, 2007). Thirdly, CVC-backing endorses the startups by sending out positive signals about the quality of the startups to the external stakeholders (Maula, 2001). CVC-backing emits a positive signal because it implies that the potential value of the startup has been recognized by knowledgeable corporate investors and that the future performance of the startup will be bright as its technology can be combined with the corporate investors' complementary resources. The literature notes that the endorsement effect of the corporate investor will be strong if the investors have prestige and are successful in the market (Pahnke et al., 2015). Refer to Table 3 for a list of detailed benefits that the start-up firms gain from CVC-backing.

Table 3. Benefits to Start-up Firms from CVC-backing (adopted from Kelly et al. (2000))

Activity	Benefits
Financing	• Access financial resources: equity, royalties, R&D funding, etc. • Reduce costs
R&D/ New product development	• Utilize market intelligence • Access to extensive publications library • Obtain technological insights • Leverage core competencies • Access complementary technologies • Access to labs and test facilities
Manufacturing	• Receive manufacturing knowledge and capabilities • Capitalize on component purchasing power • Access quality assurance capabilities
Marketing/ Distribution	• Improve market access (distribution channels, global networks) • Access and establish loyal customer base • Acquire market research and personal insights • Reduce cycle time • Increase credibility • Ties to a partner capable of driving industry standards
Legal/ Regulatory	• Advise on regulatory or patent approvals
Service/ Support	• Establish warranty, service, and customer support procedures
Reputation	• Exploit "Halo effect," large company's endorsement to clients, within industry and during financing

3.3. ANTECEDENTS OF CVC

CVC scholars examined how and under what conditions corporate investors engage in CVC investing and start-up firms receive CVC-backing.

Corporate Investor's Perspective

Taking the corporate investor's perspective, CVC scholars discussed various antecedents of CVC investing such as uncertainty (e.g. Van de Vrande et al., 2009), dynamic environment (e.g. Basu et al., 2011), intellectual property protection (IPP) regime (e.g. Dushnitsky & Lenox, 2005b), social networks (Noyes et al., 2014), population ties (e.g. Gaba & Meyer, 2008), resource, absorptive capacity (e.g. Dushnitsky & Lenox, 2005b), exploration (Titus et al., 2014), performance feedback (Gaba & Bhattacharya, 2012), organization culture (Teppo & Wustenhagen, 2009), corporate governance (Anokhin et al., 2016a), and startup's innovation potential (Park & Steensma, 2013). I elaborate on these antecedents as follows.

Uncertainty

By taking real options perspectives, a stream of research examined how firms search for and choose among different governance modes for external technology sourcing in face of various types of uncertainties (Van de Vrande et al., 2009; Tong & Li, 2011; Ceccagnoli et al., 2015). This literature considers that CVC is one of the vehicles for external corporate venturing (Van de Vrande et al., 2009) and that CVC investing involves two stages of decision-making. In the first stage, managers decide whether or not to engage in external corporate venturing. In the second stage, managers choose the governance mode for external technology sourcing. For instance, by focusing on the second stage decision, Van de Vrande and colleagues (2009) examined how relational and external uncertainties influence the choice among technology sourcing modes such as non-equity alliances, CVCs, joint ventures, minority holdings, and acquisitions. They assumed that each governance mode can be ordered in a continuum according to the levels of flexibility and commitment. In other words, they assumed that non-equity alliance is the most flexible and least committed mode, whereas that acquisition is the least flexible and most committed mode. Based on pharmaceutical firms during 1990-2000, they found that greater technological distance between the corporate investor and the startup facilitates CVC investing over non-equity alliance, joint ventures, or acquisitions. Additionally, they found that under greater environmental turbulence, non-equity alliance is the most preferred mode, whereas CVC is preferred over joint ventures. Also, they found that technological newness of the startup increases the likelihood that the established firm will employ CVC over alternative technology sourcing modes.

Along this line of research, Tong and Li (2011) examined how firms choose between acquisition and CVC. Based on firms in multiple industries during 2003-2005, they found that when an investment is surrounded by high levels of market uncertainty, corporate investors attach greater value to the real options embedded in CVC investments as opposed to those in acquisitions. Also, they found that the preference for choosing CVC over acquisition in face of higher uncertainty will be strengthened with greater irreversibility of the investment and weakened with greater growth opportunities of the investment.

In a related vein, Ceccagnoli and colleagues (2015) examined how firms choose between CVC and licensing or acquisition deals in face of uncertainties. They argued that (1) firms with lower absorptive capacity and greater technological distance face greater technological uncertainty and (2) firms with larger proportion of late-stage technologies focus on future productivity instead of current productivity, which both increases the likelihood of choosing CVC over licensing or acquisition. Based on pharmaceutical firms during 1985-2007, they found that firms with weaker scientific capabilities, which access distant technologies, or that possess smaller proportion of early-stage technologies prefer to choose

CVC over licensing or acquisition. In brief, these research on how firms choose among different governance modes for external technology sourcing found that in face of various types of uncertainties, CVC investing is preferred over alternative governance modes (Van de Vrande et al., 2009; Tong & Li, 2011; Ceccagnoli et al., 2015).

Industry Dynamics and Intellectual Property Protection Regime

Another stream of research focused on the effect of the dynamic environment on CVC investing (Dushnitsky & Lenox, 2005b; Basu et al., 2011; Sahaym et al, 2010; Kim et al., 2016). Dushnitsky and Lenox (2005b) argued that CVC investing takes place when the marginal R&D productivity of using CVC is greater than that of using internal R&D. They recognized that corporate investors can capture highly valuable innovation via CVC but also, costs can arise from adverse selection and hold-up problems. They found industries with rich technological opportunities, weak intellectual property protection (IPP) regime (i.e. patent protection), and where complementary assets are valuable motivate greater CVC investing.

Taking a resource based view, Basu and colleagues (2011) argued that firms competing in dynamic environments need to access and develop novel resources to secure their competitive positions, which motivates greater CVC investing. They found that firms operating in industries with high competition, rapid technological change, and weak IPP regime lead to greater CVC investing. In a similar vein, drawing on absorptive capacity and real options perspectives, Sahaym and colleagues (2010) argued that rapid technological change in the industry encourages the firms to engage in greater CVC investing because it is useful to have windows on new technologies and hedge against the uncertainties arising from market demands, technological trajectories, and dominant design. Also, they argued that rapidly growing industry entails excess resources, which encourages firms to explore new technologies, trajectories, and competencies through CVC investing. Based on U.S.

manufacturing industries during 1997-1999, they found that greater levels of industry R&D investments increase the number of industry-level CVC deals, and this relationship is enhanced when the technology is rapidly changing and the industry is rapidly growing. In a related vein, Kim and colleagues (2016) argued that increased competition requires the firms to engage in greater exploration and establish flexible interorganizational relationships, which can be obtained through CVC investing. Based on IT firms during 1997-2007, they showed that increased levels of product market competition increase the levels of CVC spending and this is a result of firms shifting their resources from internal R&D to CVC investing. Moreover, they found that the relationship between competition and CVC investing is strengthened for technology leaders with deep patent stocks.

Population Ties and Social Networks

A few studies examined how CVC practices are diffused through organizational populations and social networks (Gaba & Meyer, 2008; Noyes et al., 2014). Building on the diffusion literature, Gaba and Meyer (2008) studied how VC models can be diffused to the IT firms in the form of CVC programs. First, they examined how endemic innovation diffuses across different organizational populations, from VCs to IT firms. Based on VCs and IT firms during 1992-2001, they found that IT firms are more likely to adopt CVC programs when they are geographically closer to the VC population and when VC population have good IPO records of their portfolio startups. Secondly, they examined how endemic innovations diffuse within the IT firms. They found that the IT firms are more likely to adopt CVC programs when the CVC programs are popularly adopted by peer firms, when CVC programs are adopted by prominent prior adopters, when they observe prior adopters' success experience, and when prior adopters are proximate. In a similar vein, taking a social networks perspective, Noyes and colleagues (2014) examined how the firm's network positions influence access to information on how to plan, establish, and manage CVC programs and thus, affect the adoption of CVC practices. They found that firms that have direct ties with CVC practicing firms and greater network centrality are likely to sustain their CVC practices.

Dushnitsky and Lavie (2010) studied how alliance formation influences the firm's propensity for CVC investing. Taking a resource-based view, they argued that, on the one hand, alliance formation can encourage CVC activity because alliances provide distinct complementary resources to the firm, and they increase the visibility of the firm to attract start-ups that are seeking CVC sponsorships. On the other hand, they argued that alliance formation may discourage CVC activity because CVCs and alliances may provide access to similar external resources or the firms may have limited internal resources that cannot be split between the alliance and CVC activities. Based on U.S. software firms during 1990-1999, they found that alliance formation has an inverted U-shaped relationship with CVC activity, and this relationship is negatively moderated by the firms' internal resource stocks, age, and CVC experience.

Resources and Absorptive Capacity

A few studies discussed resources and absorptive capacity as important antecedents of CVC investing (Dushnitsky & Lenox, 2005b; Basu et al., 2011). Dushnitsky and Lenox (2005b) argued that the amount of CVC investing is sensitive to the availability of internal cash flow because it is more expensive to invest in startups than in internal R&D, and CVC investing entails negligible costs of retaining R&D personnel. Also, they argued that corporate investors with greater absorptive capacity are able to transfer or create knowledge from CVC investing and thus, are likely to engage in a greater level of CVC investing. By analyzing U.S. corporate investors in multiple industries during 1990-1999, they found that corporate investors with higher cash flow and greater absorptive capacity exhibit greater level of CVC investing. In a related vein, Basu and colleagues (2011) argued that greater technological and marketing resources increase the corporate investor's attractiveness to the startups, ability to recognize and assimilate external knowledge from startups, and commercialization potential of the startups. Based on Fortune 500 firms during 1990-2000, they showed that firms with greater technological and marketing resources and diverse CVC investing experience leads to increased number of new CVC relationships.

Exploration

A few studies examined the degree of exploration as an antecdent of CVC investing (Wadhwa & Basu, 2013; Titus et al., 2014). Building on real options and learning perspectives, Wadhwa and Basu (2013) argued that corporate investors with explorative initiatives seek to learn by increasing their commitment of resources to the CVC relationship but at the same time, they aim to minimize the costs arising from uncertainty. By analyzing corporate investors operating in telecommunications, semiconductor, and computer industries during 1996-2000, they found that the degree of exploration pursued by corporate investors has an inverted U-shaped relationship with the amount of CVC investing. They found that the main relationship between exploration and CVC investing is positively moderated by the corporate investor's prominence. They also found that CVC experience diversity decreases the amount of CVC investing.

In a related vein, Titus and colleagues (2014) examined the relationship between the degree of exploration and the usage of acquisitions compared to CVCs and joint ventures (JVs). By drawing from organizational learning perspective, they argued that firms that pursue greater degree of exploration engage in more acquisitions and fewer CVCs and JVs because acquisitions provide stronger commitment and control, and this relationship between exploration and relative usage of acquisition over JV and CVC is negatively moderated by technological dynamism (i.e. industries with greater R&D intensity). In other words, CVCs and JVs are preferred over acquisitions when the firms are pursuing greater exploration in industries with higher technological dynamism. They found support for their theory based on U.S. firms in the information and communication technologies (ICT), chemicals, and medical and laboratory equipment industries during 1996-2008.

Performance Feedback

Gaba and Bhattacharya (2012) pointed out that performance feedback is a significant antecedent of CVC investing. By building on the Behavioral Theory of the Firm, they argued that organizations adopt or terminate CVC units to solve the problems of innovation performance shortfall. By analyzing U.S. IT firms during 1992-2003, they found that when the innovation performance is closer to the aspiration levels (i.e. expected performance), either when the performance is above or below the aspirations, firms are more likely to adopt and less likely to terminate their CVC units. Their study examined how organizational decision-making is made with regards to positive and negative performance feedbacks in the context of CVC investing.

Organizational Culture

Teppo and Wustenhagen (2009) examined how the corporate investor's organizational culture affects the survival of CVC funds. Based on in-depth interviews with U.S. and European CVC program managers during 2003-2005, they theorized that organizational culture that does not view innovation as a key component for competitive advantage, that supports industry stability and neglects the speed of technological change, and that lacks entrepreneurial spirit negatively influences the survival of CVC funds.

Corporate Governance

A few studies discussed how corporate governance affects CVC investing (Anokhin et al., 2016a; Sahaym et al., 2016). By drawing on insights from the corporate governance literature, Anokhin and colleagues (2016a) studied how the manager, board of directors, and institutional shareholder influence the level of CVC investing. Based on corporate investors during 1998-2001, they found that while board with multiple mandates increases CVC investing, CEO duality (i.e. CEO is simultaneously the Chair of the Board) and greater institutional ownership decreases CVC investing. Furthermore, they found risk tolerance strengthens the positive relationship between board equity ownership and level of CVC investing. In a related vein, Sahaym and colleagues (2016) examined how top management team (TMT) heterogeneity, CEO non-duality (i.e. CEO is not the Chairman of the Board), TMT ownership influence the adoption of CVC investing practices by IPO firms. Based on IPO firms during 2001-2005, they found that TMT with various functional backgrounds has an inverted U-shaped relationship with the number of CVC deals that the IPO firms entered when the firm has non-duality and TMT ownership.

Start-up Firm's Innovation Potential

A stream of research examined how startup characteristics attract corporate investors to make CVC investments (Munari & Toschi, 2015; Park & Steensma, 2013; Champenois, Engel, & Heneric, 2006). For instance, by analyzing U.S. startups operating in multiple industries during 1990-2003, Park and Steensma (2013) found that corporate investors are more likely to select start-up firms with a greater number of patent applications compared to the IVCs. In a similar vein, based on CVC-backed startups in nanotechnology sector during 1985-2006, Munari and Toschi (2015) found that the increased number of core technology patents held by startups attracts greater CVC investing. On the contrary to the previous findings, based on

German biotech startups during 1995-1999, Champenois, Engel, and Heneric (2006) showed that compared to IVCs, corporate investors avoid investing in risky startups characterized with above average patents and high standard deviation of employment growth. This result implies that it is important to take into account of the risk preferences of the corporate investors as opposed to the IVCs. While the empirical findings on the effect of the startup's innovation potential on attracting CVC investment were mixed (Munari & Toschi, 2015; Park & Steensma, 2013; Champenois, Engel, & Heneric, 2006), future research may examine under what conditions startup's innovation potential become attractive. The antecedents of CVC investing from the corporate investor's perspective are summarized in Table 4.

Table 4. Antecedents of CVC (Corporate Investor's Perspective)

Antecedents	Examples
Uncertainty	• Environmental, relational uncertainties (Van de Vrande et al., 2009) • Market uncertainty (Tong & Li, 2011) • Technological uncertainty (Van de Vrande et al., 2009; Ceccagnoli et al., 2015)
Industry Dynamics and IPP Regime	• Technological change (Dushnitsky & Lenox, 2005b; Sahaym et al., 2010; Basu et al., 2011) • Technological opportunity (Dushnitsky & Lenox, 2005b) • Complementary resource (Dushnitsky & Lenox, 2005b) • Competition (Basu et al., 2011; Kim et al., 2016) • IPP regime (Dushnitsky & Lenox, 2005b; Basu et al., 2011)
Population Ties and Social Networks	• Geographical proximity with VC community, good track record of VCs (Gaba & Meyer, 2008) • Adoption by CVC peers, reputable corporate investors, prior adopter's success experience (Gaba & Meyer, 2008) • Ties with CVC practicing firms, Network Centrality (Noyes et al., 2014) • Alliance formation (Dushnitsky & Lavie, 2010)
Resources and Absorptive Capacity	• Internal Cash Flow (Dushnitsky & Lenox, 2005b) • Absorptive Capacity (Dushnitsky & Lenox, 2005b) • Technological/ marketing resource (Basu et al., 2011) • Diverse CVC investing experience (Basu et al., 2011)
Exploration Initiative	• Exploration initiative, diverse CVC investing experience, corporate investor reputation (Wadhwa & Basu, 2013) • Exploration initiative, technological dynamism (Titus et al., 2014)
Performance Feedback	• Innovation performance relative to aspirations (Gaba & Bhattacharya, 2012)
Organizational Culture	• Teppo and Wustenhagen (2009)
Corporate Governance	• TMT, board of director, institutional shareholder, CEO duality (Anokhin et al., 2016a; Sahaym et al., 2016)
Start-up Firm's Resource	• Patents held by start-up firm (Munari & Toschi, 2015; Park & Steensma, 2013; Champenois, Engel, & Heneric, 2006)

Start-up Firm's Perspective

As previously discussed, through CVC relationships, while the corporate investors are motivated to screen and absorb new technologies from the start-up firms, the start-up firms are motivated to gain access to complementary and financial resources and endorsement effects from the corporate investors (see Figure 5 in page 44) (Dushnitsky, 2006). While the interests of the corporate investor and the startup are complementary in filling the resource needs of each other, their interests diverge when the corporate investor wants to imitate the startup's technologies and the startup wants to protect its technologies from leaking. This tension between attractive resources and risk of misappropriation is called the "shark's dilemma" as the corporate investors can be perceived as corporate sharks to the startups who are seeking CVC-backing when misappropriation risk is high (Katila et al., 2008). Largely taking the startup's perspective, scholars examined how and under what conditions CVC relationship will be formed centering on the issue of divergent interests between the corporate investor and the startup (e.g. Katila et al., 2008). In particular, the literature discussed the various defense mechanisms that startups can set up (Mitchell, Dussauge, & Garrette, 2002) such as legal, timing, relational, and social defenses (Katila et al., 2008; Dushnitsky & Shaver, 2009; Hallen et al., 2014; Colombo et al., 2016) prior to forming a CVC relationship. I elaborate on these antecedents of forming a CVC relationship from the startup's perspective as follows.

While the literature assumed that the corporate investors are resource-rich, demanding, and powerful that they drive the formation of the CVC relationship, Katila, Rosenberger, and Eisenhardt (2008) suggested that it is a matching process between the corporate investor and the startup where the startup also exerts bargaining power. By drawing upon resource dependence theory, they argued that startups choose to enter a CVC relationship when the corporate investor can provide valuable complementary and financial resources and when they can defend their technology by using defense mechanisms such as timing and trade secrets. They argued trade secrets are effective means of protecting the startups' technologies because it is illegal to use improper means to discover or use trade secrets, and the startups commonly use non-disclosure agreements, material transfer agreements, and non-compete clauses to protect their trade secrets (Katila et al., 2008). Also, they argued that receiving later stage investing is an effective means of protecting their technologies because the later stage technologies that are mature and fully embodied in a product are difficult to misappropriate. By analyzing U.S. startups and corporate investors in high-tech industries during 1979-2003, they found that startups with dire needs for complementary resources and those that use trade secrets and late-stage funding rounds are more likely to enter CVC relationships.

Maula and colleagues (2009) showed that startups adopt various safeguards such as limiting the corporate investor's ownership stake, restricting the number of board seats that can be taken by the corporate investors, and accepting corporate investors only in the later stages of the startup's development. Based on surveys of U.S. startups and corporate investors during 2000-2001, they found that adopting such safeguards are effective means of decreasing the risks arising from the CVC relationship, including those from misappropriation, lower autonomy, and slower decision-making. In a similar vein, based on CVC-backed IPO firms in the U.S. during 1996-2001, Masulis and Nahata (2009) found that when there is a greater overlap of product classification between the corporate investor and the portfolio startup, the startup limits the number of board seats that corporate investors can take and increases the insiders' board representation. Moreover, they showed that startups limit the board representation by lead corporate investors that invest in the early stages.

Dushnitsky and Shaver (2009) argued that corporate investors are motivated to invest when there is an industry overlap between the corporate investor and startup, whereas startups are motivated to obtain CVC when IPP is strong. Based on U.S. corporate investors during 1990-1999, they found that a CVC relationship is likely to form when industry overlaps under strong IPP regime, whereas a CVC relationship is unlikely to form when industry overlaps under weak IPP regime. As a replication study of Dushnitsky and Shaver (2009)'s work, Colombo and Shafi (2016) examined how the industry overlap and legal defense influence the formation of CVC relationships for European firms. Although the strength of the IPP regime of the U.S. and that of the Europe are similar, in contrast to Dushnitsky and Shaver (2009), they found that weak IPP regime and industry overlap increases the CVC relationship formation. This result is because in the European VC market, while IVCs do not prefer to invest in early-stage startups, government-backed VCs (GVCs) actively finance early-stage startups. Considering that most early-stage financing opportunities come from GVCs, European startups may be willing to form CVC relationships with corporate investors that have greater industry overlaps even under weak IPP regimes. Consistent with the finding of Dushnitsky and Shaver (2009), Colombo and Shafi found that strong IPP regime and a greater industry overlap increase the formation of CVC relationships, which effect is much stronger than that under weak IPP regimes. Furthermore, they found that timing defense is ineffective, whereas social defenses (e.g. affiliation with prominent VCs) complement the legal defenses. They suppose that this result is because compared to the U.S., the European VC market lacks early-stage financing opportunities and has less dense syndication VC networks.

Hallen and colleagues (2014) studied how social defenses influence the tie formation between corporate investors and startups. They argued that startup's connection with third-party firms (i.e. IVCs) can function as a social defense mechanism through disciplining and aligning. First, third-parties discipline opportunistic partners by terminating or avoiding future ties or by broadcasting the opportunistic behavior, which results in damaging the reputation of the opportunistic partner. Secondly, third-parties help identify better-aligned ties by suggesting partners or informing the characteristics of the partners, which reduces the threat of opportunistic behavior. By analyzing U.S. CVC investing rounds during 1979-2003, they found that centrally positioned third-party IVCs are effective means of social defense and facilitate tie formation between corporate investors and startups. Furthermore, they found such third-party social defense becomes more effective when legal or timing defenses are unavailable. The antecedents of CVC investing from the startup's perspective are summarized in Table 5.

Table 5. Antecedents of CVC (Startup's Perspective)

Startup's Defense	Examples
Legal Defense	• Patents, trade secrets (Katila et al., 2008) • IPP regime, industry overlap (Dushnitsky & Shaver, 2009; Colombo & Shafi, 2016)
Timing Defense	• Later stage investment (Katila et al., 2008; Maula et al., 2009)
Relational Defense	• Limit corporate investor's board seats and ownership (Maula et al., 2009; Masulis & Nahata, 2009) • Increase insider board representation (Masulis & Nahata, 2009)
Social Defense	• Third-party centrality (Hallen et al., 2014)

3.4. MANAGEMENT OF CVC

Scholars examined how CVC is managed inside organizations. By taking the corporate investor's perspective, the literature examined how the CVC units are structured (e.g. Souitaris, Zerbinati, & Liu, 2012), how the relationship between the CVC unit and the stakeholders of CVC investing inside organizations (i.e. senior executives, business units) and outside organizations (i.e. startups, IVCs, peer corporate investors) are managed (e.g. Basu, Phelps, & Kotha, 2016), and how CVC investments are practiced (e.g. Souitaris & Zerbinati , 2014).

Organizational Design

A group of scholars examined how the CVC units should be designed and structured within organizations. They examined how and under what conditions the corporate investors (i.e. established firms) adopt mechanistic or organic structures (Souitaris, Zerbinati, & Liu, 2012), adopt incentive schemes of the IVCs (Hill et al., 2009; Dushnitsky & Shapira, 2010), how the autonomy of the CVC program affects investing behaviors and performance (Hill et al., 2009; Yang et al., 2016), how centralization shapes the senior executive's attention structure (Titus et al., 2016), how organizational culture influences CVC fund survival, and how CVC unit composition affects its goal orientation and abandonment decisions (Dokko & Gaba, 2012; Gaba & Dokko, 2016). I elaborate on each stream of literature as follows.

Mechanistic vs. Organic Structure

In an inductive study, Souitaris, Zerbinati, and Liu (2012) examined how the focus of a newly established CVC unit's isomorphism affects whether to adopt a mechanistic or an organic structure. While the mechanistic structure is characterized by high specialization, standardization, and formalization, command-like communication, and strong hierarchy, the organic structure is characterized by overlapping responsibilities, complex integration mechanism, decentralization, flexible procedures, and consultative communication process (Burns & Stalker, 1961). They classified isomorphism as endo- or exo-isomorphism depending on whether the focus of norms is inside or the outside the organization. Under endo-isomorphism, the CVC unit aligns its norms to the parties inside the parent firm, whereas under exo-isomorphism, the CVC unit aligns its norms to the parties outside the parent firm (e.g. VC community). By interviewing global CVC executives in 2002, Souitaris and colleagues found that while endo-isomorphism leads the CVC unit to adopt a mechanistic structure, exo-isomorphism leads it to adopt an organic structure. Furthermore, they found that when the CVC unit seeks legitimacy with the parent firm, it pursues endo-isomorphism, and when the CVC unit seeks legitimacy with the entrepreneurs or other IVCs, it pursues exo-isomorphism. They also found that when the CVC unit managers have corporate backgrounds, they pursue endo-isomorphism, whereas when they have private equity backgrounds, they pursue exo-isomorphism.

Incentives

Past research provides evidence that the corporate investor's emulation of the IVC's incentive schemes leads to greater financial performance (Hill et al., 2009; Dushnitsky & Shapira, 2010). Based on surveys of CV unit managers during 2001-2003, Hill and colleagues (2009) found that increased corporate investors being paid with carried interests leads to greater CV unit's financial performance. Similarly, Dushnitsky and Shapira (2010) provided evidence that incentives (i.e. compensation schemes) shape investment practices, which affects performance outcomes. They argued that corporate investors prefer later stage investments and a greater number of syndication partners. Furthermore, they argued that when corporate investors are paid with carried interests, they invest in earlier stage startups and participate in smaller syndicates. Lastly, they argued that corporate investors paid with carried interests will show greater performance. By analyzing U.S. VC investing practices during 1990-1999 from a combination of survey and secondary data, they found support for their theory.

In a related vein, taking an inductive approach, based on in-depth interviews, Teppo and Wustenhagen (2009) theorized that corporate investors without any appropriate evaluation system of financial and strategic benefits result in a lower likelihood of CVC fund survival.

Autonomy

A few research examined how the autonomy of the CVC program influences its performance and investing behaviors (Hill et al., 2009; Yang et al., 2016). Hill and colleagues (2009) argued that greater levels of vertical (i.e. in relation to senior managers of the parent firm) and horizontal autonomy (i.e. in relation to the managers of the other units of the parent firm) given to the CV unit will lead to greater performance because it allows the CV unit managers to decide the optimal integration level between the parent firm and the startup. Based on surveys of CV unit managers during 2001-2003, they found that greater vertical autonomy leads to greater CV unit's financial performance.

Yang and colleagues (2016) examined how the structural autonomy of the CVC program influences its portfolio diversification. They argued that lower autonomy of the CVC program implies greater needs to meet the strategic rationale of the business units, which narrows down the CVC unit's search for diverse startups and demand the CVC unit's investment portfolio to stick to the existing businesses. On the other hand, they argued that greater autonomy of the CVC program leads the CVC unit to engage in distant search because the senior management does not impose any strategic goals to the program. Based on

U.S. corporate investors during 1990-2004, they found that greater autonomy leads to greater CVC portfolio diversification.

Centralization

Titus and colleagues (2016) showed that the corporate investor's organizational design shapes the attention structure of the decision makers involved in CVC investing. Based on U.S. corporate investors during 2000-2008, they found that greater operational concentration - the extent that the firm is concentrated with regards to reporting structure of the business segments - leads to drawing more attention of the senior managers and better aligning CVC investing decisions with the corporate strategic initiatives, which leads to greater performance.

Organizational Culture

Teppo and Wustenhagen (2009) examined how the corporate investor's organizational culture affects the survival of CVC funds. Based on in-depth interviews, they theorized that organizational culture (1) that does not view innovation as a key component for competitive advantage, (2) that supports industry stability and neglects the speed of technological change, and (3) that lacks entrepreneurial spirit negatively influences the survival of CVC funds.

CVC Unit Composition

A few studies examined how the CVC unit composition - whether to hire internal personnel (from the parent firm) or fund managers with IVC background - affects the CVC unit's goal orientations and decisions to adopt or abandon VC practices (Dokko & Gaba, 2012; Gaba & Dokko, 2016). Dokko and Gaba (2012) examined how CVC managers modify and adopt IVC practices. They argued that the extent of practice variation depends on the CVC managers' experience with the IVC practices and their experience that enables them to assess the fit between the IVC practice and the adopting CVC unit. Based on CVC units during 1992-2008, they found that higher proportion of CVC managers with IVC experience leads the CVC unit to be oriented towards financial goals and modify less of its operational strategies. Furthermore, they found that higher proportion of internal hires in the CVC unit leads to decreasing the financial goal orientation and raising the strategic goal orientation. Also, they found that greater proportion of CVC managers with engineering experience leads to greater strategic goal orientation.

In a related vein, Gaba and Dokko (2016) examined how practice utilization and staffing choices influence the likelihood of abandoning CVC units. By analyzing CVC unit abandonment practices in the U.S. IT firms during 1992-2008, they found that hiring former IVCs in the CVC unit leads to a lesser abandonment likelihood of the CVC unit, whereas greater internal hire leads to a greater abandonment likelihood. Moreover, they found that while CVC units filled with former IVCs follow exit decisions of the VCs, CVC units consisting of internal hires follow decisions of their peer corporate investors.

Stakeholders Management

Parent Firm, Start-Up Firm, VC Community

A group of scholars discussed how CVC units manage their relationships with the parent firm's senior executives, business units, startups, and IVCs. A stream of literature focused on examining the drivers that facilitate tighter relationships among these stakeholders (Hill & Birkinshaw, 2014; Ernst, Witt, & Brachtendorf, 2005; Basu, Phelps, & Kotha, 2016; Keil, Autio, & George, 2008). For instance, taking a relational perspective, Hill and Birkinshaw (2014) argued that CV unit takes a broker role amongst the parent firm's senior executives, business units, and the VC community to create value by bringing the resources together held by these stakeholders. On the one hand, the CV unit's link with senior executives and business unit managers provides access to financial capital, marketing and distribution channels, R&D and production facilities, market intelligence, and technology forecasts. On the other hand, CV unit's link with the VC community provides access to syndicated investment opportunity, useful investment practices, and startup nurturing capabilities. Based on a survey of global CV unit managers during 2001-2003, they found that higher level of ambidexterity (i.e. interaction between exploitation and exploration) is achieved when there are stronger relationships (through frequent communication) between the CV unit and (1) the parent firm's senior executives, (2) business units, and (3) VC community. In a related vein, based on interviews with German CVC unit managers, Ernst, Witt, and Brachtendorf (2005) found that frequent communication facilitates resource transfer between the parent firm via CVC program and the startup.

Based on interviews with U.S. CVC managers during 2006-2012, Basu, Phelps, and Kotha (2016) found that corporate investors who are skillful at integrating the startup's external knowledge to the parent firm's internal units adopted investment practices such as (1) establishing explicit collaborative blueprints between the business units and the portfolio startups, and (2) avoiding competitive posture of the CVC units with the parent firm's business units and framing the CVC unit's role as complementary. In a related vein, by conducting interviews with CVC managers and startup CEOs in Germany, Weber and Weber (2007) found that knowledge sharing routines, willingness to cooperate, emotional fit, and trust between the corporate investor and the startup enhances knowledge transfer and creation within the dyad.

Based on case studies of corporate investors, Keil, Autio, and George (2008) found that the CVC unit takes the role of a knowledge broker between the startup and the parent firm. More specifically, they found that CVC unit managers facilitate the knowledge sourcing from the startup to the parent firm when the CVC managers (1) are deeply embedded in the social networks of the parent firm and the startup, (2) have prior backgrounds as entrepreneurs, VCs, acquisition managers, which can complement CVC investing with technical business experience, and (3) have external network endorsements (e.g. VC partners providing 'deal flow' of potential investment opportunities and carrying out due diligence of startups).

Another stream of literature examined the drivers that hamper the relationships among the CVC unit, business unit, and VC community (Keil, Autio, & George, 2008; Henderson & Leleux, 2005; Weber & Weber, 2011). Based on case studies of corporate investors, Keil, Autio, and George (2008) noted that the structural and cognitive barriers of the parent firm inhibit the process of knowledge sourcing from the startups. They found that when the CVC unit is positioned too close to either the parent firm (and thus the business units) or the VC community it can hamper the process of knowledge sourcing. For instance, if the CVC unit is too close to the business units and needs approval from them for investing, it will be difficult to make investments that are different from the parent firm's core business, leading to CVC investments with over-exploitative initiatives. On the other hand, if the CVC unit is too close to the VC community and isolated from the parent firm's business units, assimilating the startup's knowledge to the business units will be hindered. They also found that the CVC unit's structural misalignment with its strategic mandate can be hindering the process of knowledge sourcing. They noted that if the CVC unit's mandate is to identify the knowledge void, it needs to coordinate with the business unit, whereas if its mandate is to identify the knowledge required for new businesses, it needs to coordinate with the senior management. Furthermore, they found that conflicting goals between the parent firm's business units and CVC units can inhibit the process of knowledge sourcing. While CVC units aim for exploration, business units aim for exploitation. Accordingly, business units may lack the cognitive capability to recognize practical implications from the portfolio startup's technology, which can hamper the process of knowledge sourcing. In a similar vein, Henderson and Leleux (2005) noted that lack of recognition of the CVC unit, inadequate incentive schemes, and tenuous or conflicting relationship between the CVC and business units impede the process of knowledge sourcing from the startup to the corporate investor.

By extending their research from 2007, Weber and Weber (2011) examined how structural and personal lock-ins may become social liabilities and hamper the transfer and creation of knowledge within the CVC triad (i.e. CVC unit, corporate business unit, and portfolio startups). For instance, structural lock-in arises from unrecognized or unexpected strategic misfit between the corporate investor and the startup, which entails inflexibility and dependency in the relationship. Personal lock-in arises from individuals that are incompetent or cannot follow through the knowledge transfer process. Based on the CVC triads in Germany, they showed that social capital initially facilitates knowledge transfer and creation. However, they found that structural and personal lock-ins may eventually turn such social capital into social liability.

Networks

Keil, Maula, and Wilson (2010) examined how corporate investors enter into rigid IVC networks. Their premise is that corporate investors are able to access high-quality deal flow by taking central positions in the IVC network. Based on social networks theory and relational view, they argued that prior corporate investor's network centrality (i.e. taking the central position in the network) in the IVC syndication network influences its future position, and the corporate investor's unique resources influence its future network position. By analyzing U.S. corporate investors during 1996-2005, they found that prior corporate investor's network centrality influences its future centrality and the corporate investor's resource endowment also influences its future centrality. Furthermore, they found that the corporate investor's prior centrality and resource endowments substitute each other with respect to leading to future central positions.

Investment Practices

Some research examined the investment practices that CVC managers adopt to effectively search for external knowledge (Basu, Phelps, & Kotha, 2016) and how different norms - whether to follow the parent firm or the VC community - lead to different investment practices (Souitaris & Zerbinati, 2014). In an inductive study, based on interviews with U.S. CVC managers during 2006-2012, Basu, Phelps, and Kotha (2016) found that corporate investors who are adept at searching for external knowledge carried out investment practices such as (1) reducing the deal complexity, (2) protecting the startups' interests, which increases the corporate investors' attractiveness as potential partners to the startup and the VC community, and (3) evaluating and investing in early-stage startups, which provides windows on useful but uncertain technologies to the parent firm.

In an inductive study, Souitaris and Zerbinati (2014) examined the investment practices of CVC managers. Based on interviews with CVC executives during 2002, 2011-2012, they found that when the CVC unit follows the norms of the parent firm (i.e. endo-isomorphism), it leads to following the integrated investment logic, which is characterized by greater involvement of the business units and senior executives in the CVC decision-making process. Under such integrated investment logic, priority is given to deal referrals arising from business units, strategic potential is considered as an important screening criterion, it is important to inform senior executives about the emerging technologies and markets within a focused scope, business units are involved in the due diligence process, sponsoring from the business unit is required to make an investment, approval from the senior executives is needed to conduct the deal, and parent firm's resources are provided to the startups. On the other hand, they found that when the CVC unit follows the norms of the VC community (i.e. exo-isomorphism), it leads to following the arms-length investment logic, which implies that the business units and the senior executives are much less involved in the CVC decision-making process.

A few studies examined how corporate investors practice syndication strategies (Dushnitsky & Shapira, 2010; Souitaris & Zerbinati, 2014; Hill et al., 2009; Kim et al., 2011). Dushnitsky and Shapira (2010) examined how investment practices of corporate investors and IVCs (independent venture capitals) are different. They argued that corporate investors, typically those without any performance-based incentives, are motivated to enter syndication to share their risk with the syndicate partners. By analyzing U.S. VC investing data from survey and secondary sources during 1990-1999, they found that syndicates by corporate investors have more partners than those consisting solely of IVCs (all IVCs). In a similar vein, Souitaris and Zerbinati (2014) examined how CVC managers do deals. Based on 13 case studies on corporate investors from multiple industries, they found that corporate investors prefer to syndicate with IVCs rather than other corporate investors because IVCs provide complementary resources while other corporate investors raise conflict of interests by pursuing different strategic rationales.

Hill and colleagues (2009) examined how syndication practices impact the corporate investor's performance. They argued that syndication benefits the corporate investors by exposing them to diverse investment opportunities, letting them share risk with their partners, helping them make better decisions by drawing on multiple expertise of their partners, and providing them with access to deal flow. Based on surveys of CV unit managers during 2001-2003, they found that the corporate investor's syndication with IVCs increases the CV unit's financial performance. They also found that the corporate investor's network centrality increases the CV unit's financial performance.

In a related vein, but taking the startup's perspective, Kim and colleagues (2011) examined the effect of corporate investor's syndication on its portfolio startup performance. Contrary to the finding of Hill and colleague (2009), when analyzing South Korean startup firms during 1999-2004, Kim and colleagues found no syndication effect of the corporate investors on startup performance, whereas they found that stand alone CVC-backing increases the startup firms' employment growth, sales growth, ROA, and R&D intensity. They supposed that while standalone CVC-backing can be beneficial to the startups because corporate investors provide value-added services as a means to pursue their strategic objectives, other corporate investors' participation in the syndicate may diminish such positive effects due to conflicting interests between the syndicate partners. Research on how CVC is managed inside and outside of the organizations is summarized in Table 6.

Table 6. Management of CVC

	Example
Organization Design	• Mechanistic vs. Organic Structure (Souitaris, Zerbinati, & Liu, 2012) • Incentive (Hill et al., 2009; Dushnitsky & Shapira, 2010; Teppo & Wustenhagen, 2009) • Autonomy (Hill et al., 2009; Yang et al., 2016) • Centralization (Titus et al., 2016) • Culture (Teppo & Wustenhagen, 2009) • CVC unit composition (Dokko & Gaba, 2012; Gaba & Dokko, 2016)
Stakeholders Management	• Relationship with the parent firm's senior executives, business units, startups, and VCs (Hill & Birkinshaw, 2014; Ernst, Witt, & Brachtendorf, 2005; Basu, Phelps, & Kotha, 2016; Weber & Weber, 2007; Keil, Autio, & George, 2008; Henderson & Leleux, 2005; Weber & Weber, 2011) • Relationship with VC networks (Keil, Maula, & Wilson, 2010)
Investment Practices	• External knowledge search (Basu, Phelps, & Kotha, 2016) • Integrated vs. arms-length investment logic (Souitaris & Zerbinati, 2014) • Syndication (Dushnitsky & Shapira, 2010; Souitaris & Zerbinati, 2014; Hill et al., 2009; Kim et al., 2011)

3.5. OUTCOMES OF CVC

Scholars examined the financial and strategic outcomes of CVC from the startup's, corporate investor's, and dyadic perspectives.

Financial Outcomes

The literature discussed the financial outcomes of CVC from the perspectives of the corporate investor and the startup.

Corporate Investor's Perspective

Taking the corporate investor's perspective, a stream of literature examined how CVC investing affects financial performance at various levels of analysis, including the firm level, CVC program level, CV unit level, and the portfolio level (Dushnitsky & Lenox, 2006; Allen & Hevert, 2007; Hill et al., 2009; Yang et al., 2014). It has been implicitly assumed that the corporate investors obtain financial performance either by directly pursuing financial benefits or by pursuing strategic values, which will be eventually transformed into financial performance.

A few studies examined the effect of CVC investing on financial performance at the firm level (Dushnitsky & Lenox, 2006; Titus et al. 2016). Dushnitsky and Lenox (2006) examined the effect of CVC investing on firm valuation. Based on U.S. corporate investors during 1990-1999, they found that corporate investors who explicitly pursue strategic purposes of harnessing novel technologies through CVC investing obtain greater firm valuations regarding Tobin's Q than those purely focusing on financial returns. In a related vein, Titus and colleagues (2016) examined how a firm's organizational design influences CVC investing and its financial performance. By taking an attention-based view, they argued that operational concentration - the extent that the firm is concentrated with regards to reporting structure of the business segments - draws the attention of the senior executives to align CVC investing with the corporate strategic initiatives, which improves firm value (i.e. Tobin's Q). Also, they argued that in a low munificent environment, which is characterized by heightened competition and greater resource needs, corporate investors are likely to engage in disciplined and focused CVC investing in startups with high-value creation potential, which results in greater firm value. Based on U.S. corporate investors during 2000-2008, they found that CVC investing enhances the corporate investor's Tobin's Q when it has greater operational concentration and is operating under lesser munificent environment.

Allen and Hevert (2007) examined the effect of CVC investing on financial performance at the CVC program level. They examined the internal rate of returns (IRRs) and cash flow metrics of the CVC programs operated by IT firms in the U.S. during 1990-2002 and found that these returns are dispersed and bimodally distributed. More specifically, they found the top 30% of the CVC programs achieved IRRs greater than +40% and the bottom 30% of the CVC programs achieved IRRs lesser than -20%. 39% of the CVC programs had IRRs that met or exceeded the parent firm's cost of capital. Furthermore, Allen and Hevert identified three factors that destructed the financial performance of the CVC programs. First, low performers invested at the late stage of the VC cycle (i.e. during the last stages of the boom and bust cycle). Secondly, low performers' annual investment activities had significant variation. Thirdly, low performers did not harvest actively during the late stage of the VC cycle.

A few studies examined the effect of corporate venturing (CV) investing practices at the CV unit level (Hill et al., 2009; Birkinshaw & Hill, 2005). Hill and colleagues (2009) argued that greater the extent that the corporate investor adopts the structure and practices of the IVC firms leads to greater strategic and financial performance and longer survival of the CV units compared to those that have not adopted such structure and practices. Based on surveys of CV unit managers during 2001-2003, they found that adopting IVC practices such as carried interest compensation, managers having the authority to make investing decisions without the approvals by senior executives, and syndicating with IVCs increase the CV unit's financial performance. Financial performance was captured by surveying about the CV unit's IRR, contribution to revenue growth, and increased stock valuation. They also found that the degree of business relatedness between the corporate investor and the startup has an inverted U-shaped relationship with financial performance. In a related vein, based on interviews with European and U.S. CV managers during 2001-2004, Birkinshaw and Hill (2005) found that factors such as greater autonomy of the CV unit, closer ties with the VC community, and compensation systems that reward strategic benefits drive CV unit success.

A few studies examined the effect of CVC investing on financial performance at the corporate investor's portfolio level (Lin & Lee, 2011; Yang et al., 2014). Lin and Lee (2011) examined how CVC portfolio diversity and strategic linkages influence the investing firm's future growth opportunity. Based on Taiwanese corporate investors in multiple industries during 2000-2003, they found that increasing the portfolio diversity and the product relatedness between the corporate investor and the startup leads to greater future growth opportunity (i.e. Tobin's Q and growth option value) for the corporate investor. In a similar vein, Yang and colleagues (2014) examined the relationship between the corporate investor's portfolio diversification and the firm's value creation. By building on real options and diversification research, they argued that static net present value of the portfolio will become positive as the portfolio diversification level increases, whereas the option value will become negative. By analyzing U.S. CVC programs during 1990-2004, they found that the diversification of the corporate investor's portfolio of startups has a U-shaped relationship with the firm's value creation (i.e. Tobin's Q), and this relationship is stronger under greater financial constraints.

Start-up Firm's Perspective

A group of scholars examined how CVC investing affects the financial performance of the start-up firms in various dimensions such as the likelihood of IPO, acquisition, bankruptcy (Gompers & Lerner, 2000; Park & Steensma, 2012; Bottazzi et al., 2008), startups' valuations at the IPO or acquisition events (Gompers, 2002; Ivanov & Xie, 2010), underpricing at the IPO event (Ginsberg et al., 2011; Wang & Wan, 2013), and the startups' sales, return, and market share (Weber & Weber, 2007; Kim et al., 2011; Bertoni et al., 2013; Bertoni et al., 2010). I elaborate on these performance outcomes as follows.

A stream of research discussed the impact of CVC-backing on the start-up firm's likelihood of undergoing an initial public offering (IPO), acquisition, and bankruptcy (Gompers & Lerner, 2000; Park & Steensma, 2012; Bottazzi et al., 2008). Gompers and Lerner (2000) compared the effect of CVC-backing with that of IVC-backing on the startup's IPO likelihood. They argued that the CVCs may perform worse than the IVCs when the parent firm gives poor incentives to the CVC managers and senior executives interfere in the CVC decision-making process through bureaucracy and hamper the CVC managers from effectively selecting and monitoring their portfolio startups. On the other hand, they argued that CVCs may perform better than the IVCs if the corporate investors can exploit the complementarities of the businesses between the parent firms and the startups. Based on CVCs and IVCs in the U.S. during 1983-1994, they found that corporate investors are as successful as the IVCs with respect to the IPO likelihood of their portfolio startups, and this relationship is strengthened by the business overlap between the corporate investor and the startup. In a similar vein, based on startups in the computer, semiconductor, and wireless industries during 1990-2003, Park and Steensma (2012) found that CVC-backing increases the likelihood of the startups going public when the startups require specialized complementary assets than generic complementary assets. They also found that CVC-backing decreases the likelihood of the startups going bankrupt when the startups require specialized complementary assets than generic complementary assets and when startups are operating in an uncertain environment than a stable environment. Based on a survey of European VCs during 1998-2001, Bottazzi and colleagues (2008) found that captive VCs (i.e. CVC, bank-backed VC, government-backed VC) are less active in getting involved in managerial decision-making of the startup firms than the IVCs. Furthermore, they found that CVCs' lukewarm activism decreases the likelihood of the portfolio startups being acquired or going public compared to that of the IVCs. They measured the degree of activism based on the extent that the VCs are involved in recruiting managers for the startup, helping to assemble the board of directors, providing assistance for securing additional financing, and interacting with the startups. Thus, so far, the findings on the effect of CVC-backing on IPO likelihood of the startups are mixed (Gompers & Lerner, 2000; Park & Steensma, 2012; Bottazzi et al., 2008).

A few studies examined how CVC-backing positively influences the start-up firm's valuation at the IPO or acquisition events (Ivanov & Xie, 2010; Gompers, 2002). Ivanov and Xie (2010) argued that corporate investors take a value-adding role in the CVC relationship by providing startups with technological and R&D supports, assistance in product development, manufacturing facilities, marketing and distribution channels, connections to the business units of the parent firm, strategic guidance, and positive signals to the market. Based on CVC-backed startups during 1981-2000, they found that CVC-backing leads to a greater valuation of the portfolio startups at the IPO, and this relationship is stronger when there is a strategic fit (i.e. strategic alliance or business relationship) between the corporate investor and the startup. They also found that CVC-backing leads to a greater acquisition premium of the portfolio startup when there is a strategic fit. In a similar vein, based on U.S. corporate investors during 1983-1994, Gompers (2002) found that CVC-backed portfolio startup's valuation at the time of IPO or acquisition was at least three times of the original investment.

Other research examined how CVC-backing influences the start-up firm's underpricing at the time of IPO (Ginsberg et al., 2011; Wang & Wan, 2013). Ginsberg and colleagues (2011) examined how CVC investor's affiliation influences the underpricing (i.e. market-newness discount) of the startups at the IPO. They argued that the commercial bank-affiliated corporate investors have substantial information collected from loan activities that they have a stronger certification effect on the startup's quality than the non-bank corporate investors. Based on U.S. IPO firms backed by corporate investors during 1990-1999, they found that underpricing is lower for IPO firms backed by corporate investors affiliated with commercial banks than those backed by non-banks. They also found that underpricing is lower for IPO firms backed by corporate investors that are members of the prominent stock market index (i.e. S&P 100) than those backed by non-members, and this relationship is strengthened when the stock market is hot.

In a related vein, drawing on resource-based view and multiple agency theory, Wang and Wan (2013) argued that because IVCs aim for financial gains, they do not provide any additional positive signals of the IPO firm's prospects to the market besides that it has been certified, which increases the need for a discounted offer price. On the other hand, they argued that because corporate investors have strategic goals and excel at commercializing based on complementary resources, they provide positive signals of the IPO firm's current quality and future success, which reduces the need for a discounted offer price. By analyzing

U.S. CVC- and IVC-backed IPO firms during 2000-2007, consistent with their theory, they found that while IVC ownership is related to positive underpricing of the IPO firms, CVC ownership is related to negative underpricing.

A stream of literature discussed the positive and negative impacts of CVC-backing on the startup firm's sales, return, and other outcomes such as employment, R&D intensity, and investment sensitivity (Weber & Weber, 2007; Kim et al., 2011; Bertoni et al., 2013; Bertoni et al., 2010). Weber and Weber (2007) examined how relational fit between the corporate investor and the startup affects knowledge transfer and creation within the dyad. Based on interviews with CVC managers and startup CEOs in Germany, they found that greater relational fit (i.e. knowledge sharing routines, willingness to cooperate, emotional fit, trust) enhances knowledge transfer and creation, which ultimately increases the startup's sales, sales growth, return, and growth in market share.

Kim and colleagues (2011) also evidenced positive effect of CVC-backing on startup's performance. They argued that corporate investors have a distinctive effect on increasing the performance of startups operating in the intermediate goods industries because the corporate investor's complementary resources can be better used by startups in the vertical value chain. Based on South Korean startup firms during 1999-2004, they found that CVC-backing increases the startup firms' employment growth, sales growth, ROA, and R&D intensity.

Bertoni and colleagues (2013) argued that as opposed to corporate investors, IVCs have incentives to take action to signal their capabilities (i.e. grandstand) to potential capital providers, which will affect their treatment effects on startups. By analyzing Italian start-up firms in multiple industries during 1994-2003, they found that while both CVC- and IVC-backed startups show increased employment growth, IVC-backed startups show greater short-term sales growth than CVC-backed startups.

In contrast to the evidence on the positive effects of CVC-backing, Bertoni and colleagues (2010) showed that CVC-backing has a negative impact on startup performance. Based on Italian startups during 1994-2003, they found that while CVC-backing does not change the sensitivity of the startups' level of investment relative to their current cash flow, IVC-backing makes them less sensitive to investing. They interpret that IVC-backing effectively reduces the dire financial constraints of the startups, whereas CVC-backing does not. The financial outcomes of CVC investing from the corporate investor's and the startup's perspectives are summarized in Table 7.

Table 7. Financial Outcomes of CVC

Perspective	Level	Examples
Corporate Investor	Firm level	• Firm valuation (Tobin's Q) (Dushnitsky & Lenox, 2006; Titus et al., 2016)
	Program level	• Internal rate of return (Allen & Hevert, 2007)
	CV unit level	• Combination of IRR, contribution to top-line growth, and stock valuation (Hill et al., 2009)
	Portfolio level	• Future growth opportunity (Tobin's Q and growth option value) (Lin & Lin, 2011; Yang et al., 2014)
Startup	Firm level	• IPO, bankruptcy, acquisition likelihood (Gompers & Lerner, 2000; Park & Steensma, 2012; Bottazzi et al., 2008) • Valuation at IPO or acquisition (Gompers, 2002; Ivanov & Xie, 2010) • Underpricing at IPO (Ginsberg et al., 2011; Wang & Wan, 2013) • Sales, return, market share, R&D intensity, employment, investment sensitivity (Weber & Weber, 2007; Kim et al., 2011; Bertoni et al., 2013; Bertoni et al., 2010)

Strategic Outcomes

The literature provides evidence that the corporate investors obtain various strategic outcomes including innovation performance (e.g. Wadhwa & Kotha, 2006), knowledge transfer (e.g. Weber & Weber, 2007), learning (e.g. Keil, Autio, & George, 2008), exploration (e.g. Schildt et al., 2005), ambidexterity (Hill & Birkinshaw, 2014), capability development (e.g. Maula et al., 2013), acquisition performance (e.g. Benson & Ziedonis, 2009), and other strategic outcomes (e.g. Hill et al., 2009). I elaborate on these as follows.

- **Innovation Performance**

Corporate Investor's Perspective

Taking the corporate investor's perspective, a group of scholars addressed the effect of CVC investing on innovation performance at various levels of analysis including the firm level, portfolio level, and network level. I first elaborate on the effect of CVC investing on innovation performance at the firm-level (Wadhwa & Kotha, 2006; Dushnitsky & Lenox, 2005a; Kim et al., 2016; Keil et al., 2008). Dushnitsky and Lenox (2005a) examined whether CVC investing is an effective means for the investors to learn new technologies and practices from their portfolio startups. They argued that CVC investing facilitates the corporate investor's learning from startups by conducting due-diligence on the startups prior to investing, obtaining board seats or board observation rights and setting up dedicated liaisons that connect between the corporate investor and the startup, and observing the failure of the startups. By analyzing U.S. corporate investors during 1969-1999, they found that CVC investing leads to greater future citation-weighted patenting rates, and this relationship is strengthened when the corporate investor has greater absorptive capacity or when the intellectual property protection (IPP) regime is weak.

In a related vein, Wadhwa and Kotha (2006) extended Dushnitksy and Lenox

(2005a)'s work by considering the potential costs of CVC investing. On the benefits side, they argued CVC investing leads to knowledge creation of the corporate investors by providing access to the startup's new technologies, obtaining problem-solving capabilities, and enhancing their absorptive capacities. On the costs side, they argued that the bounded rationality of the CVC managers and resource constraints would lead to poor selection and monitoring of portfolio startups. Based on U.S. telecommunication equipment manufacturing (TEM) firms during 1989-1999, they found that the number of CVC investment has an inverted U-shaped relationship with the number of patent applications, and this relationship is reversed and becomes a U-shaped relationship when the corporate investor is actively involved with the startup by establishing strategic alliance relationships and taking board seats. In a similar vein, based on IT firms during 1997-2007, Kim and colleagues (2016) showed that increased CVC investing leads to greater patent applications for the technology leaders with deep patent stocks but not for the technology followers.

Taking a broader approach than the previously mentioned studies, Keil and colleagues (2008) examined how the use of governance modes for external corporate venturing (e.g. CVC, alliance, joint venture, acquisition) and the relatedness between the established firm and the startup influence the firm's innovation performance. Based on largest U.S. firms in the information and communication technology (ICT) industry during 1993-2000, they found that relatedness (i.e. industry overlap) between the corporate investor and startup has an inverted U-shaped relationship with the corporate investor's patent applications.

Also, at the firm-level of analysis, Anokhin and colleagues (2016b) examined how the relationship between the corporate investor and the startup influences innovation performance. Drawing from Chesbrough (2002)'s conceptual framework, they adopted the classification of the relationships between corporate investors and startups along two dimensions: (1) technology fit when current operational capabilities are linked and (2) market fit when there is market development potential. Based on corporate investors during 1998-2001, they found that when both technology fit and market fit are high or when market fit is high but technology fit is low, it leads to corporate investors obtaining greater pools of innovation opportunities and improved scale efficiency yields. On the other hand, they found that when both technology fit and market fit are low or when technology fit is high but market fit is low, it leads to corporate investors obtaining lesser pools of innovative opportunities and diminished scale efficiency yields.

Examining at the portfolio-level of analysis, Wadhwa, Phelps, and Kotha (2016) focused on how the corporate investor's portfolio diversity influences its innovation performance. By drawing on recombinatory search research, they argued that greater portfolio diversity increases the novelty of knowledge available from the portfolio startups and the willingness of startups to share their knowledge. On the other hand, they argued that greater portfolio diversity decreases the corporate investor's relative absorptive capacity and lowers the resource constraint that the corporate investor is facing with regards to managing its relationship with its portfolio startups. Based on large global telecommunication manufacturers during 1989-2000, they found that portfolio diversity has an inverted U-shaped relationship with the corporate investor's innovation performance (i.e. forward citation-weighted patent counts), and this relationship is strengthened when the portfolio startups' stocks of patented technologies and number of alliance partners increase. Conceptualizing CVC as one vehicle of external corporate venturing, Van de Vrande, Vanhaverbeke, and Duysters (2011a) examined the complementarity among CVC, strategic alliance, and acquisition with regards to increasing innovation performance. Based on largest pharmaceutical firms during 1990-1997, they showed that CVC investing is complementary with strategic alliance and acquisition with respect to raising the corporate investor's innovation performance (i.e. weighted patent count).

Taking a network-level of analysis, Baierl and colleagues (2016) examined how the corporate investor's network characteristics influence its financial and innovation performance. Based on corporate investors during 1998-2003, they found that while the corporate investor's greater centrality leads to increased innovation performance, corporate investors belonging to a restricted subgroup leads to lesser innovation performance. Innovation performance was captured by analyzing the content of the annual reports of each firm based on keywords related to innovativeness. Furthermore, they found that innovation increases the corporate investor's subsequent financial performance, which was captured by annual shareholder return.

Start-up Firm's Perspective

By taking the start-up firm's perspective, a stream of literature provides evidence that compared to IVC-backing, CVC-backing leads to greater innovation performance of the startups (Alvarez-Garrido & Dushnitsky, 2016; Chemmanur et al., 2014; Park & Steensma, 2013). Alvarez-Garrido and Dushnitsky (2016) argued that startups' access to complementary resources of the corporate investors along the industry value chain is critical to their success in research and commercialization. Based on U.S. biotech startups during 1990-2011, they found that CVC-backed startups produce greater publications and patent outputs compared to IVC-backed startups. They further found this relationship is stronger when the corporate investor is geographically proximate and regulatory demand is high (i.e. subject to FDA approval).

In a similar vein, based on IVC-backed and CVC-backed IPO firms during 1980-2004, Chemmanur and colleagues (2014) showed that CVC-backed IPO firms have greater patent outputs, although they are younger, riskier, and less profitable than IVC-backed IPO firms. They showed that the CVC-backed IPO firm's better innovation performance arises from the corporate investor's technological fit with the startups and its tolerance for failure. In a related vein, based on U.S. startups operating in multiple industries during 1990-2003, Park and Steensma (2013) showed that CVC-backed startups generate a greater number of patents during the post-funding period compared to IVC-backed startups, and this relationship is strengthened when the corporate investors have stronger reputations.

In contrast to the previous studies, building on institutional logics, Pahnke, Katila, and Eisenhardt (2015) showed the negative effect of CVC-backing on startups' innovation performance. They argued that while corporate investors aim to increase strategic and financial gains based on financial and complementary resources, their corporate logics such as dispersed authority, complex and slow decision-making, conflicting goals, focus on strategic aims, and long time horizon inhibit the technical and commercial innovation of the portfolio startups. Based on U.S. medical device firms during 1986-2007, after removing the selection effect, they found that CVC-backing decreases the portfolio startups' technical innovation (i.e. counts of patented technologies and product approval), and this negative effect is stronger when there is industry overlap between the corporate investor and the startup. They suggested that the industry overlap may increase the misappropriation hazard that the startup is facing and diminish its technical innovation.

As previously discussed, the empirical findings on the effect of CVC investing on startup's innovation performance are mixed. It may be interesting for future research to study under what conditions CVC investing increases or decreases the startup's innovation performance. Also, it may be interesting to study why startups pursue CVC relationships despite it results in negative innovation performance in the sample of startups in Pahnke and colleagues (2015)'s work.

- **Knowledge Transfer**

A stream of research examined how CVC investing impacts knowledge transfer from the corporate investor's perspective (Smith & Shah, 2013; Lee, Kim, & Jang, 2015) and the dyadic perspective (Weber et al., 2016; Weber & Weber, 2007).

By taking a corporate investor's perspective, a few studies examined how CVC investing impacts knowledge transfer from the startup to the corporate investor (Smith & Shah, 2013; Lee, Kim, & Jang, 2015). For instance, Smith and Shah (2013) considered the cases when the portfolio startups are simultaneously the users of the corporate investors' products. By building on user innovation research (e.g. Di Stefano, Gambardella, & Verona, 2012), they argued that knowledge sourced from innovative users contribute more to generating new technologies and products than non-users because users pick up unrecognized needs, have better understanding of the context where the innovation can be applied, and interact with the innovation communities where they can draw upon diverse solutions. Based on four main corporate investors in the medical device industries during 1978-2007 (i.e. Boston Scientific, Medtronic, Guidant, and Johnson & Johnson), they found that the corporate investors' relationships with the portfolio startups that are founded by practicing physicians lead to a greater number of startups' patents being cited by the corporate investor's patents and products. In a related vein, based on U.S. corporate investors in ICT industry during 1995-2005, Lee, Kim, and Jang (2015) showed that the level of CVC investing has an inverted U-shaped relationship with the level of knowledge transferred from the startup to the corporate investor (i.e. number of the startup's patents cited by the corporate investor), and this relationship is strengthened by the corporate investor's knowledge diversity.

By taking a dyadic perspective, a few studies examined how CVC investing impacts knowledge transfer between the startup and the corporate investor (Weber et al., 2016; Weber & Weber, 2007). By extending Dyer and Singh's (1998) relational view, Weber and colleagues (2016) studied how inter-organizational rent is generated in the relationships between the corporate investors and the startups. Based on surveys and interviews on CVC managers in Austria, Germany, and Switzerland, they found that greater relation-specific assets, knowledge-sharing routines, and complementary resources and capabilities generate greater relational rent. Relational rent was captured by how the relationship improved the product quality, development of new markets, and cost reduction. Furthermore, they found that relation-specific asset and knowledge-sharing routines mediate the relationship between complementary resources/capabilities and relational rent. In a similar vein, based on interviews with CVC managers and startup CEOs in Germany, Weber and Weber (2007) found that greater relational fit (i.e. knowledge sharing routines, willingness to cooperate, emotional fit, trust) between the corporate investor and the startup enhances knowledge transfer and creation. Knowledge transfer and creation were captured by the (1) value added they provided to their partners regarding explicit and tacit knowledge and social networks and (2) the extent they learned from their partners.

The knowledge transfer research mostly focused on the corporate investor's and the dyadic perspective. By taking a dyadic perspective, it may be interesting to examine how the values are captured by the partners in a CVC relationship. For example, how are the relational rents split between the corporate investor and the startup that are in a CVC relationship?

- **Learning**

By taking the corporate investor's perspective, a few inductive studies discussed how CVC investing influences its learning. Keil, Autio, and George (2008) conceptualized CVC investing as a disembodied experimentation that takes place outside the organization, and it leads to internalizing capabilities generated through such experimentation. Based on case studies of corporate investors, they found that CVC units take on the roles of knowledge brokers that develop, experiment, and learn novel technical and business practices from startups and transfer these to the parent firms. Baldi and colleagues (2015) proposed that there is a U-shaped relationship between portfolio diversification and the corporate investor's learning propensity based on a qualitative study of top corporate investors in biopharmaceutical industry during 2003-2013.

On the other hand, taking the startup's perspective, Maula and colleagues (2009) examined how CVC investing impacts the startup's learning. Based on surveys of U.S. corporate investors and CEOs of the startups in multiple industries in 2000, they found that greater social interaction between the corporate investor and the startup increases the startup's realized learning benefit. Startup's learning benefit was captured by the extent that the startup learned from the corporate investor by obtaining market knowledge, information on competition, and technical know-how. On the other hand, they found that the adoption of greater relationship safeguards decreases the degree of social interaction between the corporate investor and the startup, which ultimately inhibits the startup's learning.

- **Exploration**

Taking the corporate investor's perspective, a stream of literature examined how CVC investing increases exploration (Schildt et al., 2005; Wadhwa, Phelps, & Kotha, 2010; Van de Vrande et al., 2011b). Schildt and colleagues (2005) examined whether governance modes for external technology sourcing (i.e. CVC, alliance, joint venture, acquisition) lead to explorative or exploitative learning. Based on U.S. firms engaging in external corporate venturing in the ICT industry, they found that lower integrated modes (e.g. CVC, alliance, joint venture) lead to greater explorative learning (i.e. generating patents that do not cite their own prior patents) than higher integrated modes (e.g. acquisition). Furthermore, they found that the greater overlap between the patent portfolios of the parent firm and the startup leads to lower exploration. Building on insights from the recombinatory search and interorganizational learning literature, Wadhwa, Phelps, and Kotha (2010) argued that the corporate investor's portfolio characteristics relate to creation of exploratory knowledge. Based on large telecommunications equipment manufacturers, they found that corporate investors investing in portfolio startups with moderately diverse, mature, and codified technological knowledge leads to greater explorative knowledge creation. In a similar vein, Van de Vrande and colleagues (2011b) examined the effects of CVC investing, alliance, and acquisition on the creation of pioneering technologies (i.e. explorative innovation). By analyzing largest pharmaceutical firms during 1990-2000, they found that greater number of CVC investing leads to increased number of pioneering technologies, and this relationship is weakened when the corporate investor invests in newer technologies.

While the previous studies took the corporate investor's perspective, from the startup's perspective, Galloway and colleagues (2017) examined how the relationship between the corporate investor's ownership and the startup's likelihood of explorative alliance formation is moderated by founders with high influence (captured by the founder ownership and technology-related knowledge). By analyzing U.S. startups that underwent IPOs during 1997-2007, they found that both founder's ownership and technology-related knowledge strengthen the positive relationship between the corporate investor ownership and the likelihood of the startup firm forming an explorative alliance.

- **Ambidexterity**

The overall CVC literature focused on examining the exploratory role of CVC investing by discussing how it can provide windows on new technology (Dushnitsky & Lenox, 2006), build options for future licensing, alliance, acquisition, new market entry (e.g. Wadhwa & Phelps, 2011), and promote entrepreneurial culture (Kanter, 1985). However, CVC investing can be pursued for either explorative or exploitative purposes (Schildt et al., 2005). The ambidexterity literature emphasizes the idea that striking the right balance between exploitation and exploration leads to a firm's greater performance and longer survival (March, 1991).

A stream of research related to CVC investing examined how ambidexterity is carried out and what are its performance outcomes (Hill & Birkinshaw, 2014; Hill & Birkinshaw, 2008). Hill and Birkinshaw (2014) focused on the corporate venturing (CV) unit, which is broader than a CVC unit. While CVC unit focuses on external corporate venturing, CV unit carries out both internal and external corporate venturing by investing in and developing new business opportunities inside and outside the parent firm. By focusing on the CV unit, Hill and Birkinshaw examined why and how some CV units survive and others do not. They conceptualized exploitation as using existing capabilities such as the parent firms' assets and capabilities, existing technologies, and intellectual properties. They conceptualized exploration as building new capabilities by creating breakthrough technologies, investing in disruptive technologies, and providing windows on new technologies. Based on a survey of global CV unit managers during 2001-2003, they found that higher level of ambidexterity (i.e. interaction between exploitation and exploration) leads to a greater likelihood of CV unit survival. By conceptualizing the CV unit as a boundary-spanning entity, they argued that CV units become ambidextrous with the help of supportive relationships that provide key resources. In this regards, they found that a stronger the relationship between the CV unit and (1) senior managers, (2) other business units, and (3) the VC community leads to higher levels of ambidexterity.

In a related vein, Hill and Birkinshaw (2008) classified CV units' strategic objectives under two dimensions: internal vs. external and exploitation vs. exploration. They argued that well aligning strategic objectives with organizational profiles (e.g. relationship with senior managers and VC community, relative focus on building, developing, selecting, exiting ventures, incentive system) will result in greater financial and strategic performance. Based on surveys of global CV unit managers during 2001-2003, they found that better alignment between strategic objectives and organizational profiles lead to better CV unit performance (captured by financial performance, technological development, entrepreneurial capability). Furthermore, they showed that exploitation-oriented CV units survive longer than exploration-oriented CV units.

By taking an inductive approach, Basu, Phelps, and Kotha (2016) examined how CVC units search for external knowledge (i.e. exploration) and integrate it within the parent firm's organizational units (i.e. exploitation). Based on interviews with U.S. CVC managers during 2006-2012, they found that while all CVC units adopted the investing practices that are well established in the VC community, those practices idiosyncratic to CVC investing, such as being entrepreneurial and politically savvy to build connections within the organization, led to the corporate investor's better learning from the portfolio startups.

The ambidexterity literature noted that balancing between exploitation and exploration can be achieved through structural, temporal, or contextual separation between the two activities (Raisch et al., 2008). While structural solutions separate exploitation and exploration under two separate organizational units, contextual solutions establish systems, processes, and beliefs that allow individuals in the organizational units to divide their time to exploitation and exploration, and temporal solutions oscillate between the two activities over time. Most CV research examined how ambidexterity can be achieved through contextual separation and scholars largely focused on cross-sectional data analysis (Hill & Birkinshaw, 2014; Hill & Birkinshaw, 2008). It may be interesting for future research to examine how exploitation and exploration in CVC can oscillate over different time periods and the resulting performance outcomes by analyzing longitudinal data.

- **Capability Development**

Past research showed that CVC investing helps corporate investors hone their capabilities to pick up technological discontinuities (Maula et al., 2013), select and value potential investment targets and acquisition targets (Yang et al., 2009; Benson & Ziedonis, 2009), and engage in external corporate venturing (Keil, 2004).

Maula and colleagues (2013) examined how senior managers pick up technological discontinuities. They argued that the corporate investor's heterogeneous interorganizational relationships (i.e. syndication ties with VCs) provides access to more diverse information and viewpoints that can help reshape the manager's attention patterns and facilitate timely attention to technological discontinuities. Based on largest U.S. corporate investors in the ICT industry during 1989-2000, they found that corporate investor's syndication with VCs, in particular, those with high-statuses, enable the managers to attend to technological discontinuities earlier.

Yang, Narayanan, and Zahra (2009) conceptualized CVC investing as an effective learning mechanism to equip the corporate investors with selection and valuation capabilities of potential investment targets, which enhances the corporate investor's financial and strategic performance. While selection capabilities are based on whether corporate investors can select investment targets that can generate financial and strategic returns, valuation capabilities are whether corporate investors can take a fair proportion of the portfolio startup's equity. Based on U.S. corporate investors and portfolio startups during 1990-2001, they found that an intense, diverse, and syndicated CVC investing experience leads the corporate investors to select portfolio startups with greater strategic potential (i.e. IPO likelihood, patent counts), and this relationship will be stronger when project uncertainty is lower. Furthermore, they found that diverse experience enhances the corporate investor's valuation capability (i.e. post-money valuation), and this relationship will be stronger when project uncertainty is lower. In a related vein, Benson and Ziedonis (2009) examined how CVC investing helps the corporate investors to develop capabilities to select and valuate acquisition targets. By drawing upon absorptive capacity literature, they argued that CVC investing equips the corporate investors with capabilities to identify and evaluate valuable, unique, and synergistic targets. Based on U.S. corporate investors in the IT industry during 1987-2003, they found that greater CVC intensity leads to increased performance of acquiring startups at a diminishing rate.

Based on case studies of two ICT firms during 1996-2000, Keil (2004) showed that through acquisitive and experiential learning, firms develop external corporate venturing capabilities. While acquisitive learning occurs when firms acquire external knowledge and internalize it, experiential learning occurs inside organizations and create knowledge that is adapted to the organization. External corporate venturing capabilities consist of organizational structures, resources, processes, skills, knowledge, education and reward systems that enable the firm to utilize external ventures to develop new capabilities and reconfigure existing ones to build new businesses.

- **Acquisition Performance**

As discussed in the Motivations of CVC section (pp. 36-46), by building on a real options perspective, CVC investing can be conceptualized as stepping stones for future licensing, alliance, and acquisition opportunities. The literature provides evidence that the resolution of various types of uncertainties increases the likelihood that the CVC investing will lead to subsequent licensing, alliance, or acquisition deals (Ceccagnoli, Higgins, & Kang, 2015; Wadhwa & Phelps, 2011; Van de Vrande & Vanhaverbeke, 2013; Benson & Ziedonis, 2010; Maula & Murray, 2000). However, studies that discuss the performance outcomes arising from such relationships are scarce, except for acquisitions (Benson & Ziedonis, 2010). Thus, here I focus my review of the literature on the performance outcomes of acquiring CVC portfolio startups.

A stream of literature consistently showed that CVC investing leads to greater acquisition performance (Benson & Ziedonis, 2009; Ivanov & Xie, 2010; Masulis & Nahata, 2011). Benson and Ziedonis (2009) examined how the information gained through CVC investing can be used to select lucrative acquisition target firms. By drawing on the absorptive capacity literature, they argued that by CVC investing, corporate investors gain capabilities to identify and evaluate valuable, unique, and synergistic target startups, whereas they leverage their internal knowledge base to assimilate and utilize the startups' knowledge after the acquisition. Also, they argued that the corporate investors can gain access to potential acquisition targets when they can prove their commitment to the IVCs and when they have good reputations. Thus, they argued that stable CVC investing is better off than sporadic investing. Based on U.S. corporate investors in the IT industry during 1987-2003, they found that greater CVC investment intensity leads to increased acquisition performance (i.e. abnormal returns) at a diminishing rate, and stable CVC investing results in greater acquisition performance than sporadic CVC investing. In a related vein, based on CVC-backed startups that were acquired during 1981-2000, Ivanov and Xie (2010) found that CVC-backing leads to greater acquisition premiums of the portfolio startups when there is strategic fit between the corporate investor and the startup compared to non-CVC-backed acquisitions. Similarly, based on U.S. corporate investors during 1991-2006, Masulis and Nahata (2011) found that CVC investing leads to greater cumulative abnormal return (CAR) than that of IVC, and this relationship arises from corporate investor's pursuit of strategic benefit.

While the previous studies evidenced the positive performance of third-party corporate investors' acquisition of startups, Benson and Ziedonis (2010) evidenced a negative performance effect of acquiring portfolio startups by original corporate investors. Based on top U.S. corporate investors during 1987-2003, they found that while the overall performance of third-party corporate investors' acquiring startups is positive with the average CAR of 0.67%, the performance of original corporate investors' acquiring their portfolio startups is negative with the average CAR of -0.97%. They further showed that the original corporate investor's underperformance cannot be explained by owner's curse, poor governance, or managerial overconfidence. Furthermore, they found that the third-party corporate investors' performance of acquiring startups is stronger for those that have dedicated CVC units, which indicates the importance of the organizational design of CVC investing.

Benson and Ziedonis (2010)'s work leaves a puzzle in the acquisition performance literature. It may be interesting to further study why the acquisition of portfolio startups by the original corporate investors underperform. Also, while there has been some research on the role of dedicated units in the alliance context (Kale, Dyer, & Singh, 2002), those from CVC has been scarce. It may be interesting for future research to discuss the role of dedicated

CVC units and in general, how CVC units can be effectively designed to obtain greater strategic outcomes.

- **Other Strategic Outcomes**

The literature examined how CVC investing results in other strategic outcomes. For instance, Hill and colleagues (2009) examined how the adoption of VC practices influence CV unit performance. They captured strategic performance by asking the CV unit managers about the extent that the corporate venturing activities helped ecosystem building, option building, providing windows on emerging technologies, increasing visibility inside and outside the organization, and creating spin-outs. They found that by adopting VC practices such as incentive, autonomy, syndication, staging, and specialization, CV units obtain greater strategic and financial performance and increased survival.

Basu and Wadhwa (2013) examined the relationship between CVC investing and discontinuous strategic renewal, which involves major changes in the corporate investor's core businesses by entering new businesses or exiting from existing businesses. Taking a real options perspective, they argued that CVC investing creates growth options in new and existing businesses but does not induce firms to exit from existing businesses. Based on Fortune 500 firms during 1990-2000, they found that CVC investing is negatively related to the firm's likelihood of pursuing discontinuous renewal, and this relationship is stronger when the firm is operating in a dynamic industry and has strong internal capabilities.

Lee and Kang (2015) conceptualized CVC investing as creating diverse options. They argued that greater level of CVC investing leads to accessing the startup's diverse knowledge. However, they expected that when CVC investing exceeds a certain level, due to resource constraints, lesser resources will be allocated to internal R&D and lesser existing knowledge will be recombined with new knowledge, leading to a reduction of diverse knowledge generation. Based on U.S. corporate investors during 1990-2010, they found that greater level of CVC investing has an inverted U-shaped relationship with the corporate investor's technological diversification. Also, they found that greater portfolio diversity of the corporate investor has an inverted-U shaped relationship with technological diversification, and this relationship is strengthened by the corporate investor's absorptive capacity.

Ivanov and Masulis (2011) examined how CVC-backing influences the corporate governance of portfolio startups that underwent IPOs. They argued that corporate investors are motivated to equip their portfolio startups with good governance before applying for an IPO because it preserves the corporate investor's reputation, increases greater strategic opportunities arising from investors and underwriters, and constrains the startup's managerial entrenchment motives. Based on IVC- and CVC-backed U.S. IPO firms during 1992-1999, they found that compared to IVC-backing, CVC-backing results in IPO firms adopting a greater number of independent board of directors, an increased level of anti-takeover provisions, and smaller primary shares to preserve their voting rights. Furthermore, they found CVC-backed IPO firms survive longer and have a lower likelihood of being acquired.

LiPuma (2007) examined how CVC investing influences the internationalization of portfolio start-up firms. Based on U.S. startups during 1997-2003, they found that greater CVC-backing leads to increased proportion of the startup's revenue being generated from foreign markets. The strategic outcomes of CVC investing are summarized in Table 8.

Table 8. Strategic Outcomes of CVC

	Perspective	Level	Examples
Innovation Performance	Corporate investor	Network	• Innovativeness (Baierl et al., 2016)
		Firm	• Patent generation, citation, application (Wadhwa & Kotha, 2006; Dushnitsky & Lenox, 2005a; Kim et al., 2016; Keil et al., 2008) • Pools of innovation opportunity (Anokhin et al., 2016b)
		Portfolio	• Patent generation (Wadhwa, Phelps, and Kotha, 2016; Van de Vrande, Vanhaverbeke, & Duysters, 2011a)
	Startup	Firm	• Patent, publication, product approval (Alvarez-Garrido & Dushnitsky, 2016; Pahnke, Katila, & Eisenhardt, 2015; Chemmanur et al., 2014; Park & Steensma, 2013)
Knowledge Transfer	Corporate investor	Firm	• Startup's patents cited by the corporate investor (Smith & Shah, 2013; Lee, Kim, & Jang, 2015)
	Dyad	Dyad	• Value added and learning effect (Weber & Weber, 2007) • Improved product quality, new market development, cost reduction (Weber et al., 2016)
Learning	Corporate Investor	Firm	• Learning propensity (Keil, Autio, & George, 2008; Baldi et al., 2015)
	Startup	Firm	• Learning about market, technology, competition (Maula et al., 2009)
Exploration	Corporate Investor	Firm	• Patents that do not cite their own prior patents (Schildt et al., 2005; Wadhwa, Phelps, & Kotha, 2010; Van de Vrande et al., 2011b)
	Startup	Firm	• Explorative Alliance (Galloway et al., 2017)
Ambidexterity	Corporate investor	CV unit	• CV unit survival (Hill & Birkinshaw, 2014) • Financial performance, technological development, entrepreneurial capability (Hill & Birkinshaw, 2008)
		CVC unit	• Learning from startups (Basu, Phelps, & Kotha, 2016)
Capability Development	Corporate investor	Firm	• Alert technological discontinuities (Maula et al., 2013) • Selection and valuation of potential investment targets (Yang, Narayanan, & Zahra, 2009) • Selection and valuation of potential acquisition targets (Benson & Ziedonis, 2009) • External corporate venturing capability (Keil, 2004)
Acquisition Performance	Corporate investor	Firm	• Acquisition of startups by third-party corporate investor (Benson & Ziedonis, 2009; Ivanov & Xie, 2010; Masulis & Nahata, 2011) • Acquisition of startups by original corporate investor (Benson & Ziedonis, 2010)
Other Strategic Outcomes	Corporate investor	Firm	• Ecosystem building, option building, providing windows on emerging technologies, increasing visibility inside and outside the organization, and creating spin-outs (Hill et al., 2009) • Discontinuous strategic renewal (Basu & Wadhwa, 2013)
		Portfolio	• Technological diversification (Lee & Kang, 2015)
	Startup	Firm	• Corporate governance of startups (Ivanov & Masulis, 2011) • Internationalization (LiPuma, 2007)

3.6. FUTURE RESEARCH DIRECTION

I have discussed the current state of knowledge in CVC research, focusing on four themes: motivations of CVC, antecedents of CVC, management of CVC, and outcomes of CVC. While CVC research has focused on investigating the antecedents and outcomes of CVC, research on the motivations and management is still in a fairly embryonic stage. It will be fruitful for future research to examine and seek empirical evidence on the motivations and management of CVC. Furthermore, I expect that investigating the intersections among the four themes will provide fruitful opportunities for future research. I elaborate on the direction for future research as follows.

Most of the research on motivations of CVC was based on surveys and anecdotal evidence (e.g. Kann, 2000; Maula, 2001; Keil, 2000). Future research may seek for evidence of various motivations to engage in CVC based on quantitative analysis of a large sample of firms. For instance, how does CVC investing help the corporate investors to complement their technology portfolio by sourcing knowledge from the startups? Also, while there has been theoretical research or anecdotal evidence on corporate investors' motivations to build ecosystems (Riyanto & Schwienbacher, 2006; Kann, 2000), there is little empirical evidence based on large samples of firms. How does CVC investing help build ecosystems of products and technologies that will complement the core products and technologies of the parent firm?

The literature on outcomes of CVC has focused on various performance dimensions such as innovation performance (e.g. Wadhwa & Kotha, 2006), knowledge transfer (e.g. Weber & Weber, 2007), learning (e.g. Keil, Autio, & George, 2008), exploration (e.g. Schildt et al., 2005), ambidexterity (Hill & Birkinshaw, 2014), capability development (e.g. Maula et al., 2013), and acquisition performance (e.g. Benson & Ziedonis, 2009). However, more performance dimensions should be examined to reflect the various motivations of CVC. For instance, how does CVC result in ecosystem building or networking with startups and VC communities? How does CVC help the corporate investor or the startup to enter new markets or businesses?

While the literature on the motivations of CVC and the literature on the outcomes of CVC developed separately, it may be interesting to examine how setting certain motivations affects its outcomes. For instance, by analyzing German corporate investors, Weber and Weber (2005) found that the corporate investors focusing primarily on either strategic or financial goals show greater goal attainment compared to those aiming for a mixture of strategic and financial goals. They supposed that setting a mixture of goals may have caused conflict and inefficiencies in the CVC units. This finding leaves us an empirical puzzle because we observe that the majority of the corporate investors have a mixture of strategic and financial goals. It may be interesting for future research to examine how multiple goals are set and championed by multiple actors in organizations from different motivations and how this process influences performance outcomes.

Scholars have recognized that CVC investing is an effective tool for organizational learning (Keil, Autio, & George, 2008) and that CVC can be carried out for conflicting initiatives of exploitation and exploration (Schildt et al., 2005; Wadhwa & Basu, 2013). While research found resource allocation decisions to exploitation and exploration can impact the firm's financial, strategic performance, and longevity (Hill & Birkinshaw, 2008), the literature has not yet examined how exploitative and explorative CVC investing decisions are carried out. It may be interesting for future research to look at how resources are allocated to exploitation and exploration in CVC investing.

CVC research has recognized that various stakeholders of the CVC program, such as the established firm's senior executives, business units, the start-up firms, and the venture capitals (VCs), take part in the CVC decision-making process and share the jointly created value (e.g. Basu, Phelps, & Kotha, 2016; Keil, Autio, & George, 2008). Much less attention has been paid to how powerful entities of corporate governance, such as shareholders or board of directors, might affect CVC investing decisions (recent exceptions are Anokhin et al. (2016a) and Sahaym et al. (2016). While recent CVC research examined how the characteristics of the top management team, CEO duality, board, and shareholders impact the number of CVC deals firms enter (Anokhin et al., 2016a; Sahaym et al., 2016), future research may study how the entities of corporate governance might impact exploitative and explorative CVC decisions.

Research on outcomes of CVC suggests that striking the right balance between exploitation and exploration enhances a firm's performance and survival (Hill & Birkinshaw, 2014; Hill & Birkinshaw, 2008). While this research indicates that equally allocating the resources to exploitation and exploration is important, recent development in the ambidexterity literature suggests that oscillating between exploitation and exploration over time can raise a firm's performance (Raisch & Birkinshaw, 2008). Future research may examine how such oscillation between exploitative and explorative CVC investing impacts a firm's performance.

Research on antecedents of CVC focused on how and under what conditions CVC activity increases. However, scholars paid much less attention to when CVC is terminated. A few studies examined how staffing choice and performance feedback influence abandonment decisions of CVC units (Gaba & Dokko, 2016; Gaba & Bhattacharya, 2012). Future research may investigate alternative mechanisms of CVC unit termination such as how the relationships between CVC units and its stakeholders (e.g. business units, startups) influence the perception and legitimacy of the CVC unit's existence. Also, it may be interesting for future research to examine the conditions when CVC deals are abandoned.

The literature understood CVC as one of the vehicles for external technology sourcing along with alternative vehicles such as licensing, alliance, and acquisition (Ceccagnoli, Higgins, & Kang, 2015; Van de Vrande et al., 2009). In this regards, the literature examined how alternative governance mode for technology sourcing motivates CVC or how CVC motivates adoption of alternative governance mode. However, there was limited research on how alternative governance mode for technology sourcing motivates CVC. For instance, only a few research examined how alliance leads to subsequent CVC deals (Dushnitsky & Lavie, 2010) or how internal R&D increases CVC investing (Sahaym et al., 2010). It may be fruitful for future research to examine how acquisition or licensing deals affect future CVC decisions.

Also, the literature on governance mode for technology sourcing focused on examining how and under what conditions CVCs lead to subsequent licensing, alliance, or acquisition deals (Ceccagnoli, Higgins, & Kang, 2015; Wadhwa & Phelps, 2011; Van de Vrande & Vanhaverbeke, 2013; Benson & Ziedonis, 2010; Maula & Murray, 2000). On the contrary, there is limited research on their performance outcomes except for when CVCs lead to subsequent acquisitions (Benson & Ziedonis, 2010; Benson & Ziedonis, 2009; Ivanov & Xie, 2010; Masulis & Nahata, 2011). Thus, it may be interesting for future research to investigate the performance outcomes of using CVC as stepping stones for future licensing and alliance opportunities.

In a related vein, a stream of research found that the acquisition of CVC portfolio startups by third-party acquirers results in positive performance (Benson & Ziedonis, 2009; Ivanov & Xie, 2010; Masulis & Nahata, 2011), whereas the acquisiton by the original corporate investors results in negative performance (Benson & Ziedonis, 2010). It may be interesting to study why the acquisition of portfolio startups by the original corporate investors underperforms than that by third-party acquirers (Benson & Ziedonis, 2010). Also, Benson and Ziedonis (2010) noted that third-party acquirers with dedicated CVC units performed better than those without such units. While there has been some research on the role of dedicated units in the alliance context (Kale, Dyer, & Singh, 2002), those from CVC has been under-examined. It may be interesting for future research to examine the role of dedicated CVC units and in particular, how CVC units are effectively designed to undertake strategic initiatives such as increasing alliance or acquisition opportunities.

Most of the literature on how CVC is organized conducted studies based on qualitative analysis (e.g. Basu et al., 2016). It may be useful for future research to seek for empirical evidence based on quantitative analysis of a large sample of firms. Furthermore, literature on how CVC is organized needs to be tied up to the performance literature. For instance, in a broad sense, how does the management of CVC influence the performance outcomes? In this regards, it may be worthwhile to examine how the stakeholders of CVC, particularly those related to alternative technology sourcing modes, such as alliance or acquisition units interact with the CVC unit and influence performance outcomes. For instance, how does the interaction between the alliance and CVC units influence the decision to step up to establish a strategic alliance from a CVC relationship and what are its performance outcomes?

Also, the literature on the organization of CVC has examined how the endo- and exo-isomorphism lead to different organizational designs and investment practices (Souitaris, Zerbinati, & Liu, 2012; Souitaris & Zerbinati, 2014). It may be interesting to examine how the different norms - "powerful standards of behavior that are rooted in widely shared beliefs about how actors should behave (Philippe and Durand, 2011)" - between the CVC units and the actors inside the firm (e.g. parent firm's business unit, senior executives) or outside the firm (e.g.

startups, IVCs) influence the knowledge transfer process and subsequent innovation performance (Di Stefano, King, & Verona, 2013). For instance, how does the adoption of endo- or exo-isomorphism affect the knowledge transfer process and innovation performance?

Overall, the majority of CVC research is developed from the corporate investor's perspective. While research taking the start-up firm's perspective has been developing, there are huge opportunities for future research (Basu et al., 2016). From the startup's perspective, it may be fruitful to examine how managerial decisions are made. For instance, how does negative performance feedback influence organizational change and how is this relationship influenced by corporate governance such as CVC or IVC? How does slack and problemistic search impact decision-making of the startup within the CVC relationship? Also, it may be interesting for future research to examine how knowledge transfer works for the startup in a CVC relationship. For example, how does the CVC relationship influence the extent the corporate investor's patents are applied and cited at the startups' patents and products?

Also, more CVC research that takes the dyadic perspective is called for. For example, the knowledge transfer research has mostly focused on the dyadic perspective. For this research, it may be interesting to examine how the value capture and bargaining occurs in a CVC relationship. For instance, how and under what conditions are the relational rents split between the corporate investor and the startup?

3.7. CONCLUSION

During the past four decades, CVC has increasingly become a focus of academic interests. Prior research has provided significant insights on why firms engage in CVC, how and under what conditions firms undertake CVC, how CVC is managed inside and outside the firm, and the financial and strategic outcomes of CVC. I suggested that the intersections of the four themes are fruitful avenues for future research.

Among the directions for future research I discussed, in the next three essays of this dissertation, I focus on the intersections among the antecedents, management, and outcomes of CVC. More specifically, I aim to investigate how exploitative and explorative CVC investing decisions are made under the influence of shareholders and board of directors. Furthermore, I aim to examine the performance consequences of oscillating between exploitation and exploration in CVC investing. In the next chapter (first essay), by breaking away from the empirical context of CVC investing and drawing insights from corporate governance research, I theorize on how poor firm performance influences the managerial decision-making with regards to allocating resources to exploitation and exploration and how such decisions are affected by shareholders and board of directors.

CHAPTER 4. ESSAY 1. PERFORMANCE FEEDBACK, CORPORATE GOVERNANCE, AND THE DIRECTION OF ORGANIZATIONAL CHANGE[5]

ABSTRACT

Review of the CVC literature suggests that research is called upon on the intersections among the antecedents, management, and outcomes of CVC. In the first essay, by breaking away from the empirical context of CVC investing and taking a broader perspective, we theorize on how poor firm performance influences the managerial decision-making with regards to allocating resources to exploitation and exploration and how such decisions are affected by shareholders and board of directors. We draw upon the Behavioral Theory of the Firm (BTF) and Corporate Governance research because these are useful in explaining how resource allocations are made to exploitative and explorative CVC investing.

More specifically, by drawing on insights from the BTF, corporate governance, and decision risk research, we theorize on how poor firm performance influences the direction of change and how the concentration of a firm's dedicated and transient shareholders influence this relationship. Furthermore, by drawing on insights from the BTF, corporate governance, and organizational control research, we theorize on how the relationship between poor firm performance and direction of change will be influenced by the board's monitoring and advising intensities. We predict that poor firm performance triggers firms to engage in increased organizational change (P1). We predict that this change is directed at exploitation rather than

[5] This chapter is co-authored with Pierre Dussauge and Corey Phelps

exploration when managers are risk-averse (P2) and it is directed at exploration rather than exploitation when managers are risk-seeking (P3). Assuming that typical managers are risk-averse, we predict that as the concentration of dedicated ownership in a poorly performing firm increases, the firm alters its search trajectory by exploring more and exploiting less (P4). Also, we predict that as the concentration of transient ownership in a poorly performing firm increases, the firm alters its search trajectory by exploiting more and exploring less (P5). We also predict that as the level of the board's monitoring intensity increases in a poorly performing firm, firms will increase their investments in exploitation and decrease their investments in exploration (P6) and as the level of the board's advising intensity increases in a poorly performing firm, firms will increase their investments in exploration and decrease their investments in exploitation (P7).

This essay contributes to research on the Behavioral Theory of the Firm and corporate governance by showing how the direction of organizational change, as indicated by the firms' allocation of resources to exploration and exploration, in response to negative performance feedback, is influenced by the concentration of dedicated and transient shareholders and by the board's monitoring and advising intensities.

Keywords: Behavioral Theory of the Firm, Corporate Governance, Exploitation, Exploration.

4.1. INTRODUCTION

Review of the CVC literature suggests that research is called upon on the intersections among the antecedents, management, and outcomes of CVC. In this essay, by breaking away from the empirical context of CVC investing and taking a broader perspective, we theorize on how poor firm performance (i.e. negative performance feedback) influences the managerial decision-making with regards to allocating resources to exploitation and exploration and how such decisions are affected by shareholders and board of directors. We build on the Behavioral Theory of the Firm (BTF) and Corporate Governance research because these are useful in explaining how resource allocations are made to exploitative and explorative CVC investing.

The conditions under which organizations change their strategic behavior is a core topic of research in strategy and organization theory (e.g., Argote & Greve, 2007; Gavetti et al., 2012). One compelling theoretical approach to investigating this question is the Behavioral Theory of the Firm (BTF), which argues that boundedly rational decision makers simplify organizational performance evaluation by setting discrete targets or "aspiration levels" and, when realized performance falls below such levels, engage in problemistic search to identify satisfactory solutions that are expected to reverse the performance shortfall (Cyert & March, 1963; Levinthal & March, 1981). The idea that organizations pursue adaptive change in response to performance feedback is a cornerstone proposition of the BTF (Gavetti, et al., 2012). Substantial empirical research employs this core insight and has found that poor organizational performance predicts changes in a variety of strategic actions (Shinkle, 2012) including acquisitions, divestitures, market entry, competitive positioning, and R&D investments (Iyer & Miller, 2008; Shimizu, 2007; Greve, 2003a; Greve, 1998). Despite the enormous influence the BTF has had on organizational theory and strategy research, substantial opportunity exists to expand our understanding of how performance relative to aspiration levels leads to organizational change.

First, BTF research provides little insight into how influential external and internal constituencies, such as shareholders and board of directors, might affect organizational decision-making during times of poor performance (Gavetti et al., 2012). Instead, this research typically assumes an organization is composed of a dominant coalition of managers that reigns over the strategic decision-making process, reflecting its own interests and preferences (Desai, 2016). This assumption stands in stark contrast with a fundamental insight from corporate governance research. The governance literature recognizes that the interests of a firm's top managers in making strategic decisions may conflict with those of the firm's owners (shareholders) and that the purpose of corporate governance is to influence a firm's strategic decision-making by aligning it with shareholders' interests (Monks & Minow, 2008). Firms adopt corporate governance mechanisms such as shareholders or board of directors to influence managerial decision-making (Daily et al., 2003).

On the one hand, research shows that shareholders often seek to influence a variety of corporate strategy decisions (Kochhar & David, 1996; Hoskisson et al., 2002; Kim et al., 2008), particularly when firms perform below expectations (McCahery, Sautner & Starks, 2016). Corporate governance research also recognizes that a firm's shareholders are often heterogeneous with respect to their investment incentives and time horizons and that these differences result in different preferences for particular managerial decision-making (Bushee, 1998; Hoskisson et al., 2002; Kochhar & David, 1996; Zhang & Gimeno, 2016). This research stream often distinguishes between dedicated shareholders and transient shareholders (Bushee, 1998; Porter, 1992). Dedicated shareholders have relatively long-term investment horizons, take large positions in a few firms, and are thus, concerned about their ability to liquidate their positions (Bushee, 1998; Porter, 1992). Transient shareholders have short-term horizons, take small positions in a large number of firms, and are thus, less concerned about liquidity (e.g. Bushee, 1998; Porter, 1992). Of particular relevance to the BTF and problemistic search, studies show that when firms are confronted with earnings pressure or miss earnings targets, dedicated shareholders encourage top management to maintain or increase investments in projects that have long-term payoffs such as R&D and discourage managers from allocating resources to projects with short-term payoffs, whereas transient shareholders have opposite preferences (Bushee, 1998; Zhang & Gimeno, 2016). While these findings suggest shareholder composition may influence how firms respond to negative performance feedback, prior research has not explored this proposition.

On the other hand, in addition to the shareholder's influence, the corporate governance literature recognizes that the board of directors often seek to influence a variety of corporate strategy decisions through monitoring and advising (Desai, 2016; Faleye et al., 2011), particularly when firms perform below aspirations (Desai, 2016; Dowell et al., 2011; Tuggle et al., 2010). Research on board influence suggests that poor firm performance provides legitimacy to the board of directors and shareholders to limit the level of managerial discretion and influence managerial decision-making (Desai, 2016; Dowell et al., 2011; Tuggle et al., 2010). This research stream often discusses the two main roles of the board as monitoring and advising (Faleye et al., 2011; Dalton et al., 1998; Jensen, 1993; Johnson, Daily & Ellstrand, 1996). As the fiduciary of the shareholders, the board takes the monitoring role so that managers do not pursue perks but work for the best interests of the shareholders (Johnson, Daily & Ellstrand, 1996; Jensen & Meckling, 1976; Eisenhardt, 1989). Additionally, the board takes the advising role and provides expert advice and counsel to the managers for the success of the firm (Lorsch & MacIver, 1989; Pfeffer & Salancik, 1978). Of particular relevance to the BTF and problemistic search, studies show that when firms are under the influence of inside board members, who typically carry out strong advising roles, they are likely to discourage R&D investments, which typically have long-term payoffs (Faleye et al., 2011; Deutsch, 2005; Zahra, 1996; Baysinger et al., 1991; Hill & Snell, 1988). On the other hand, studies show that when firms are under the influence of outside board members, who generally take monitoring roles, they are likely to encourage R&D investments (Faleye et al., 2011; Deutsch, 2005; Zahra, 1996; Baysinger et al., 1991; Hill & Snell, 1988). While these findings suggest board composition may influence how firms respond to negative performance feedback, prior research has not explored this proposition (except for a recent study by Desai (2016)). By integrating insights from corporate governance research on both shareholder and board influences with those from the BTF, we can improve our understanding of how and why organizations change in response to poor performance.

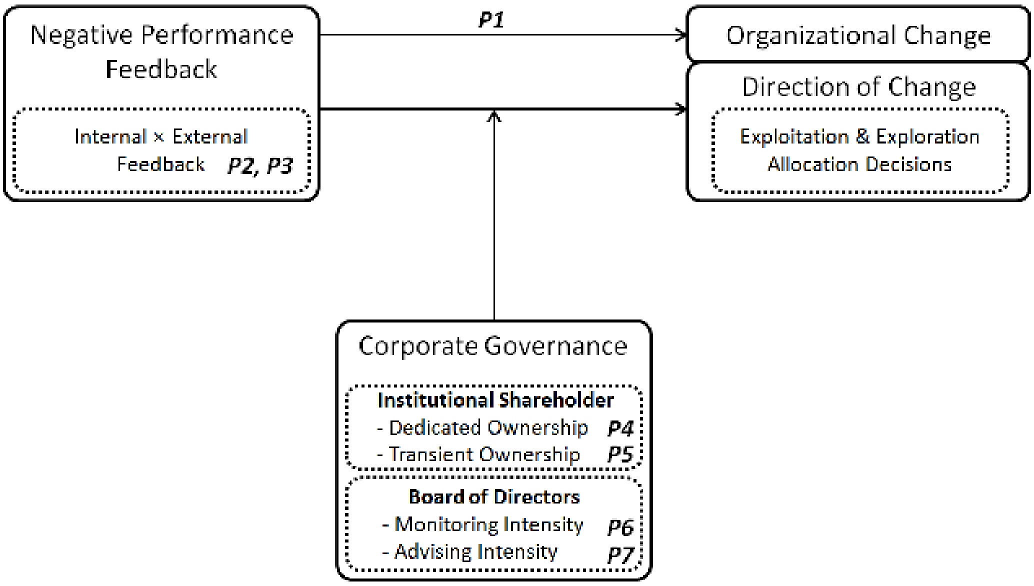
Secondly, BTF research provides little insight into how negative performance feedback influences where firms search for solutions and thus, the direction of organizational change (Greve & Zhang, 2016; Kuusela et al., 2016). Although Cyert and March (1963) proposed that problemistic search is initially myopic – organizations begin searching for solutions in the neighborhood of the problem and will only search more broadly if no satisfactory solutions are found – empirical research has almost entirely focused on whether and when firms make a particular type of change rather than the direction of change (Kuusela et al., 2016 and Greve & Zhang, 2016 are recent exceptions). For example, while research shows negative performance feedback increases R&D intensity (Chen & Miller, 2007; Greve, 2003a), it does not consider where such R&D expenditures are allocated. Firms may allocate R&D resources to ongoing projects in areas of technology in which they have established competence or to new projects in unfamiliar areas (Dosi, 1988). In other words, firms may search for solutions locally (i.e. exploit) or distally (i.e. explore) (March, 1991; Nelson & Winter, 1982). In general, in responding to negative performance feedback, firms may choose particular types of solutions to performance problems and then choose where to search within the chosen domains for particular solutions. The BTF lacks a mechanism to predict how problemistic search affects decision-making with regards to the direction of change after the need for and type of change have been established (Greve & Zhang, 2016).

One potential solution to this theoretical limitation of the BTF is to recognize that the need for organizational change and the direction of change may be independent and driven by different mechanisms. Kacperczyk et al. (2015) recently argued that prior BTF research on the impact of negative performance feedback often confounded two different theoretical mechanisms – the organizational change-inducing effect of problemistic search (as developed in the BTF) and the risk-seeking inducing effect of managerial loss aversion from prospect theory (Kahneman & Tversky, 1979). Consequently, much BTF research has theorized that negative organizational performance feedback triggers both problemistic search and managerial loss aversion, leading firms to adopt risky changes. Kacperczyk et al. (2015) showed the two effects are independent: poor organization-level performance indeed triggers organizational change but not the riskiness of the change. Instead, the riskiness of change is driven by the extent to which managers of the organizational unit implementing the change are performing below peers in other units of the same organization, which triggers individual loss aversion and risk-seeking behavior (Kacperczyk et al., 2015).

These results have important implications for predicting the direction of organizational change triggered by poor organizational performance. Because the returns to local search efforts (exploitation) are typically realized sooner and are less variable than those of distant search (exploration) (March, 1991), local search is less risky than more distant exploration. Consequently, Kacperczyk et al.'s (2015) study suggests that where firms search for solutions and thus, the direction of organizational change will depend on the risk preferences of managers implementing the change. However, the BTF as developed by Cyert and March (1963) does not consider the influence of risk on organizational change and the related empirical research rarely distinguishes between organizational change and the riskiness of such change. By focusing on how managerial risk preferences are altered by comparing their performance with the peers in other units of the same organization and how such risk preferences interact with the need for change, we can improve our understanding of where organizations search for solutions to solve the problem of poor performance.

To address these limitations of the BTF literature, we investigate how poor organizational performance and managerial risk preferences affect where firms search for solutions within a particular domain of change and this relationship is influenced by different types of shareholders – dedicated and transient – and different roles of board of directors – monitoring and advising.

Figure 6. Theoretical Model



In investigating our research question, we build on the BTF and draw on insights from decision risk, corporate governance, and organizational control research to explain how dedicated and transient ownerships and monitoring- and advising-intensive boards affect the direction of organizational change. Our theoretical model is illustrated in Figure 6. As a baseline proposition, we argue that negative firm-level performance feedback results in increased likelihood of organizational change (P1). We then examine how poor firm performance and managerial risk preferences influence the direction of change with respect to allocating resources to exploitation and exploration. We argue that poor firm performance and risk-averse managers trigger more exploitation and less exploration (P2) whereas, poor firm performance and risk-seeking managers trigger more exploration and less exploitation (P3).

Prior to theorizing on the moderating effect of shareholders and boards on the relationship between performance shortfall and direction of change, we assume that typically managers are risk-averse because they are under employment risk and scrutiny by investors

(Block & Ornati, 1987; Dushnitsky & Shapira, 2010; Thelander, 2016). We predict that as the concentration of dedicated ownership in a poor performing firm increases, the firm will alter its search trajectory by exploring more and exploiting less because dedicated shareholders prefer long-term growth in value creation and are more inclined to voice their interests when firm performance misses expectations (P4) (Bushee, 1998; Zhang & Gimeno, 2016). In contrast, because transient shareholders prefer short-term returns and are more inclined to pose a credible threat of exiting their positions if performance misses expectations (Bushee, 1998; Zhang & Gimeno, 2016), we argue that as the concentration of transient ownership increases, poorly performing firms will increase their investments in exploitation and decrease their investments in exploration (P5). In addition to the shareholder's influence, we examine the board's influence on the relationship between performance shortfall and the direction of change. While the strategic control aims to control managers based on the quality of the decision-making process, financial control relies on the measurable outcome of the decision-making (Eisenhardt, 1985). We argue that as the level of the board's monitoring intensity increases, poorly performing firms will increase their investments in exploitation and decrease their investments in exploration because monitoring-intensive boards rely on financial controls, which motivates managers to become myopic and risk-averse (P6). Lastly, we argue that as the level of the board's advising intensity increases, poorly performing firms will increase their investments in exploration and decrease their investments in exploitation because monitoring-intensive boards rely on strategic controls, which motivates managers to become long-term oriented and risk-tolerant (P7).

This theoretical chapter contributes to the BTF and corporate governance research as follows. While BTF traditionally examined when and how firms will change, our study moves beyond this focus and explores the direction of such changes (Kuusela et al., 2016). We do so by building on recent research that suggests where firms search for solutions, and thus the direction of organizational change, depends on the interaction between the negative performance feedback and the risk preferences of managers implementing the change (Kacperczyk et al., 2015). Furthermore, the BTF research assumes that organizational decision making is the sole purview of a dominant coalition of managers (Desai, 2016), whereas we theorize how influential external and internal constituencies, such as shareholders and board of directors, can affect organizational decision-making during times of poor firm performance (Gavetti et al., 2012). In doing so, we integrate insights from corporate governance and organizational control research and predict how the direction of organizational change in response to negative performance feedback is influenced by the concentration of dedicated and transient ownership and by the board's monitoring and advising intensities.

4.2. THEORY AND PROPOSITIONS

4.2.1. Negative Performance Feedback and Organizational Change

We draw upon the behavioral theory of the firm (BTF) to understand whether and when firms change and the direction of such change (Cyert & March, 1963). The BTF assumes that managers are boundedly rational because decision problems are typically intractable and decision makers have limited cognitive ability (Simon, 1982). Boundedly rational managers simplify the evaluation of organizational performance by adopting a discrete measure of performance in the form of success or failure instead of using a continuous measure (Greve, 2003b). Accordingly, boundedly rational managers use an aspiration level, "the smallest outcomes that are deemed satisfactory" (Schneider, 1992: 1053), to evaluate performance. When performance falls below aspiration levels organizational decision makers engage in "problemistic search" to seek for solutions that can reverse the performance decline and enhance future performance (Cyert & March, 1963). Problemistic search continues until decision makers find a solution that satisfies their criteria because bounded rationality prevents them from identifying optimal solutions (Cyert & March, 1963). Problemistic search is initially myopic because decision makers search for solutions in the neighborhood of the problem and current actions (Cyert & March, 1963; Levinthal & March, 1981). If no satisfactory solutions are found in the neighborhood of the problem, problemistic search becomes broader (Cyert & March, 1963). The BTF predicts that as organizational performance declines below aspiration levels, the likelihood and intensity of search will increase (Cyert & March, 1963), leading to an increased likelihood of organizational change (Greve, 2003b).

This prediction has found empirical support for a wide range of behavioral changes (Shinkle, 2012). For instance, research found that declining performance below aspiration level triggers increased likelihood of acquisitions (Iyer & Miller, 2008), divestitures (Shimizu, 2007), market entry, competitive positioning (Greve, 1998), R&D investments (Chen & Miller, 2007; Greve, 2003a), inter-organizational partnerships (Baum, Rowley, Shipilov, & Chuang, 2005), externalization of R&D through participation in consortia (Bolton, 1993), and corporate venture capital investments (Gaba & Bhattacharya, 2012; Ma, 2016). Thus, we predict that declining performance relative to aspiration levels results in increased likelihood of organizational change.

Proposition 1: When performance relative to aspiration level decreases, likelihood of organizational change increases.

4.2.2. Negative Performance Feedback and the Direction of Change

While the previous proposition addresses the influence of negative performance feedback on whether organizational change takes place, it does not address where firms will search for and in which direction the change will take place. Firms may pursue local or distant search (Nelson & Winter, 1982) or, in other words, pursue exploitation or exploration (March, 1991). We follow substantial prior research and conceptualize exploitation and exploration as two ends of the same continuum (e.g. Lavie et al, 2010; Phelps, 2010). Accordingly, on the single continuum of search distance, while local search is conceptualized as exploitation, distant search is conceptualized as exploration (Cyert & March, 1963; Nelson & Winter, 1982). Thus, at one static point of time, allocating more resources to exploration implies that lesser resources are allocated to exploitation and vice versa. The BTF lacks a mechanism to predict how negative performance feedback affects the direction of search - whether to allocate more resources to exploitation or to exploration (Greve & Zhang, 2016; Kuusela et al., 2016).

To explain where firms will search in response to poor performance, we draw on recent research that shows the mechanism leading to the decision to change is different and independent from the mechanism that influences the riskiness of the change (Kacperczyk et al., 2015). Accordingly, two different triggering mechanisms of performance feedback are discussed: one is organizational-level problem triggered by referents outside the firm (i.e. external feedback), which takes the traditional BTF perspective (Cyert & March, 1963; Greve, 2003a), and the other is managerial-level problem triggered by referents inside the firm (i.e. internal feedback), which takes the prospect theory perspective (Gaba & Joseph, 2013).

In line with the first proposition, the BTF predicts that a firm's performance compared with the performance of similar firms or competitors (i.e. external social aspiration) triggers organizational change (Cyert & March, 1963). On the other hand, managers' comparison of their own performances with those of the peers in other units of the same firm (i.e. internal social aspiration) influences the riskiness of change. Managers pay attention to the internal referents because they are socially and physically proximate to the managers and unfavorable internal social comparisons are detrimental to their careers (Kacperczyk et al., 2015). Accordingly, Kacperczyk et al. (2015) found that performance decline relative to internal social aspiration triggers individual loss aversion and risk-seeking behavior and on the other hand, performance increase relative to internal social aspiration triggers risk-averse behavior. Furthermore, Kacperczyk et al. (2015) found that performance shortfall relative to internal and external social aspirations triggers risky change. Accordingly, the riskiness of change is driven by the interaction between the extent to which managers of the organizational unit implementing the change are risk-averse or risk-seeking and whether organizational change takes place. Thus, we expect that organizational change triggered by external performance feedback and managerial risk preference influenced by internal performance feedback will interact with each other, and influence the direction of organizational change.

Discussion of managerial risk preference and thus, the riskiness of change is important because we expect that it influences the allocation of resources to exploration and exploitation. BTF scholars have argued and found that exploration is riskier than exploitation because it involves acquisition of new knowledge (March, 1991; Levinthal & March, 1993; Garcia et al., 2003; Greve, 2007; Raisch & Birkinshaw, 2008). Exploration is riskier than exploitation because it is difficult to estimate the returns from exploration a priori and it takes longer for the returns to come to fruition. March (1991:73) notes that “compared to returns from exploitation, returns from exploration are systematically less certain, more remote in time, and organizationally more distant from the locus of action and adaptation.” Furthermore, Levinthal and March (1993:105) propose that exclusively engaging in exploration keeps the firms trapped in a downward spiral of search, failure, and unrewarding change that does not generate any returns from its knowledge. Empirical research also supports the assumption that exploration is riskier than exploitation (Garcia et al., 2003). Studies have found that returns from exploration activities through research projects take 12-36 months to realize and 20-80% of all projects are unsuccessful (Cooper, 1993). On the other hand, studies have found that returns from exploitation activities through development projects take 3-9 months to realize and have greater success rates (Garcia, 2002). Thus, we assume that exploration is riskier than exploitation.

Assuming that exploration is riskier than exploitation, when the firm is poorly performing and organizational change is triggered, while risk-averse managers direct organizational change at exploitation, risk-seeking managers direct organizational change at exploration. Consequently, when the need to change is triggered by performance decline relative to external social aspiration and when the manager's risk-averse behavior is triggered by performance increase relative to internal social aspiration, we expect that the managers will seek for less risky changes and thus, search locally (i.e. exploit) rather than distally (i.e. explore) to resolve the problem of performance decline. On the other hand, when the need to change is triggered by performance decline relative to external social aspiration and when the manager's risk-seeking behavior is triggered by performance decline relative to internal social aspiration, we expect that the managers will seek for more risky changes and thus, search distally (i.e. explore) rather than locally (i.e. exploit) to resolve the problem of performance decline.

Proposition 2: When performance relative to internal social aspiration level increases and when performance relative to external social aspiration level decreases, the proportion of exploitation increases (and the proportion of exploration decreases).

Proposition 3: When performance relative to internal and external social aspiration level decreases, the proportion of exploration increases (and the proportion of exploitation decreases).

Corporate Governance and the Direction of Change

While BTF research typically assumes that a dominant coalition of managers are solely responsible for making decisions about organizational change and do so in accordance with their interests and preferences, corporate governance research shows that shareholders and board of directors actively try to influence a firm's strategic decision-making process to align it with their own interests (Baysinger et al., 1991; Kochhar & David, 1996; Hoskisson et al., 2002; Kim et al., 2008; McCahery et al., 2016; Desai, 2016). We integrate insights from corporate governance research on firm strategy to understand how shareholders and board of directors influence where managers search for solutions in response to poor firm performance.

In the following discussion of the influence of shareholders and board of directors on the direction of organizational change, we assume that the managers are typically risk-averse and prefer exploitation over exploration for the following reasons. First, while shareholders are risk neutral because they can diversify their risk by managing a portfolio of investments, managers are risk-averse because they cannot diversify their employment risk (Eisenhardt, 1989). Managers prefer to avoid the risk involved in exploration as they have to bear the risk of being fired if the exploration fails due to stochastic reasons which are indistinguishable from the failure caused by managerial incompetence (Holstrom, 1982). Managers do not want to be blamed for failure of explorative projects which contain high risks. On the other hand, managers prefer to achieve certain outcomes that come to fruition by investing in exploitative projects. Secondly, the literature suggests that managers are short-term oriented because the market infers the ability of the managers by observing the firm's quarterly earnings (Porter, 1992; Manso, 2011). Evaluations based on quarterly performances makes the managers to be concerned about near-term stock price movements and operate under short-term performance horizons (Froot et al., 1992). Achieving good performance in the stock market allows managers to gain greater wealth and lower employment risk (Finkelstein et al., 2009). Furthermore, managers' average employment periods are shorter than the time it takes until the explorative projects produce results (Hill & Birkinshaw, 2014). Therefore, managers' performances are unlikely to be assessed by the results of explorative projects during their tenure periods. Accordingly, managers aim to produce quick and visible results within their tenure period by pursuing exploitative projects instead of pursuing explorative projects that produce uncertain outcomes in a distant future. Next, we discuss how shareholders influence where risk-averse managers search for solutions in response to poor firm performance.

4.2.3. Shareholder Influence and the Direction of Change

Corporate governance research identifies various types of shareholders that influence managerial decision making (e.g., Connelly et al., 2010) and often distinguishes between two main types – dedicated and transient shareholders (Porter, 1992; Bushee, 1998). Dedicated shareholders have relatively long-term investment horizons, take large positions in a few firms, and are thus, concerned about their ability to liquidate their positions (Bushee, 1998). On the contrary, transient shareholders have short-term horizons, take small positions in a large number of firms, and are thus, less concerned about liquidity (Bushee, 1998).

Research shows that dedicated and transient shareholders influence a variety of managerial decisions (Bushee, 1998; Connelly et al., 2010; Fang et al., 2014; Kim, 2014; Zhang & Gimeno, 2016). Moreover, governance research suggests that, when performance falls below aspirations, dedicated and transient shareholders attempt to restrain managerial discretion and encourage managers to incorporate their preferences into managerial decision-making (Bushee, 1998; Tuggle et al., 2010; Zhang & Gimeno, 2016). Research on board influence suggests that poor performance provides legitimacy to corporate governance mechanisms, such as the board of directors and shareholders, to limit the level of managerial discretion and influence managerial decision-making (Dowell et al., 2011; Tuggle et al., 2010).

More specifically, corporate governance research suggests that both dedicated and transient shareholders monitor and seek to influence the strategies of the firms in which they invest, including the allocation of resources to exploitation and exploration initiatives, because either exploitation or exploration have the potential to substantively impact financial returns (Bushee, 1998; Uotila et al., 2009; Benner, 2010; Fang et al., 2014). We expect dedicated and transient shareholders to monitor the allocation of financial resources to exploitation and exploration initiatives and when performance falls below aspirations, attempt to influence this resource allocation process. Next, we develop propositions on how dedicated and transient shareholders influence the direction of a firm's search in response to poor firm performance.

The Effect of Dedicated Ownership

Given their long-term investment horizons and concentrated ownership positions, dedicated shareholders desire long-term stock price appreciation (Bushee, 1998; Porter, 1992; Ramalingegowda, 2006). Consistent with this view, Ramalingegowda (2006) found that dedicated shareholders are responsive to stock price changes in a 7 to 24 months holding period. While they are concerned about their portfolio firms' abilities to create long-term cash flows, they are less concerned about short-term cash flow generation (Porter, 1992). Moreover, research suggests that dedicated shareholders are tolerant of failure and less concerned about short-term earnings volatility, particularly when long-term value prospects of a company are still promising (Koh, 2007), which promotes corporate venturing efforts (Zahra, 1996) and encourages firm exploration (Tian & Wang, 2014; Ferreira et al., 2014). Dedicated shareholders form long-term relationships with their portfolio companies, monitor them, and engage in discussions with their managers (Fich et al., 2015; Schnatterly et al., 2008) and frequently submit proposals that raise corporate governance and strategy issues (McCahery et al., 2016).

While dedicated shareholders encourage managers to pursue long-term growth strategies and exploration (Tian & Wang, 2014; Connelly et al., 2010), their preferences become more salient when their portfolio firms face heightened trade-offs between focusing on current or future cash flows (Bushee, 1998; Zhang & Gimeno, 2016). In the face of earnings pressure, research suggests that dedicated shareholders encourage managers to commit to long-term strategies that generate long-term cash flows and discourage managers from pursuing myopic strategies that only result in short-term cash flows (Bushee, 1998; Zhang & Gimeno, 2016). For example, Bushee (1998) found that dedicated shareholders do not pressure managers to reduce R&D expenditure in the face of earnings pressure and instead encourage R&D activity in times of poor performance. As exploration is focused on generating future cash flows and exploitation is concerned with short-term efficiency (March, 1991), this research suggests dedicated shareholders prefer managers to engage in exploration over exploitation when performance falls below aspiration levels (Bushee, 1998; Zhang & Gimeno, 2016).

Consequently, we expect an increase in a firm's dedicated ownership to influence the direction of search triggered by poor firm performance. Increasing levels of dedicated ownership correspond to their increasing use of voice to influence managerial decisions (e.g. Hoskisson et al., 2002). We expect that an increase in dedicated ownership will increase the likelihood that their preferences in allocating resources to exploration over exploitation will be reflected in managerial decision-making. In particular, we expect that a firm's performance shortfall will trigger its dedicated shareholders to voice their preferences and influence and encourage managers to allocate more resources to exploration over exploitation.

Proposition 4: As the level of dedicated ownership increases, declining performance (below the aspiration level) results in a lower proportion of exploitation and a concomitant increase in the proportion of exploration.

The Effect of Transient Ownership

Transient shareholders aim for short-term stock price appreciation because they take small equity stakes in a large number of firms and aim to cash out their positions in the short-term (Porter, 1992; Bushee, 1998; Bushee, 2004). Consistent with this view, Ramalingegowda (2006) found that transient shareholders are responsive to stock price changes in a 1 to 3 months holding period. While transient shareholders tend to overvalue short-term earnings, they undervalue long-term earnings (Bushee, 2001). This research suggests that transient shareholders would tend to prefer exploitation over exploration given the lower uncertainty and shorter time horizons of returns to exploitation.

Transient shareholders are likely to encourage managers to pursue short-term strategies (Connelly et al., 2010; Tian & Wang, 2014; Fang et al., 2014), thereby discourage corporate venturing investments (Zahra, 1996). Their preferences for short-term strategies become more salient when their portfolio firms face heightened trade-offs between focusing on current or future cash flows (Bushee, 1998; Zhang & Gimeno, 2016). In the face of earnings pressure, research indicates that transient shareholders encourage managers to pursue myopic strategies (Bushee, 1998; Zhang & Gimeno, 2016). For instance, transient shareholders are likely to pressure managers to reduce R&D expenditure in the face of increased earnings pressure to boost up short-term earnings (Bushee, 1998). Thus, in times of poor firm performance transient shareholders are likely to pressure managers to adopt myopic strategies and forgo efforts to generate future cash flows to realize immediate cash flow benefits (Bushee, 1998; Zhang & Gimeno, 2016). Since exploration is focused on generating future cash flows and exploitation is concerned with generating short-term cash flows (March, 1991), this research suggests transient shareholders prefer managers to engage in exploitation rather than exploration when performance falls below aspiration levels (Bushee, 1998; Zhang & Gimeno, 2016).

Transient shareholders can threaten to exit their positions due to their relatively small size of investments from the poorly performing firms. Transient shareholders threaten the managers that they will sell their shares if their interests of achieving short-term investment goals are not satisfied (Hoskisson et al., 2002). Because managers are rightly concerned that sudden sales of shares by transient shareholders will result in a declining stock price and market valuation (Graves and Waddock, 1990), they are likely to take into account of transient shareholders' preferences for short-term strategies when making their decisions (Bushee, 1998; Connelly et al., 2010; Fang et al., 2014; Zhang & Gimeno, 2016), leading to an increased likelihood of exploitation.

Accordingly, we expect an increase in a firm's transient ownership to influence the direction of search triggered by poor firm performance. Increasing levels of transient ownership correspond to their increasing level of credible threat of exiting to influence managerial decisions (e.g. Hoskisson et al., 2002). We expect that increasing transient ownership increases the likelihood that their preferences in allocating resources to exploitation over exploration will be reflected in the managerial decision-making. In particular, we expect that a firm's performance shortfall will trigger its transient shareholders to use the threat of exit to encourage managers to allocate more resources to exploitation over exploration.

Proposition 5: As the level of transient ownership increases, declining performance (below the aspiration level) results in a greater proportion of exploitation and a concomitant decrease in the proportion of exploration.

4.2.4. Board Influence and the Direction of Change

Along with the shareholder's influence, corporate governance research suggests that board of directors have substantial influence over managerial decision-making (Lorsch & MacIver, 1989; Baysinger et al., 1991; Dalton et al., 1998). For instance, the corporate governance research has found that the board influences managerial decisions with respect to R&D investments (Faleye et al., 2011; Baysinger et al. 1991; Hill & Snell, 1988), diversification (Judge & Zeithaml, 1992;

Baysinger, Kosnick & Turck, 1991; Hill & Snell, 1988), corporate restructuring (Johnson et al., 1993), acquisitions (Faleye et al., 2011; Haunschild, 1993), divestiture (Desai, 2016), filing bankruptcy (Daily & Dalton, 1994; Daily, 1995), organizational design (Palmers et al., 1993), and making strategic changes (Alexander et al., 1993; Goodstein et al. 1994).

The board's degree of independence to the management has been one of the most important concepts in the board influence literature (Dalton et al., 1999). Board independence is captured by the extent to which the board of directors is not affiliated with the company through any employment or economic exchange relationships. It has been argued that independent board of directors will well keep the fiduciary duty for shareholders and oversee the management without facing any conflict of interests because they have no ties with the management (Dalton et al., 1999). In other words, based on their objective and neutral positions, independent directors will effectively monitor the management and be able to criticize or even ouster the management if needed (Dalton et al., 1999). While the effect of board independence on managerial decision-making and firm performance has been extensively examined, meta-analysis of the board independence-performance link has been found to have no significant effect at all (Dalton et al., 1998). Scholars suggest that the operationalization of independence via board composition variables (e.g. inside, outside, independent/interdependent, affiliated directors) may have confounded the board independence-performance relationships because they capture multiple constructs else than only reflecting the independence (Daily et al., 1999). Thus, as a solution to the confounding effect of board independence variables, scholars proposed that we examine instead each specific roles of the board that comes to play via board committees (Dalton et al., 1999).

Thus, instead of examining the board at-large, we take a the fine-grained approach by examining the board committees because it is at the committee level where the critical functions are carried out and decisions are made (Lorsch & Maclver, 1989). The board committee allows the directors to focus their use of limited time and attention and narrow down the complexity of the information they deal with (Lorsch & Maclver, 1989: 59). Above all, committees' small size and focused nature make them effective in influencing managerial decision-making. For instance, from the U.S. sample of S&P 1,500 firms from 1998 to 2006, an average board consists of 9 directors whereas, average number of directors working for the monitoring committee is 3 (Faleye et al., 2011). Because typical committees are composed of a small number of directors, compared to the boards at-large, the likelihood of social loafing (i.e. the phenomenon in which each individual in a group exerts lesser effort as the total number of members in the group increases) decreases (Kidwell & Bennett, 1993). Thus, a small number of directors in a committee exert more effort compared to the board at-large. Also, having fewer group members increases the cohesiveness of the group, which increases the efficiency of communicating and decision-making, and thus, increases the performance (Lipton & Lorsch, 1992). Moreover, whereas large boards are likely to develop a group of coalitions that will hamper the process of reaching consensus, in particular, by triggering delayed and indecisive decision-making in face of crisis (Goodstein et al., 1994; Dalton et al., 1999), committees with small number of directors are unlikely to form such coalitions (Evans & Dion, 1991).

In general, board committees carry out the function of either monitoring or advising (Baldenius et al., 2014; Linck et al., 2008; Faleye et al., 2011; Dalton et al., 1998; Jensen, 1993; Johnson, Daily & Ellstrand, 1996). First, grounded in the agency theory perspective, the board monitors the managers so that they do not pursue perks but work for the best interests of the shareholders (Johnson, Daily & Ellstrand, 1996; Jensen & Meckling, 1976; Eisenhardt, 1989).

As the fiduciary of the shareholders, the directors' duties include hiring and dismissing managers, deciding executive pay, and monitoring managers (e.g., Monks & Minow, 2008). Secondly, grounded in the resource dependence perspective (Pfeffer & Salancik, 1978), the board provides critical resources from the external environment, including advice and counsel, to the senior managers for the success of the firm (Lorsch & MacIver, 1989). Mostly, former or active CEOs are the common members of the board and they provide expert advice to the managers and gets involved in formulating the strategy of the firm (Hillman & Dalziel, 2003; Lorsch & MacIver, 1989; Hermalin & Weisbach, 1988). The most common types of board committees are audit, compensation, nominating/governance, finance/investment/strategy, and executive committees (Faleye et al., 2011). While the audit, compensation, nominating/governance committees have the primary function of monitoring, the finance/investment/strategy, executive committees focus on the function of advising (Faleye et al., 2011). While the committees with monitoring function such as audit committees consist of financial experts (e.g. former CFOs or accountants), the committees with advising function such as finance/investment/strategy committees consist of former CEOs, consultants, or technology and marketing executives (Baldenius et al., 2014). Thus, instead of examining the effect of board independence, by taking the committee-level perspective, we focus on the effects of monitoring and advising functions of the board.

Research on board influence suggests that poor firm performance provides legitimacy to the board members to limit the level of managerial discretion and influence managerial decision-making (Dowell et al., 2011; Tuggle et al., 2010). For instance, Tuggle et al. (2010) found that under-performance triggers the board of directors to decrease the extent of managerial discretion by restraining CEOs' controls over the agendas of the board meeting. On the other hand, Tuggle et al. (2010) found that over-performance triggers the board to lower its monitoring intensity and the managers to have greater discretion over decision-making (Tuggle et al., 2010). Moreover, research finds that poor firm performance triggers the firm to hire, in particular, outside or independent directors to enhance its monitoring function (Johnson, Daily & Ellstrand, 1996; Hermalin & Weisbach, 1988). Along this line of research, scholars found that poor firm performance with larger outside board members, which represents greater monitoring intensity, increases the likelihood that the CEO will be fired (Boeker & Goodstein, 1993; Boeker, 1992; Weisbach, 1988). Accordingly, poor firm performance triggers the board to step in managerial decision-making and increase its monitoring intensity (Tuggle et al., 2010; Hermalin & Weisbach, 1988). Along this line of reasoning, we expect that poor firm performance will trigger the board to step into the managerial decisions of allocating resources to exploitation and exploration.

More specifically, corporate governance research suggests that the boards influence the innovation strategies of the firms in which they invest, including the allocation of resources to exploitation and exploration, because exploitation and exploration has the potential to substantively impact financial returns (Baysinger et al., 1991; Hill & Snell, 1988; Deutsch, 2005; Faleye et al. 2011). For instance, research found that independent boards decrease a firm's R&D spending (Baysinger et al., 1991; Hill & Snell, 1988; Deutsch, 2005) and monitoring-intensive boards decrease a firm's R&D intensity and patent citations (Faleye et al. 2011). Accordingly, we expect that the boards will monitor the allocation of financial resources to exploitative and explorative programs and when performance falls below aspirations, attempt to influence this resource allocation process. Next, we develop propositions about how the board's monitoring and advising intensities influence the direction of a firm’s search in response to poor firm performance.

The Effect of the Board's Monitoring Intensity

The organizational control theory provides insight into how the board oversees the managers through two types of control systems: strategic and financial controls (Baysinger & Hoskisson, 1990; Eisenhardt, 1985). While the *strategic control* aims to evaluate managers based on the quality of the decision-making process, *financial control* relies on the measurable outcome of the decision-making (Eisenhardt, 1985). Under the system of strategic controls, the board has an open relationship with the managers and evaluate them based on subjective information (Baysinger & Hoskisson, 1990). Through strategic control, the board evaluates managers based on how strategically desirable the decisions were ex-ante and on financial performance ex-post the decisions were made. On the other hand, under the system of financial controls, the board evaluates the managers based on whether performance targets were achieved ex-post (Baysinger & Hoskisson, 1990). While the monitoring committees base their evaluation on objective and measurable information, advising committees base their assessment on subjective and internal information. As the monitoring and advising committees differ in the type of information they possess, they are likely to employ different control systems. Whereas monitoring committees prefer to use financial control, advising committees prefer to employ strategic control.

When the board's monitoring intensity is high, the managers are unlikely to share the firm's internal information with the board because they may lose the private benefits of controlling (Adams & Ferreira, 2007; Faleye et al., 2011). Managers dislike board interference because they highly consider the psychic value of being in control and high board interference makes them lose their authority and respect from their subordinates, which makes it difficult for them to manage the firm (Dyck & Zingales, 2004). Furthermore, managers are afraid that board interference will diminish their values in the markets for CEOs (Adams & Ferreira, 2007).

Accordingly, scholars found that when the monitoring intensity is high, managers are less willing to share strategic information with the board, which leads to lesser information exchange and lower quality of board advising (Adams & Ferreira, 2007; Adams, 2009). Thus, the monitoring-intensive boards are unlikely to have access to the information on the quality of the decision-making process, but instead, they are likely to have access to information on the outcome of the decision-making. Thus, monitoring-intensive boards rely on financial control instead of strategic control to oversee managers.

From the manager's perspective, financial controls are strongly associated with rewards based on short-term market valuation of the firm (Gupta, 1987). Research found that when financial controls are emphasized, the market undervalues risky projects such as exploration (Hoskisson & Hitt, 1988). Under financial control, managers are likely to become more risk-averse because their employment risk increases when they engage in risky projects. Along this line of evidence, research shows that the board's stronger monitoring intensity leads to increased managerial myopia, which results in decreased acquisition and innovation performance (Faleye et al., 2011). Moreover, a recent study by Balsmeier et al. (2017) found that greater share of independent directors leads to increased generation of patents and citations but such citations are directed at exploitation because these come from existing areas of technology base, which increases incremental innovation. Thus, we expect that as monitoring-intensive board relies on financial controls, the managers become myopic and risk-averse (Faleye et al., 2011), which leads to increased allocation of resources to exploitation over exploration. From the previous discussions, we propose that under negative performance feedback, a greater level of monitoring intensity of the board will result in greater exploitation and lesser exploration.

Proposition 6: As the level of the board's monitoring intensity increases, declining performance (below the aspiration level) results in a greater proportion of exploitation and a concomitant decrease in the proportion of exploration.

The Effect of the Board's Advising Intensity

The board's advising positively influences a firm's market valuation because the board's expertise complements that of the managers (Adams & Ferreira, 2007; Kim et al., 2014). Past research found that both the board's advising quality and capability increases a firm's Tobin's Q (Coles et al., 2012; Engelberg et al., 2013). In particular, board advising creates greater value by providing high-quality advice when managers provide firm-specific information to the board (Adams & Ferreira, 2007). As the manager's interaction with the board results in greater firm valuation (Coles et al., 2012), managers are likely to interact with the advising-intensive boards and provide firm-specific information. Accordingly, the advising-intensive boards are likely to have access to the information on the quality of the managerial decision-making process. Thus, advising-intensive boards rely on strategic control to oversee managers.

From the manager's perspective, strategic controls are strongly associated with rewards based on long-term market valuation of the firm (Gupta, 1987). Research found that when strategic controls are emphasized, the market overvalues risky projects such as exploration (Hoskisson & Hitt, 1988). Under strategic control, managers are likely to become more risk-tolerant because their employment risk is not directly correlated with risky projects. Past research has consistently found that the increased percentage of outside directors, which represents stronger advising capability, positively influences the level of a firm's R&D expenditure (Deutsch, 2005; Zahra, 1996; Baysinger et al., 1991; Hill & Snell, 1988). As advising-intensive boards rely on strategic controls, the managers become long-term oriented and risk-tolerant (Faleye et al., 2011), which leads to increased allocation of resources to exploration over exploitation. Thus, we propose that under negative performance feedback, increasing level of advising intensity of the board will result in greater exploration and lesser exploration.

Proposition 7: As the level of the board's advising intensity increases, declining performance (below the aspiration level) results in a greater proportion of exploration and a concomitant decrease in the proportion of exploitation.

4.3. DISCUSSION

The Behavioral Theory of the Firm has provided critical insights into why and how organizations search for alternatives and change their behaviors (Cyert & March, 1963). Specifically, the BTF has been useful in explaining how performance shortfall relative to aspiration levels triggers organizations to search for and adopt a variety of organizational changes (Shinkle, 2012). While this research has convincingly shown how negative performance feedback affects whether and when firms change, it provides little insight into the direction of change and how such direction is influenced by a firm's shareholders and board of directors. By drawing on insights from corporate governance and decision risk research, we examine how poor firm performance and managerial risk preference influence the direction of change. Furthermore, by drawing on insights from corporate governance and organizational control research, we investigate how the concentration of a firm's dedicated and transient shareholders and the board's monitoring and advising intensities influence the relationship between performance shortfall and the direction of change.

We predict that poor firm performance triggers firms to engage in increased organizational change (P1). We predict that this organizational change is directed at exploitation over exploration when managers are risk-averse (P2) and it is directed at exploration over exploitation when managers are risk-seeking (P3). Assuming that typically managers are risk-averse, we predict as the concentration of dedicated ownership in a poorly performing firm increases, the firm alters its search trajectory by exploring more and exploiting less (P4) and as the concentration of transient ownership in a poorly performing firm increases, the firm alters its search trajectory by exploiting more and exploring less (P5). We also predict that as the level of the board's monitoring intensity increases in a poorly performing firm, the firm will increase its investments in exploitation over exploration (P6) and as the level of the board's advising intensity increases in a poorly performing firm, the firm will increase its investments in exploration over exploitation (P7).

This study contributes to research on the Behavioral Theory of the Firm and corporate governance research. While BTF traditionally examined when and how firms will change, our study moves beyond this focus and explores the direction of such changes (Kuusela et al., 2016). We do so by building on recent decision risk research that suggests where firms search for solutions, and thus the direction of organizational change, depends on the interaction between performance shortfall and the risk preferences of managers implementing the change (Kacperczyk et al., 2015).

We also contribute to the BTF by highlighting how different types of influential external and internal constituencies, such as shareholders and board of directors, can affect the direction of organizational search. Because the BTF research typically assumes organizational decision making is the sole purview of a dominant coalition of managers (Desai, 2016), it provides little insight into how shareholders and board of directors can affect organizational decision-making during times of poor performance (Gavetti et al., 2012). We integrate insights from corporate governance research and predict how the direction of organizational change in response to negative performance feedback is influenced by the concentration of dedicated and transient ownership. Furthermore, we integrate insights from organizational control research and predict how the direction of organizational change in response to negative performance feedback is influenced by the board's monitoring and advising intensities.

4.3.1. Limitations and Future Research Directions

Theoretical Extensions

In this chapter, we drew upon Behavioral Theory of the Firm and corporate governance research to explain how performance shortfall relative to aspiration levels influence the direction of change and how this relationship is affected by shareholders and board of directors. This chapter's theory can be extended by considering how the slack search, learning effect, micro-level processes of conflict resolution and performance feedback, and alternative external constituencies can influence the managerial decision-making processes and the direction of change as follows.

First, while we have focused on how poor firm performance triggers problemistic search and subsequent direction of change, future research may examine how satisfactory firm performance triggers slack search and subsequent direction of change (Levinthal & March, 1981). In this paper, we have focused on how performance below aspiration triggers problemistic search and influences managerial decisions of allocating resources to exploitation and exploration. However, according to the BTF, search can be triggered by two mechanisms, which are problemistic search and slack search (Cyert & March, 1963; Levinthal & March, 1981). When performance is above aspiration levels and this results in accumulation of slack (i.e. excess resources) over time, organizations engage in “slack search” and greater exploration (Cyert & March, 1963; Levinthal & March, 1981). Slack functions as a buffer to the uncertainty arising from the environmental changes and it encourages exploration because it increases a firm's tolerance for failure (Levinthal & March, 1981). When performance is above aspirations, slack delays the upward adjustment of aspiration levels (Cyert & March, 1963). When performance is below aspirations, slack functions as the emergency resource that is injected for the firm's current operations (Cyert & March, 1963). Thus, slack facilitates the organization to stabilize under and adapt to the environmental changes. While we focused on the effects of negative performance feedback and problemistic search on resource allocation decisions of exploitation and exploration, future research may examine the effects of positive performance feedback and slack search on exploitation and exploration decisions.

Secondly, while we did not take into consideration of the learning that occurs during the performance feedback process, there may be a learning effect (March, 1991). We assumed that marginal performance shortfall relative to aspirations influences the marginal allocation of resources to exploitation and exploration. We focused our study on the effect of negative performance feedback at each point of time. However, negative performance feedback process may occur continuously and thus, have a learning effect from failure to achieve the aspiration levels (Madsen & Desai, 2010; Thornhill & Amit, 2003; Sitkin, 1992). It may be interesting to examine how firms that have consistent negative performance feedback will differ in their organizational responses to the problem from those firms that have temporary negative performance feedback. For instance, based on orbital launch data, Madsen and Desai (2010) find that failure in period t enhances a firm's own likelihood of success in period t+1 compared to a firm that had success experience in period t. Accordingly, it may be interesting to study whether consistent negative performance feedback enhances a firm's learning effect from failure and thus, lead to greater firm performance.

Thirdly, we assumed that interactions amongst managers, shareholders, and board of directors take place, but we did not directly discuss how such interactions occur in detail. The original BTF argues that multiple coalitions of decision-makers go through a political process of bargaining to set the organizational goals (Cyert & March, 1963). BTF assumes that these coalitions of decision-makers interact with each other and influence the managerial decision-making process (Cyert & March, 1963). Taking this perspective, we assumed that managers and shareholders or board of directors interact with each other during the periods of poor firm performance whereas, we do not directly observe this micro-level process of interactions. While the current literature evidences the interactions of managers, shareholders, and board of directors through surveys and anecdotes (McCahery et al., 2016; Desai, 20160; Tuggle et al., 2010; Connelly et al., 2010), we do not yet know how such interactions happen in the micro-level. Furthermore, evidence in the literature suggests that there may be interactions between dedicated and transient shareholders (Connelly et al., 2010) and between monitoring and advising board of directors (Faleye et al., 2011), which may influence the managerial decision-making on allocating resources to exploitation and exploration. It will be an interesting future research avenue to observe and analyze the micro-level processes of bargaining amongst the multiple coalitions of decision-makers and their influence over decision-making on the direction of change. More specifically, by taking into consideration of the micro-level interactions among multiple coalitions, future research may study how conflicting goals of these coalitions of decision-makers can be resolved and agreed upon. While Cyert & March (1963) suggested such conflicting demands can be resolved by sequentially attending to one goal at a time, decentralizing the decision-making, or using the organizational slack, interesting insights can be sought through examining the micro-level interactions of multiple coalitions.

Fourthly, while we investigated how multiple coalitions of decision-makers such as managers, shareholders, and board of directors interact amongst each other, future research may examine how alternative internal constituencies such as the creditors, organizational units, and social networks or external constituencies such as the media, auditors, and legislators interact and influence the managerial decision-making process and the direction of change. In the original BTF, Cyert and March (1963) discussed stockholders, creditors, and organizational units as part of the multiple coalitions of decision-makers. Recently, Desai (2016) discussed the board of directors as part of the multiple coalitions whereas, in this chapter, we examined the board of directors, shareholders, and managers as part of the coalitions of decision-makers. These coalitions of decision-makers participate in the political bargaining process of organizational goal formation, have different preferences, attempt to influence the managerial decision-making process, and distribute the decision-making outcome amongst themselves (Cyert & March, 1963). For instance, it may be interesting to study how creditors, along with shareholders, influence the managerial decision-making process. Also, it may be fruitful to examine how different organizational units influence the managerial decision-making process. For instance, future research may aim to answer the following research questions: How are organizational goals formed and performance feedback made by the interactions between organizational units that compete for and draw upon the same pool of scarce resources? How does the unit that engages in internal R&D and that engages in external R&D take part in the goal formation and performance feedback processes?

Furthermore, organizations are not only composed of coalitions such as managers, stockholders, creditors, and organizational units (Cyert & March, 1963), but also they consist of social networks that influence the managerial decision-making process (Phelps et al., 2012). For instance, social ties based on academic, geographical, and family background can affect the process of decision-making and the performance feedback process (e.g. Tsai & Goshal, 1998). Accordingly, it may be fruitful to examine how different social networks within and between organizations influence the performance feedback process.

Moreover, while Cyert and March (1963) defined the coalitions of decision-makers as constituencies that the influence managerial decision-making process and share the outcomes of such decisions, recent development of the literature in external corporate governance research suggests that there are entities outside the boundary of the firm that strongly influences and shapes the corporate strategies and managerial decision-making (Aguilera et al., 2015). These external governance mechanisms include legal system, corporate control, external auditors, governance ratings, stakeholder activism, and media (Aguilera et al., 2015). For instance, research on legal system shows that legal and cultural institutions influence the degree of managerial discretion (Crossland & Hambrick, 2007), post-acquisition restructuring (Capron & Guillen, 2009), and hostile take-over (Schneper & Guillen, 2004). Research on corporate control indicates various characteristics of the market for corporate control impact the likelihood of tender offer (Davis & Stout, 1992) and acquisition performance (King et al., 2004). Studies on external auditors show that auditing influences external financing opportunities (Hope et al., 2011), credit ratings (Lennox & Pittman, 2011), and fraud incidences (Lennox & Pittman, 2011). Research on rating organizations indicates that analyst recommendations influence CEO dismissal decisions (Wiersema & Zhang, 2011). Research on stakeholder activism shows that hedge fund activism impacts executive turnovers (Klein & Zur, 2009). Research on media discusses that press coverage can influence executive devaluations (Wiesenfeld et al., 2008). Accordingly, it will be interesting to answer the following research questions by taking these external constituencies into account: When will particular goals receive attention from different constituencies? How and under what conditions will particular constituencies intervene in managerial decision-making process and influence the direction of change?

Empirical Applications

Our theory on performance feedback, corporate governance, and direction of organizational change can be applied to the empirical settings that meet the following conditions. First, it is a setting where the firm's performance shortfall relative to aspirations triggers problemistic search to resolve such problems. Secondly, it is a setting where the managerial decision-making has substantial variation in exploitation and exploration. Thirdly, it is a setting in which corporate governance entities have substantial influence over managerial decision-making. Typically, firms that engage in innovation sourcing through acquisition, strategic alliances, and corporate venture capital (CVC) investments are adequate settings that meet the former conditions.

For instance, firms engaging in acquisitions are an appropriate setting to test our theory because acquisitions are triggered when performance falls below aspirations (Iyer & Miller, 2008). Moreover, acquisitions can be conducted for either exploitative or explorative purposes (Luger, 2014). On the one hand, firms use acquisitions as vehicles to explore new technologies or products (Ahuja and Katila, 2001), enter new markets and regions (Finkelstein and Haleblian, 2002; Hennart and Reddy, 1997). On the other hand, firms conduct acquisitions to exploit their existing product bases (Amburgey and Miner, 1992), enter into existing markets and regions (Baum et al., 2000; Prager, 1992). Also, acquisition decisions are under the influence of the shareholders and board of directors (Hoskisson et al., 2002; Faleye et al., 2011).

Also, firms engaging in strategic alliances are an adequate setting to test our theory because it is triggered by negative performance feedback (Baum et al., 2005). Also, research has found substantial variation in alliance initiatives including exploitation and exploration. Firms aim to explore new knowledge through explorative alliances, whereas they attempt to exploit and commercialize existing knowledge through exploitative alliances (Hagedoom & Duysters, 2002;

Dittrich & Duysters, 2007; Cesaroni, Minin & Piccaluga, 2005; Vanhaverbeke et al., 2006; Rothaermel & Deeds, 2004; Dussauge et al., 2000). Furthermore, strategic alliance decisions are under the influence of corporate governance entities such as dedicated and transient shareholders (Connelly et al., 2010).

Lastly, firms engaging in Corporate Venture Capital investing – direct minority equity investments made by established firms in privately held entrepreneurial ventures (Dushnitsky & Lenox, 2006) – are an appropriate setting to test our theory because CVC is a primary form of external R&D that is used as a means to search for innovations that can help solve organizational performance problems (Gaba & Bhattacharya, 2012). Research shows that poor firm performance motivates greater CVC activity (Gaba & Bhattacharya, 2012; Ma, 2016). Furthermore, CVC investing exhibits substantial variation in terms of their exploitative and explorative initiatives within and across firms (Wadhwa & Basu, 2013). While explorative CVC relationships represent the commitment of financial resources by corporate investors to ventures with relatively novel knowledge, exploitative relationships represent investments made in ventures with similar knowledge (Wadhwa & Basu, 2013). Also, research shows that shareholders and board of directors substantially influence a firm's CVC investing decisions (Anohkin et al., 2016).

In this chapter, we have examined how negative performance feedback influences whether and where firms search for and how this main relationship is affected by a firm's shareholders and board of directors. In the next chapter, we empirically test our theories on the relationship between poor firm performance and the direction of change and how this relationship is moderated by dedicated and transient shareholders (i.e. Propositions 1, 2, 4, 5) in the context of CVC investing.

CHAPTER 5. ESSAY 2. PERFORMANCE FEEDBACK, SHAREHOLDER INFLUENCE AND THE DIRECTION OF ORGANIZATIONAL CHANGE: EVIDENCE FROM CORPORATE VENTURE CAPITAL INVESTING[6]

ABSTRACT

Review of the corporate venture capital (CVC) literature suggests that research is demanded on the intersections among the antecedents, management, and outcomes of CVC. In the previous essay, we theorized how poor firm performance influences the managerial decision-making with regards to allocating resources to exploitation and exploration and how such decisions are affected by shareholders and board of directors. In this essay, we test the propositions developed in the previous essay on how the managerial decision-making with regards to allocating resources to exploitation and exploration is influenced by dedicated and transient shareholders in the CVC context. By analyzing data on the exploratory versus exploitative nature of 10,261 CVC investments made by 286 companies during 1993-2013, we find that poor firm performance motivates firms to increase their CVC investment intensity and that this change is directed at exploitative investments. We also find that as the concentration of dedicated ownership increases in a poorly performing firm, the firm alters its search trajectory by exploring more and exploiting less. This study contributes to research on the behavioral theory of the firm and CVC by showing how the direction of organizational change, as indicated by where firms invest CVC, in response to negative performance feedback is influenced by the concentration of dedicated ownership.

Keywords: Behavioral Theory of the Firm, Corporate Governance, Exploration, Exploitation, Corporate Venture Capital.

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5.1. INTRODUCTION

Review of the CVC literature suggests that research is demanded on the intersections among the antecedents, management, and outcomes of CVC. In the previous essay, we theorized how poor firm performance influences the managerial decision-making with regards to allocating resources to exploitation and exploration and how such decisions are affected by shareholders and board of directors. In this essay, we test the propositions developed in the previous essay on how the managerial decision-making with regards to allocating resources to exploitation and exploration is influenced by dedicated and transient shareholders in the CVC context.

As discussed in the previous essay, while the research on the Behavioral Theory of the Firm (BTF) has convincingly shown how negative performance feedback affects whether and when firms change, it provides little insight into the direction of change and how such direction may be influenced by a firm's shareholders. To address these limitations of the BTF literature, we investigate how poor organizational performance and managerial risk preferences affect where firms search for solutions within a particular domain of change and how different types of shareholders – dedicated and transient – influence managers in allocating firm resources to the direction of change. While dedicated shareholders have relatively long-term investment horizons, take large positions in a few firms, and are thus, concerned about their ability to liquidate their positions, transient shareholders have short-term investment horizons, take small positions in a large number of firms, and are thus, less concerned about liquidity (Bushee, 1998; Porter, 1992). We examine the influence of dedicated and transient shareholders on firm exploration and exploitation in the context of corporate venture capital (CVC) investing.

Corporate venture capital - direct minority equity investments made by established firms in privately held entrepreneurial ventures - is an increasingly important and prevalent means of corporate growth and development (Dushnitsky & Lenox, 2006; 2005; Wadhwa & Kotha, 2006).

While corporate investors may pursue financial returns in making CVC investments, most firms use CVC for strategic reasons to enhance their ability to innovate (Dushnitsky, 2006). As such, CVC programs are widely recognized as a means of externalizing firm R&D (e.g., Dushnitsky & Lenox, 2005; Gaba & Bhattacharya, 2012). CVC investments represent discrete, identifiable commitments of financial resources to strategic relationships that can vary in terms of their exploitative or explorative nature (Wadhwa & Basu, 2013; Schildt et al., 2005). We follow substantial prior research and conceptualize exploration and exploitation as two ends of the same continuum (e.g., Lavie et al, 2010; Phelps, 2010). Whereas explorative CVC relationships represent the commitment of financial resources by corporate investors to ventures with relatively novel knowledge, exploitative relationships represent investments made in ventures with similar and therefore familiar knowledge (Wadhwa & Basu, 2013).

CVC investing is an appropriate setting to investigate our research question for the following three reasons. First, CVC is a primary form of external R&D and, like internal R&D, is used as a means to search for innovations that can help solve organizational performance problems (Gaba & Bhattacharya, 2012). While studies have found that negative performance feedback motivates firms to increase organizational search via internal R&D (Chen & Miller, 2007; Greve, 2003a) and the externalization of R&D (Bolton, 1993), research also shows that poor firm performance motivates CVC activity (Gaba & Bhattacharya, 2012; Ma, 2016). Second, CVC investments exhibit substantial variation in terms of their exploitative/explorative nature within and across firms (Wadhwa & Basu, 2013). These two aspects of CVC allow us to observe change within a domain of firm behavior as well as the direction of the change. Finally, research shows that shareholders influence a firm's CVC investing (Anohkin et al., 2016). Moreover, our interviews with Investor Relations (IR) Executives from eight CVC firms revealed that senior managers carefully consider the views of institutional shareholders regarding their firms' CVC investments.

In investigating our research question we build on the BTF and draw on insights from decision risk and corporate governance research to explain how dedicated and transient ownership affects the direction of a firm's CVC investing. As a baseline, we argue that negative firm-level performance feedback results in increased CVC activity. We then examine how poor firm performance and managerial risk preferences influence the direction of change in CVC activity. We argue that CVC program managers are typically risk averse because the vast majority are not paid incentive compensation (Block & Ornati, 1987; Dushnitsky & Shapira, 2010; Thelander, 2016), leading to systematic risk aversion in their investments (Dushnitsky & Shapira, 2010), and therefore prefer exploitation over exploration (March 1991). Consequently, when the need to change is triggered by negative firm-level performance feedback, CVC program managers will search locally by investing in ventures from nearby sectors. Finally, we argue that shareholder composition will moderate this relationship. Specifically, because dedicated shareholders prefer long-term growth in value creation and are more inclined to voice their interests when firm performance misses expectations (Bushee, 1998; Zhang & Gimeno, 2016), we predict that as the concentration of dedicated ownership in a poor performing firm increases, the firm will alter its search trajectory by exploring more and exploiting less. In contrast, because transient shareholders prefer short-term returns, are more inclined to voice their interests when firm performance misses expectations and have the credible threat of exiting their positions if performance does not recover quickly (Bushee, 1998; Zhang & Gimeno, 2016), we hypothesize that as the concentration of transient ownership increases, poor performing firms will increase investments in exploitative ventures.

To better understand our phenomenon of interest, we interviewed Investor Relations Executives of eight CVC firms and three Fund Managers/Analysts of Institutional Investors (see Appendix D for respondent background). Analysis of these interviews provided grounding for our theory development. We tested our predictions on a sample of 286 companies that made 10,261 CVC investments during 1993-2013 and found support for all but one prediction – we did not find a moderating effect of transient ownership on the direction of firm search.

This study contributes to both the BTF and CVC literatures. While BTF traditionally examined when and how firms will change, our study moves beyond this focus and explores the direction of such changes (Kuusela et al., 2016). In doing so, we integrate insights from corporate governance research and show how the direction of organizational change in response to negative performance feedback is influenced by the concentration of dedicated ownership. We contribute to research on Corporate Venture Capital by showing that poor firm performance, in addition to influencing the adoption and termination of CVC programs (Gaba & Bhattacharya, 2012), also motivates increasing CVC investment activity. This study is also one of the first to explore the influence of corporate governance on CVC investing (see also Anokhin et al. 2016) and the first to show that corporate ownership structure influences where firms invest CVC.

5.2. THEORY AND HYPOTHESES

5.2.1. Negative Performance Feedback and Organizational Change

We draw upon the behavioral theory of the firm (BTF) to understand whether and when firms change and the direction of such change (Cyert & March, 1963). The BTF assumes that managers are boundedly rational because decision problems are typically intractable and decision makers have limited cognitive ability (Simon, 1982). Boundedly rational managers simplify the evaluation of organizational performance by adopting a discrete measure of performance in the form of success or failure instead of using a continuous measure (Greve, 2003b). Accordingly, boundedly rational managers use an aspiration level, "the smallest outcomes that are deemed satisfactory" (Schneider, 1992: 1053), to evaluate performance. When performance falls below aspiration levels organizational decision makers engage in "problemistic search" for solutions to reverse the decline in performance and enhance future performance (Cyert & March, 1963). Problemistic search continues until decision makers find a solution that satisfies their criteria because bounded rationality prevents the identification of optimal solutions (Cyert & March, 1963). Problemistic search is myopic in that decision makers search for solutions to the problem of poor performance in the neighborhood of the problem and current actions (Cyert & March, 1963; Levinthal & March, 1981). The theory predicts that as organizational performance declines below aspirational levels, the likelihood and intensity of search will increase (Cyert & March, 1963), leading to an increased likelihood of organizational change (Greve, 2003b). This prediction has found empirical support for a wide range of behavioral changes (Shinkle, 2012).

Negative organizational performance feedback and the problemistic search it triggers will increase CVC activity when relevant decision makers deem that increasing the intensity of externally searching the landscape of innovative start-ups will increase the supply of potential solutions to poor performance. These relationships with ventures provide a variety of potential solutions, including access to new technologies, business models and markets; learning about potential acquisition targets, stimulating demand for core products by nurturing complements, and developing strategic relationships such as licenses or alliances (Dushnitsky, 2006). CVC is one mode of organizational search and a primary form of external R&D and, like internal R&D, is used as a means to search for innovations that can help solve organizational performance problems (Gaba & Bhattacharya, 2012). External sources of knowledge are critical to a firm's ability to innovate (Cassiman & Veugelers, 2006) and CVC investing has been shown to enhance investing firm innovation performance (Wadhwa & Kotha, 2006; Wadhwa, Phelps & Kotha, 2016). While studies have found that negative performance feedback motivates firms to increase their internal R&D (Chen & Miller, 2007; Greve, 2003a) and their externalization of R&D through participation in consortia (Bolton, 1993), research also shows that poor firm performance motivates CVC activity (Gaba & Bhattacharya, 2012; Ma, 2016). Increased CVC investing can be channeled to increase the breadth of search for potential solutions in the form of innovative ventures that can solve organizational performance problems. Assuming that negative performance feedback triggers problemistic search in the form CVC investing, we predict:

Hypothesis 1: When performance relative to aspiration level decreases, CVC investment intensity will increase.

5.2.2. Negative Performance Feedback and the Direction of Organizational Change

While the previous prediction addresses the influence of negative performance feedback on the type of organizational change, it does not address where firms will search and the direction of change. Firms may pursue local or distant search (Nelson & Winter, 1982) or, in other words, pursue exploitation or exploration (March, 1991). As previous research shows, firms may use CVC investing to search locally by investing in ventures with similar knowledge stocks or search more distantly by investing in ventures with unfamiliar knowledge stocks (Wadhwa & Basu, 2013). The BTF lacks a mechanism to predict how problemistic search affects the direction of search (Greve & Zhang, 2016).

To explain where firms will search in response to poor performance we draw on recent research that shows the mechanism leading to the decision to change is different and independent from the mechanism that influences the riskiness of the change (Kacperczyk et al., 2015). The riskiness of change is driven by the extent to which managers of the organizational unit implementing the change are risk-averse or risk seeking, which Kacperczyk et al., (2015) find to be driven by whether the managers are performing below peers in other units of the same organization, which triggers individual loss aversion and risk-seeking behavior. Because the returns to local search (exploitation) are typically realized sooner and are more certain than those from distant search (exploration) (March, 1991), local search is less risky than distant search. Thus, where firms search for solutions, and the direction of organizational change, will depend on the risk preferences of managers implementing the change.

Accordingly, we expect poor firm performance and managerial risk preferences to interact in their influence on the direction of change in CVC activity. In general, poor performance triggers managers to search locally rather than distantly to find solutions for poor performance (Cyert & March, 1963; Levinthal & March, 1981). This tendency is likely to be reinforced by the risk preferences of CVC managers. CVC program managers are typically risk averse because the vast majority are compensated using a standard corporate compensation scheme rather than incentive compensation linked to the performance of their CVC investments (Block & Onata, 1987; Dushnitsky & Shapira, 2010; Thelander, 2016), leading to systematic risk aversion in their investments (Dushnitsky & Shapira, 2010). Moreover, CVC unit managers' investment decisions are typically reviewed and ratified by committees of senior corporate executives (Dushnitsky, 2012) and decision makers become more risk averse when they expect their choices to be reviewed by others (Tetlock & Boettger, 1994). Consequently, when the need to change is triggered by negative firm-level performance feedback, we expect that CVC program managers will search locally by investing in ventures from nearby sectors.

Hypothesis 2: When performance relative to aspiration level decreases, the proportion of exploitative CVC investments increases (and the proportion of explorative investments decreases).

5.2.3. Shareholder Composition and the Direction of Organizational Change

While BTF research typically assumes a dominant coalition of firm managers are solely responsible for making decisions about firm change and do so in accordance with their interests and preferences, corporate governance research shows that institutional shareholders actively try to influence a firm's strategic decision-making process to align it with their own interests (Kochhar & David, 1996; Hoskisson et al., 2002; Kim et al., 2008; McCahery et al., 2016). We integrate insights from corporate governance research to understand how shareholders influence where decision makers search for solutions in response to poor firm performance.

Corporate governance research identifies various types of shareholders that influence managerial decision-making (e.g., Connelly et al., 2010) and often distinguishes between two main types – dedicated and transient (Porter, 1992; Bushee, 1998). Whereas dedicated shareholders have relatively long-term investment horizons, take large positions in a few firms and are thus concerned about their ability to liquidate their positions, transient shareholders have short-term horizons, take small positions in a large number of firms and are thus less concerned about liquidity (e.g. Bushee, 1998; Porter, 1992).

Research shows that dedicated and transient shareholders influence a variety of managerial decisions (Bushee, 1998; Connelly et al., 2010; Fang et al., 2014; Kim, 2014; Zhang & Gimeno, 2016). Moreover, corporate governance research suggests that, when performance falls below aspirations, dedicated and transient shareholders attempt to restrain managerial discretion and encourage managers to incorporate their preferences into managerial decision-making (Bushee, 1998; Tuggle et al., 2010; Zhang & Gimeno, 2016). Research on board influence suggests that poor performance provides legitimacy to board members and shareholders to limit the level of managerial discretion and influence managerial decision-making (Dowell et al., 2011; Tuggle et al., 2010).

More specifically, governance research suggests that both dedicated and transient shareholders monitor and seek to influence the innovation strategies of the firms in which they invest, including the allocation of resources to incremental and radical innovation initiatives, because innovation has the potential to substantively impact financial returns (Bushee, 1998; Benner, 2010; Fang et al., 2014). Because CVC programs are an important part of their parent firms' innovation strategies (Dushnitsky & Lenox, 2005) and these programs have access to financial resources to allocate to exploratory or exploitative initiatives (Wadhwa & Basu, 2013), we expect dedicated and transient shareholders to monitor the allocation of financial resources to these programs and when performance falls below aspirations, attempt to influence this resource allocation process.

In the following, we discuss how and by whom the CVC resource allocation process is carried out based on the analysis of our interviews and insights from the CVC literature. The majority of the senior executives of the CVC program we interviewed testified that CVC investment decisions are made by the investment committees. While the members of the investment committee vary upon companies, analysis of the interviews shows that it commonly includes senior executives from the C-level suite (e.g. CEO) and those of the business units. In line with the evidence from the interviews, the literature on stakeholders of CVC also evidences that the senior executives and business units are influential internal stakeholders who are involved in the CVC decision-making process (e.g. Weber & Weber, 2011; Basu, Phelps, & Kotha, 2016). Thus, we assume that the CVC investing decisions are made at the senior executive level.

Interview respondents further noted that while the initiation of the CVC deals and discussion of the potential investment targets are sought and championed by the business units or the CVC units, the CVC investment decisions are made by checking the strategic potential of the deal and its expected financial returns. Also, the CVC literature found that when firms select targets for investments, they consider the complementarity or the relatedness of the startup with their own thematic areas of focus for CVC investments (Basu et al., 2016). In other words, firms search for potential investment opportunities that align well with its overall corporate venturing strategy (Basu et al., 2016). As CVC investing is one of the important vehicles for external corporate venturing (Van de Vrande et al., 2009), its decision is subject to approval by the senior executives and the investment committee. Thus, CVC investing decisions are made by senior executives based on the strategic and financial prospects of the deal and in line with the corporate venturing strategy.

Thus, we assume that CVC resource allocation decisions are primarily made at the senior executive level. Accordingly, we assume that the CVC resource allocation is conducted through two processes: (1) *decision-making process* at the senior executive level, which is influenced by shareholders when the firm is poorly performing (2) *decision execution process* conducted by the directors of the CVC programs, who follow the result of the decisions made by the senior executives. Following Figure 7 depicts the decision-making and execution processes of allocating CVC resources to exploration and exploitation. In this essay, we focus on the decision-making process of CVC resource allocation as a result of the interactions between the shareholders and senior executives during performance shortfalls. Next, we develop predictions about how dedicated and transient shareholders will influence the direction of a firm's search via CVC investing in response to poor firm performance.

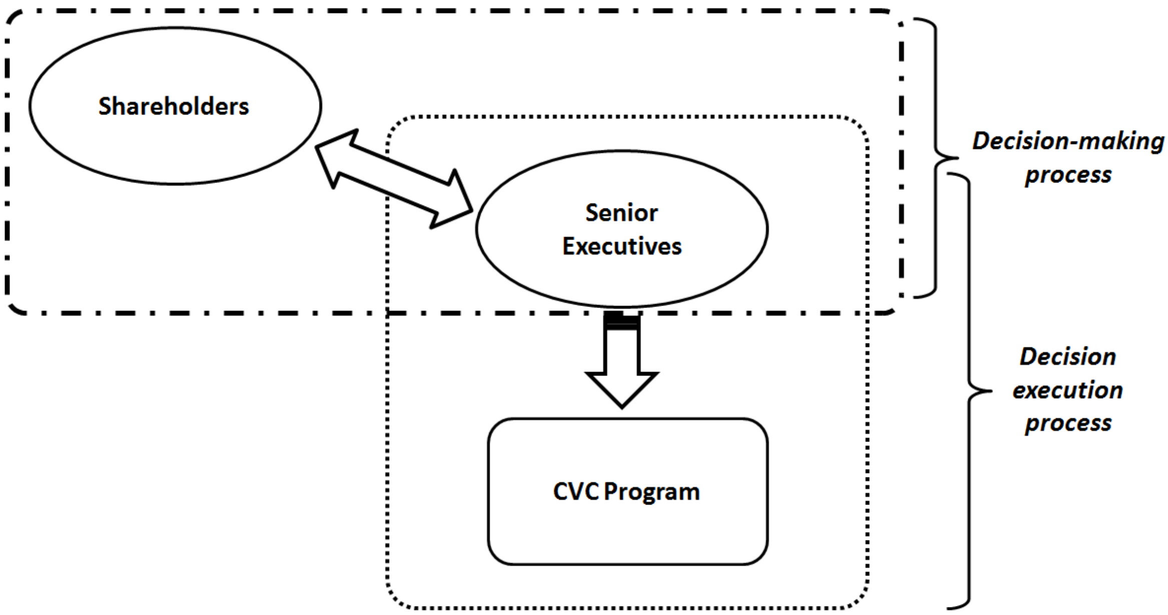


Figure 7: CVC Resource Allocation Process

The Effect of Dedicated Ownership

Given their long-term investment horizons and concentrated ownership positions, dedicated shareholders desire long-term stock price appreciation (Bushee, 1998; Porter, 1992; Ramalingegowda, 2006). While they are concerned about their portfolio firms' abilities to create long-term cash flows, they are less concerned about short-term cash flow generation (Porter, 1992). IR managers we interviewed confirmed that dedicated shareholders care most about how their portfolio firms are positioned for long-term growth.

> "Dedicated shareholders care about how the company is positioning for long-term growth."
>
> - IR Manager at a Global IT Consulting Firm

Moreover, research suggests that dedicated shareholders are tolerant of failure and less concerned about short-term earnings volatility, particularly when long-term value prospects of a company are still promising (Koh, 2007), which promotes uncertain corporate venturing efforts (Zahra, 1996) and encourages firm exploration (Tian & Wang, 2014; Ferreira et al., 2014). Dedicated shareholders form long-term relationships with their portfolio companies, monitor them, and engage in discussions with their managers (Fich et al., 2015; Schnatterly et al., 2008) and frequently submit proposals that raise corporate governance and strategy issues (McCahery et al., 2016).

While dedicated shareholders generally encourage managers to pursue long-term growth strategies (Tian & Wang, 2014; Connelly et al., 2010), their preferences become more salient when their portfolio firms face heightened trade-offs between focusing on current or future cash flows (Bushee, 1998; Zhang & Gimeno, 2016). In the face of earnings pressure, research suggests that dedicated shareholders encourage managers to commit to long-term strategies that generate long-term cash flows and discourage managers from pursuing myopic strategies that only result in short-term cash flows (Bushee, 1998; Zhang & Gimeno, 2016). For example, Bushee (1998) found that dedicated shareholders do not pressure managers to reduce R&D expenditure in the face of earnings pressure and instead encourage R&D activity in times of poor performance. As exploration is focused on generating future cash flows and exploitation is concerned with short-term efficiency (March, 1991), this research suggests dedicated shareholders prefer managers to engage in exploration over exploitation when performance falls below aspiration levels (Bushee, 1998; Zhang & Gimeno, 2016).

Consequently, we expect an increase in a firm's dedicated ownership to influence the direction of change in CVC activity triggered by poor firm performance. Increasing levels of dedicated ownership correspond to their increasing use of voice to influence managerial decisions (e.g. Hoskisson et al., 2002). We expect that an increase in dedicated ownership increases the likelihood that their preferences in allocating resources to exploration over exploitation will be reflected in managerial decision making. In particular, we expect that a firm's performance shortfall will trigger its dedicated shareholders to voice their preferences and influence and encourage managers to allocate more resources to exploratory CVC investments instead of exploitative investments.

Hypothesis 3: As the level of dedicated ownership increases, declining performance (below the aspiration level) results in a lower proportion of exploitative CVC investments and a concomitant increase in the proportion of explorative investments.

The Effect of Transient Ownership

Because they take small equity stakes in a large number of firms and aim to cash out their positions in the short-term (Porter, 1992; Bushee, 1998; Bushee, 2004), transient shareholders prefer short-term stock price appreciation (Porter, 1992). The IR managers we interviewed confirmed that transient shareholders are concerned about the next quarter's earnings forecast and any events that may influence short-term stock prices.

> "Transient shareholders care about next quarter's earning guidance, guidance for the fiscal year, and any kind of news items that can come up in any given time frame that may impact short-term stock prices. Transient shareholders ask short-term questions as they have short-term viewpoints."
>
> - IR Manager at a Global IT Consulting Firm

Consistent with this view, Ramalingegowda (2006) found that transient shareholders are responsive to stock price changes in a 1 to 3 months holding period. While transient shareholders tend to overvalue short-term earnings, they undervalue long-term earnings (Bushee, 2001). This research suggests that transient shareholders would tend to prefer exploitation over exploration given the lower uncertainty and shorter time horizons of returns to exploitation.

While transient shareholders are likely to encourage managers to pursue short-term strategies (Connelly et al., 2010; Tian & Wang, 2014; Fang et al., 2014), thereby discouraging corporate venturing investments (Zahra, 1996), their preferences become more salient when their portfolio firms face heightened trade-offs between focusing on current or future cash flows (Bushee, 1998; Zhang & Gimeno, 2016). In the face of earnings pressure, research indicates that transient shareholders encourage managers to pursue myopic strategies (Bushee, 1998; Zhang & Gimeno, 2016). For instance, transient shareholders are likely to pressure managers to reduce

R&D expenditure in the face of increased earnings pressure (Bushee, 1998). Thus, in times of poor firm performance transient shareholders are likely to pressure managers to adopt myopic strategies and forgo efforts to generate future cash flows to realize immediate cash flow benefits (Bushee, 1998; Zhang & Gimeno, 2016). Since exploration is focused on generating future cash flows and exploitation is concerned with short-term efficiency (March, 1991), this research suggests transient shareholders prefer managers to engage in exploitation rather than exploration when performance falls below aspiration levels (Bushee, 1998; Zhang & Gimeno, 2016).

In addition to being more likely to voice their preferences when their firms perform poorly, transient shareholders have the credible threat of exiting their positions (due to their relatively small size), which they can use to discipline managers by threatening to sell their shares if their interests of achieving short-term investment goals are not satisfied (Hoskisson et al., 2002). Because managers are rightly concerned that sudden sales of shares by transient shareholders will result in a declining stock price and market valuation (Graves and Waddock, 1990), they are likely to take into account of transient shareholders' preferences for short-term when making decisions (Bushee, 1998; Connelly et al., 2010; Fang et al., 2014; Zhang & Gimeno, 2016), leading to an increased likelihood of exploitation.

Accordingly, we expect an increase in a firm's transient ownership to influence the direction of change in CVC activity triggered by poor firm performance. Increasing levels of transient ownership correspond to their increasing use of both voice and the credible threat of exit to influence managerial decisions (e.g. Hoskisson et al., 2002). We expect that increasing transient ownership increases the likelihood that their preferences in allocating resources to exploitation over exploration will be reflected in the managerial decision making. In particular, we expect that a firm's performance shortfall will trigger its transient shareholders to use voice and/or the threat of exit to encourage managers to allocate more resources to exploitative CVC investments instead of explorative investments.

Hypothesis 4: As the level of transient ownership increases, declining performance (below the aspiration level) results in a greater proportion of exploitative CVC investments and a concomitant decrease in the proportion of explorative investments.

We have illustrated our hypothesized relationships as follows (refer to Appendix E for the list of Hypotheses). As seen in Figure 8, as performance relative to aspiration level decreases, CVC investment intensity will increase (H1). Also, as seen in Figure 9, performance relative to aspiration level decreases, the proportion of exploitative CVC investments will increase (and the proportion of explorative investment will decrease) (H2). Furthermore, we expect that as the level of dedicated ownership increases, declining performance results in a greater proportion of explorative CVC investments and lower proportion of exploitation (H3) and as the level of transient ownership increases, declining performance results in a lower proportion of exploration and greater proportion of exploitation (H4).

Figure 8. Hypothesized Relationship (H1)

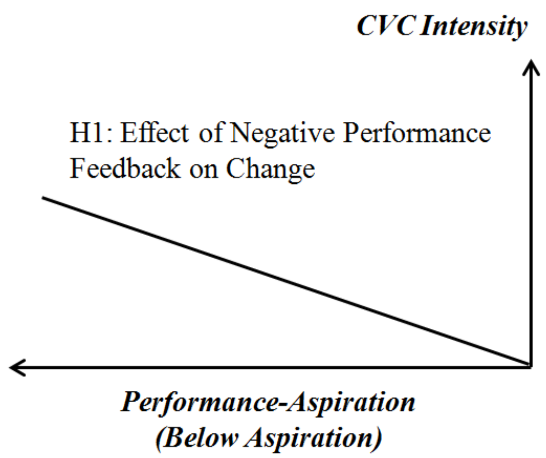
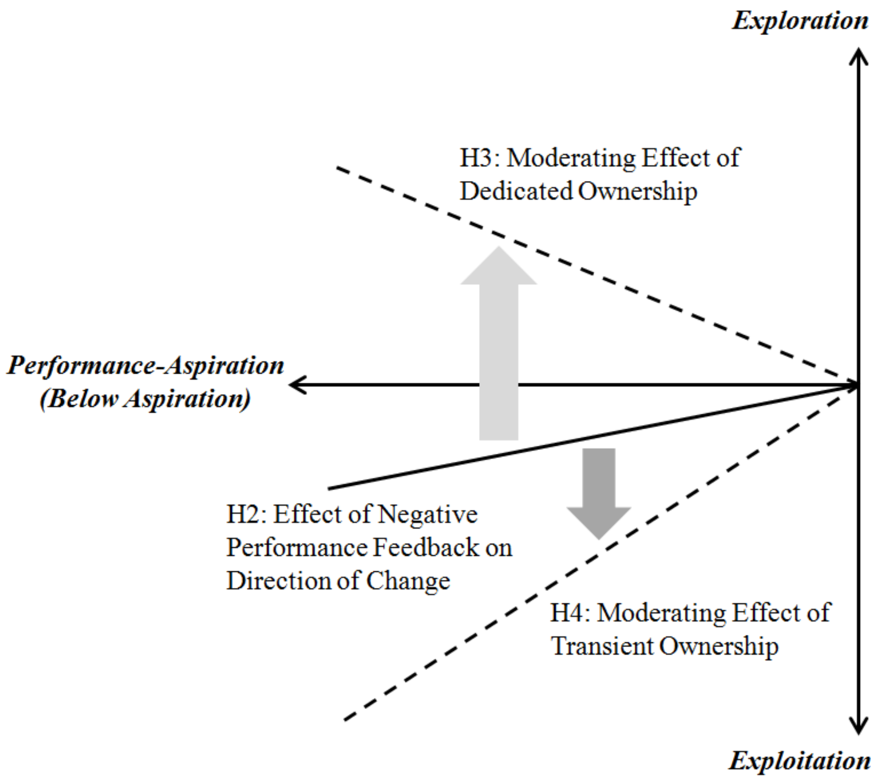


Figure 9. Hypothesized Relationship (H2-H4)



5.3. DATA AND METHODS

5.3.1. Empirical Setting

We test our theory in the empirical context of CVC investing. CVC refers to direct minority equity investment made by established firms in privately held entrepreneurial ventures (Dushnitsky & Lenox, 2005). CVC investing is an appropriate setting to test our theory for the three reasons. First, CVC is a means of external search for innovations that can help solve organizational performance problems and is sensitive to organizational performance feedback (Gaba & Bhattacharya, 2012). Second, CVC vary with respect to whether these are exploitative or explorative (Schildt et al., 2005; Wadhwa & Basu, 2013). Explorative CVC investments are aimed at searching externally for new and unfamiliar knowledge that might be technology or market related (Wadhwa & Basu, 2013) while exploitative CVC investments are meant to search for existing and familiar knowledge (that are technology or market related) in which the corporate investor has prior experience (Wadhwa & Basu, 2013). Finally, research suggests institutional shareholders influence CVC investing decisions (Anohkin et al., 2016). Our interviews with IR managers also revealed that senior managers listen to and incorporate institutional shareholders' views on CVC investments into their decision-making. For instance, an IR Executive of a Global Data Storage Company noted that "we listen to institutional shareholders' views on everything – from our capital allocation, to our venture capital investments, and how we run our business."

5.3.2. Sample

To gain a better understanding of the phenomenon and ground our theory development, we conducted interviews with eight IR managers from companies with active CVC programs and three institutional shareholders who have substantial equity positions in companies with active CVC programs[7] (see Appendix D for the respondent's background). IR Managers function as direct communication channels between institutional shareholders and senior managers (Bushee & Miller, 2012).

To test our hypotheses, we constructed a sample by identifying companies that made at least one CVC investment during 1993-2013 and whose equity shares were held by large institutional shareholders with investments of at least US$100 million. We used Thomson Reuters' Institutional Holdings 13F database to collect institutional ownership data. Institutional shareholders that operate with at least $100 million of investments are required to report their holdings to the U.S. Securities and Exchange Commission through 13F filings every quarter. All common stock positions greater than 10,000 shares or $200,000 are required to be reported in 13F filings. We used Thomson Reuters' VentureXpert database to collect CVC investment data for each sample company. We collected dedicated and transient ownerships classification data from Brian Bushee's website, earnings per share (EPS) data from Thomson Reuters' Institutional Brokers' Estimate System (I/B/E/S) database, and historical standard industrial classification (SIC) code data from Lexis Nexis Corporate Affiliations database. The parent-subsidiary relationship data of the parent corporation and the CVC program were collected from Lexis

[7] We used a semi-structured interview protocol. We explored the dedicated and transient shareholders' investment goals, their nature of the communication with senior managers, and their preferences with regards to making CVC investments. We selected our interview respondents from the sample companies with the largest annual CVC investments in 2014 and 2015 based on Global Corporate Venturing reports. On average, each interview lasted about 35 minutes and all interview generated about 100 pages of printed transcripts.

Nexis Corporate Affiliations, Factiva newspaper, and homepages of the CVC programs. Financial statement and executive data were collected from Compustat and Execucomp databases. Merging data from these databases resulted in a sample that consists of 10,261 CVC investments made by 286 companies during 1993-2013 (refer to Appendix B for the list of sample firms). Using the quarter as our observation period, the final sample consists of 2,729 company-quarter observations.

5.3.3. Measures

Dependent Variables

We employ two different dependent variables. *CVC Intensity*$_t$ represents the outcome variable to test H1 while *Exploration Share*$_t$ is used as the dependent variable in tests of H2-H4. We measure *CVC intensity*$_t$ as the ratio of the quarterly firm level CVC investments (in US dollars) to quarterly sales. This variable was log transformed due to high skewness.

Our second dependent variable, *Exploration Share*$_t$, is defined as the proportion of explorative CVC investment over total CVC investment (i.e. $\frac{\text{Exploration}_{it}}{\text{Exploration}_{it}+\text{Exploitation}_{it}}$). In constructing the measure, we follow substantial prior research and conceptualize exploration and exploitation as two ends of the same continuum (e.g., Lavie et al, 2010; Phelps, 2010). In computing the measure, we followed research that measures exploration and exploitation based on the similarity of the SIC codes of pairs of firms (Vermeulen & Barkema, 2001; Wadhwa & Basu, 2013; Stettner & Lavie, 2014). Specifically, we measure exploitation versus exploration at the level of a CVC investment using Wadhwa & Basu's (2013) coding scheme. If the first four digits of the SIC codes of the firm and the venture are equal, the relationship is coded as 0 (i.e., pure exploitation). If the first three digits of the SIC codes of the firm and venture are equal, the relationship is coded as 0.25. If the first two digits of the SIC codes are equal, the relationship is coded as 0.5. If the first digit of the SIC codes are equal, the relationship is coded as 0.75. If none of the SIC codes of the firm and the venture are equal, the relationship is coded as 1 (i.e., pure exploration).

To measure the proportion of explorative CVC investment for each firm *i* in quarter *t*, we first calculated the average of the industry relatedness between firm *i* and venture *j* for each quarter *t*. Then we weighted this average relatedness by the amount of CVC investment in each quarter *t* as in the following equation (1).

$$Exploration\ Share\ of\ CVC\ investment_{it} = \frac{\sum_{ij} Quarterly\ CVC\ investment_{ijt} \times SIC\ Relatedness_{ijt}}{\sum_{ij} Quarterly\ CVC\ investment_{ijt}} \quad (1)$$

Quarterly CVC investment is measured by the total US dollar amount of CVC investments made to every venture *j* by each firm *i* in each quarter *t*. For instance, consider the following example where firm Alpha invests in ventures A, B, and C during the first quarter of 2005 (refer to Table 9). The proportion of explorative CVC investment of firm Alpha in the first quarter of 2005 is computed as: $\frac{0.5\times100+1\times50+0.75\times100}{100+50+100} = 0.70$. Increasing values indicate increasing exploration (and decreasing exploitation) while decreasing values indicate increasing exploitation (and decreasing exploration).

Table 9. Proportion of Explorative CVC investment (example)

Quarter	Corporation	Start-up Firm	Industry Relatedness	CVC investment (USD)
2005 Q1	Alpha	A	0.5	100
2005 Q1	Alpha	B	1	50
2005 Q1	Alpha	C	0.75	100

Independent Variables

Earnings Gap $_{t\text{-}1}$

Taking both shareholders' and managers' perspectives, earnings per share (EPS) is a widely accepted metric that is used to assess whether the firms' performance was satisfactory (Bolton, 1993; Kasznik & McNichols, 2002). Research suggests that if actual earnings are above expected earnings, stock price will rise and, on the other hand, if actual earnings are below expected earnings, stock price will decline (Bartov et al., 2002). Thus, both institutional shareholders and managers will interpret actual EPS below expected EPS as a performance problem. Accordingly, we measure the aspiration level with the expected EPS and performance with the actual EPS. Expected EPS was calculated by taking the average of all analysts' earnings forecasts for each quarter and company available from the I/B/E/S database. Actual EPS data were also collected from the I/B/E/S database. To measure the *earnings gap*, we first took the difference between actual EPS and expected EPS. This measure captures the distance between actual performance and aspiration level. Following the BTF, we assume that an increasing earnings gap triggers more intense problemistic search (Cyert & March, 1963).

We use a spline function to observe performance below and above aspiration levels (Greene, 2003). Following the empirical BTF literature (e.g., Greve, 1998; Greve, 2003a; Desai, 2016), we use a spline specification to compute separate variables for performance below and above aspiration levels. To capture performance below aspiration level, denoted as *Earnings Gap Below Aspiration*, we identified observations for which actual EPS was below the aspiration level and subtracted actual EPS from the aspiration level. For observations in which realized performance exceeded the aspiration level, the value of this variable is set to zero. This variable takes on positive values when performance is below the aspiration level and higher values indicate decreasing performance relative to aspirations. To capture performance above aspiration level, denoted as *Earnings Gap Above Aspiration,* we identified observations for which actual EPS exceeded the aspiration level and subtracted the aspiration level from actual EPS. For observations in which realized performance was below the aspiration level, the value of this variable is set to zero. Higher values indicate increasing performance relative to aspiration level. As we do not theorize about the influence of performance above aspiration level, we include this variable as a control in our estimations.

Dedicated Ownership $_{t-1}$ and Transient Ownership $_{t-1}$

We measured *Dedicated Ownership* as the proportion of total outstanding shares in firm *i* in quarter *t-1* held by dedicated institutional shareholders. Likewise, we measured *Transient Ownership* as the proportion of total outstanding shares in firm *i* in quarter *t-1* held by transient institutional shareholders. We used Thomson Reuter's Institutional Holdings 13F database to identify institutional shareholders, equity shares held by these shareholders, and total outstanding shares in each quarter. We used the classification of transient and dedicated ownership developed by Brian Bushee (see the Appendix A for a description of this approach). We merged Brian Bushee's ownership classification data with 13F data to construct our ownership variable.

Control Variables

To rule out alternative explanations and potential confounding factors, we controlled for environmental and organizational variables that may influence a firm's intensity and direction of CVC activity.

We use a set of variables to control for environmental antecedents of CVC activity. Because the technological dynamism of a firm's competitive environment increases the benefits of exploration and encourages firm CVC investing (Basu et al., 2011), we control for *technological dynamism* by following Basu et al.'s (2011) approach. First, we identify in which industry(ies) firm i operates in period t using 4-digit SIC codes. We then compute average (quarterly) R&D intensity for all publicly-traded firms operating in each 4-digit SIC code using Compustat data (Basu et al., 2011). Finally, we select the maximum average R&D intensity for all industries in which the firm operates to proxy for *technological dynamism*. As an alternative measure, we use the average technological dynamism across all industries in which the firm operates and obtain similar results. To control for potential confounding effects generated by different firms' CVC programs operating in different geographies, we include *dummy variables that reflect the region* in which a company's CVC program is based: United States, non-U.S. developed countries, and emerging economies based on the classification by Dow Jones and Standard & Poor's. To control for industry variation in CVC activity, we include *industry dummies* based on two-digit level SIC codes. These dummies distinguish 34 different industries in which the sample companies primarily operate. Finally, to control for time-varying sources of unobserved heterogeneity common to all sample firms (e.g., macroeconomic conditions) we included *year dummies* for the years from 1993 to 2013.

We also include a set of variables to control for firm-level antecedents of CVC activity. We control for *firm size* using the total number of firm employees from Lexis Nexis Corporate Affiliations data. As an alternative measure of firm size we use quarterly net sales from the Compustat database and obtain similar results. Because age increases a firm's tendency to exploit existing competencies (Sorensen and Stuart, 2000), we control for *firm age*, which we measure by subtracting the founding year of the company from the current year. A firm's R&D expenditures reflect internal search for innovations (Greve, 2003a) and can increase its ability to absorb knowledge from external sources (Cohen and Levinthal, 1990). Accordingly, we control for quarterly *firm R&D intensity*, measured as quarterly R&D expenditures divided by quarterly sales. We collected these data from Compustat. Next, we control for the structure of a sample firm's CVC program because it may affect whether shareholders can influence CVC investment decisions. If the CVC program is a separate legal entity in the form of a wholly owned subsidiary, shareholders may infer that they have limited ability to influence its decisions. We control for *CVC program structure* using a dummy variable, coded as 1 if the program is governed by a separate, wholly-owned subsidiary and 0 otherwise. We checked whether the CVC program is held as a wholly owned subsidiary using Lexis Nexis Corporate Affiliations, SEC 10-K reports, and Factiva news searches.

By operating many businesses, diversified firms may pursue more CVC investment opportunities and have access to more investment opportunities, thereby affecting their CVC activity. We measure *diversification* as the number of four-digit SIC codes in which firm i operated in period t. Firm profitability can impact the accrual of slack resources, which can affect the need to change and the direction of search (Cyert & March, 1963). We control for *firm profitability* as return on sales, measured by dividing quarterly operating income after depreciation by net sales. Because the intensity of a firm's CVC investment may affect the visibility of the CVC program and the attention given by institutional shareholders, we control for *CVC intensity* (as operationalized above) in our tests of H2-H4. Finally, because managers tend to become more risk-averse and prefer exploitation over exploration as they get older, biasing organizational search (Kammerlander et al., 2015; Miller & Shamsie, 2001), we control for *CEO age* (in years). We collected the data for this variable from the Execucomp module of Compustat.

Research has discussed various forms of slack resources as influencing the direction of organizational search (Greve, 2003a; Kim et al., 2008). From the BTF perspective, slack may function as a performance buffer and lead to greater experimentation, risk taking, and exploration (Cyert & March, 1963). On the other hand, slack may alleviate the pressure for survival, decrease the need to develop new technologies, and encourage organizations to consume their excess resources to meet near-term performance targets by engaging in exploitation (Bourgeois, 1981). We control for three different types of slack: absorbed slack, unabsorbed slack, and potential slack. *Absorbed slack* refers to administrative resources that are left over from short-term operations and maintenance of the organization. Following Singh (1986), we measure a firm's absorbed slack using the ratio of quarterly selling, general, and administration expenses to quarterly sales. *Unabsorbed slack* refers to uncommitted ready-to-deploy financial resources such as cash funds. Unabsorbed slack encourages managers to take more risk (Greve, 2007). We measure unabsorbed slack using a firm's quick ratio: the ratio of current assets to current liabilities (Singh, 1986). *Potential slack* refers to a firm's ability to borrow and inject new financial resources (Bourgeois, 1981). Following Bourgeois (1981), we compute potential slack using a firm's debt to equity ratio. We collected the data to compute these different measures of slack from Compustat. Refer to Appendix C for an overview of how the variables were measured and the data sources.

5.3.4. Estimation Approach

We modeled two different dependent variables and use estimation approaches appropriate to each. The first dependent variable, CVC intensity, is a continuous level measure and although it is bounded from below at zero, the log-transformed version of the variable, which we use as the

DV in the test of H1, is roughly normally distributed. Consequently, we used a panel linear estimator with firm effects to estimate the models with this outcome variable. Because the use of random effects relies on the assumption that errors and regressors are uncorrelated, we used a Hausman (1978) test to choose between fixed and random effects. We lagged all independent variables one period, which reduces concerns of reverse causality and removes the possibility of simultaneity bias.

The second dependent variable, Exploration Share, is a proportion and presents challenges to using linear regression models (Gujarati, 1995). Thus, we used two alternative estimation methods to analyze the data. First, following Papke and Wooldrige (2008), we used a Generalized Estimating Equations (GEE) Fractional Response Model for panel data. We used probit model as the link function, exchangeable correlation matrix, and heteroscedasticity adjusted standard errors. Alternatively, we used panel linear estimation method with robust standard errors. The results of Hausman tests for each estimated model indicated the appropriateness of using random effects rather than fixed effects (Greene, 2003). We compute variance inflation factors to assess problematic multicollinearity. As a robustness check, we compare the results from both estimation methods.

5.4. RESULTS

Table 10 shows the summary statistics and Pearson-correlation matrix. On average, our sample companies make CVC investments that are slightly more explorative (56.7%) than exploitative (43.3%), which is consistent with research that suggests CVC investments are, in general, inclined towards exploration (MacMillan et al., 2008).

Our main models and results are shown in Table 11. To test H1, we ran the Random Effects Panel Estimation in Model 1. The result supports H1 that when performance relative to aspiration level decreases, CVC investment intensity increases. This result is positive and statistically significant at 1% level. The effect size indicates that a performance shortfall by 1 USD earnings per share relative to the average analyst forecasts will increase the CVC investment intensity by 218%. Results concerning H2–H4 are shown in models 2 to 7. Results from GEE Fractional Probit Estimation are reported in Models 2 to 4 and results from Random Effects Panel Estimation are reported in Models 5 to 7. Models 2 and 5 include the main effects of earnings below aspiration, dedicated ownership, and transient ownership. Models 3 and 6 include the interaction between earnings gap and dedicated ownership. Models 4 and 7 include the interaction between earnings gap and transient ownership. Results from Models 2 and 3 support H2 that when performance relative to aspiration level decreases, the proportion of explorative investments decreases (and the proportion of exploitative CVC investments increases). These results are negative and statistically significant at 10% level. It shows that performance shortfall by 1 USD earnings per share relative to the average analyst forecasts will decrease the proportion of exploration by 0.99 ~ 1.20 %. While the results from Models 2 and 3 were statistically significant for the earnings below aspiration variable, coefficient estimates from Models 4 to 7 were negative but not statistically significant.

Table 10. Summary Statistics and Correlations (Essay 2)

	N	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Exploration Share $_{t}$	2,729	0.567	0.375	1.000																
2. Earnings Gap (above aspiration) $_{t-1}$	1,528	0.104	0.901	0.024	1.000															
3. Earnings Gap (below aspiration) $_{t-1}$	1,521	0.053	0.208	0.007	-0.030	1.000														
4. Dedicated Ownership $_{t-1}$	1,393	0.009	0.014	0.121*	0.015	-0.018	1.000													
5. Transient Ownership $_{t-1}$	1,525	0.001	0.001	0.058*	0.060*	0.040	0.353*	1.000												
6. Technological Dynamism $_{t-1}$	1,528	0.105	0.089	-0.377*	-0.056*	-0.066*	-0.136*	-0.246*	1.000											
7. Firm Size $_{t-1}$	1,491	71,700	88,380	0.100*	0.016	-0.006	-0.168*	-0.297*	-0.029	1.000										
8. Firm Age $_{t-1}$	1,528	18.468	22.407	0.009	-0.032	-0.006	-0.005	0.005	0.023	-0.003	1.000									
9. External CVC Structure $_{t-1}$	1,528	0.335	0.472	0.015	0.009	0.014	-0.187*	-0.214*	0.106*	0.213*	-0.068*	1.000								
10. Unabsorbed Slack $_{t-1}$	1,130	2.437	2.844	0.033	0.053	0.047	0.127*	0.338*	-0.032	-0.208*	0.066*	0.011	1.000							
11. Absorbed Slack $_{t-1}$	1,102	0.355	0.190	-0.307*	0.172*	-0.092*	-0.019	0.115*	0.284*	-0.177*	-0.056	-0.118*	0.192*	1.000						
12. Potential Slack $_{t-1}$	1,294	1.778	2.767	0.162*	0.009	0.051	0.067*	-0.051	-0.164*	0.475*	0.143*	0.091*	-0.144*	-0.214*	1.000					
13. R&D Intensity $_{t-1}$	920	12.337	20.164	0.170*	-0.014	0.108*	0.017	-0.032	-0.096*	0.029	0.024	-0.001	-0.191*	-0.416*	0.142*	1.000				
14. CVC Intensity $_{t-1}$	1,239	1.998	1.910	-0.080*	-0.023	-0.069*	0.166*	0.344*	0.077*	-0.415*	-0.119*	-0.031	0.386*	0.364*	-0.170*	-0.143*	1.000			
15. Diversification $_{t-1}$	1,528	3.890	3.338	-0.026	-0.028	0.001	-0.101*	-0.150*	0.185*	0.432*	0.080*	0.235*	-0.095*	-0.246*	0.404*	0.166*	-0.222*	1.000		
16. Return on Sales $_{t-1}$	1,260	0.174	0.369	-0.041	-0.189*	-0.005	-0.136*	-0.226*	0.105*	0.031	0.074*	0.078*	0.033	-0.203*	-0.011	-0.049	-0.146*	0.001	1.000	
17. CEO age $_{t-1}$	1,082	55.099	6.834	0.055	-0.006	0.069*	-0.085*	-0.085*	-0.067*	0.113*	0.127*	0.085*	0.050	-0.162*	0.008	-0.130*	-0.190*	0.157*	0.186*	1.000

*Significance level: *$p<0.05$*

Table 11. Effect on CVC Intensity and Proportion of Explorative CVC Investment (Total Sample)

	DV: CVC Intensity $_t$	DV: Proportion of Explorative CVC Investment $_t$					
		GEE Fractional Probit			Random Effects		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Earnings Gap (above aspiration) $_{t-1}$	0.515*** (0.146)	0.273** (0.121)	0.331** (0.143)	0.280** (0.112)	0.084*** (0.031)	0.094*** (0.035)	0.083** (0.033)
H1, H2: Earnings Gap (below aspiration) $_{t-1}$	2.182*** (0.668)	-0.986* (0.558)	-1.204* (0.678)	-0.825 (0.856)	-0.208 (0.204)	-0.289 (0.276)	-0.446 (0.343)
Dedicated ownership $_{t-1}$		6.883* (3.712)	5.471 (3.921)	8.081** (3.941)	2.767* (1.427)	2.496 (1.628)	3.075* (1.571)
Transient Ownership $_{t-1}$		115.613 (85.922)	131.098 (86.593)	96.728 (89.113)	42.104 (26.801)	41.177 (26.928)	28.45 (27.238)
H3: Below aspiration $_{t-1}$ × Dedicated Ownership $_{t-1}$			336.652*** (112.523)			90.933** (43.215)	
H4: Below aspiration $_{t-1}$ × Transient Ownership $_{t-1}$				608.957 (1787.879)			258.898 (701.877)
Technological Dynamism $_{t-1}$	0.429 (0.717)	-2.505*** (0.836)	-2.409*** (0.818)	-2.152*** (0.802)	-0.794*** (0.274)	-0.771*** (0.269)	-0.737*** (0.277)
Firm Size $_{t-1}$	0 (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)
Firm Age $_{t-1}$	-0.013** (0.005)	0.001 (0.003)	0 (0.003)	0.001 (0.003)	0 (0.001)	0 (0.001)	0 (0.001)
External CVC Structure $_{t-1}$	-0.348 (0.292)	0.182 (0.177)	0.229 (0.180)	0.245 (0.188)	0.021 (0.052)	0.027 (0.053)	0.028 (0.054)
Unabsorbed Slack $_{t-1}$	0.178** (0.077)	0.034 (0.044)	0.046 (0.041)	0.029 (0.044)	0.026 (0.016)	0.028* (0.015)	0.029* (0.016)
Absorbed Slack $_{t-1}$	-0.285 (0.688)	-1.677* (0.913)	-1.845* (0.962)	-1.635* (0.904)	-0.297* (0.172)	-0.311* (0.184)	-0.300* (0.175)
Potential Slack $_{t-1}$	-0.342*** (0.088)	0.231** (0.114)	0.225* (0.121)	0.203* (0.118)	0.05 (0.034)	0.052 (0.035)	0.057* (0.030)
R&D Intensity $_{t-1}$	-0.009 (0.015)	-0.013 (0.015)	-0.013 (0.015)	-0.013 (0.015)	0.003 (0.002)	0.002 (0.002)	0.002 (0.002)
CVC Intensity $_{t-1}$		-0.082** (0.035)	-0.092*** (0.034)	-0.079** (0.035)	-0.036*** (0.012)	-0.036*** (0.012)	-0.037*** (0.013)
Diversification $_{t-1}$	-0.068 (0.056)	-0.04 (0.030)	-0.045 (0.032)	-0.043 (0.031)	-0.011 (0.009)	-0.014 (0.009)	-0.013 (0.009)
Return on Sales $_{t-1}$	-1.327** (0.554)	-0.155 (0.418)	-0.134 (0.447)	-0.172 (0.456)	-0.012 (0.135)	-0.002 (0.148)	-0.036 (0.150)
CEO age $_{t-1}$	-0.048** (0.019)	0.008 (0.011)	0.003 (0.011)	0.009 (0.011)	0 (0.003)	-0.001 (0.003)	-0.001 (0.004)
Constant	0.542 (1.247)	0.262 (0.926)	0.72 (0.917)	0.162 (0.943)	-0.317 (0.234)	-0.279 (0.233)	-0.287 (0.238)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. Obs	657	594	574	583	621	601	609
No. Cluster	56				57	56	57
R-Squared	0.463				0.367	0.371	0.365
Chi-Squared		1280.566	1373.724	1108.702	.	.	.

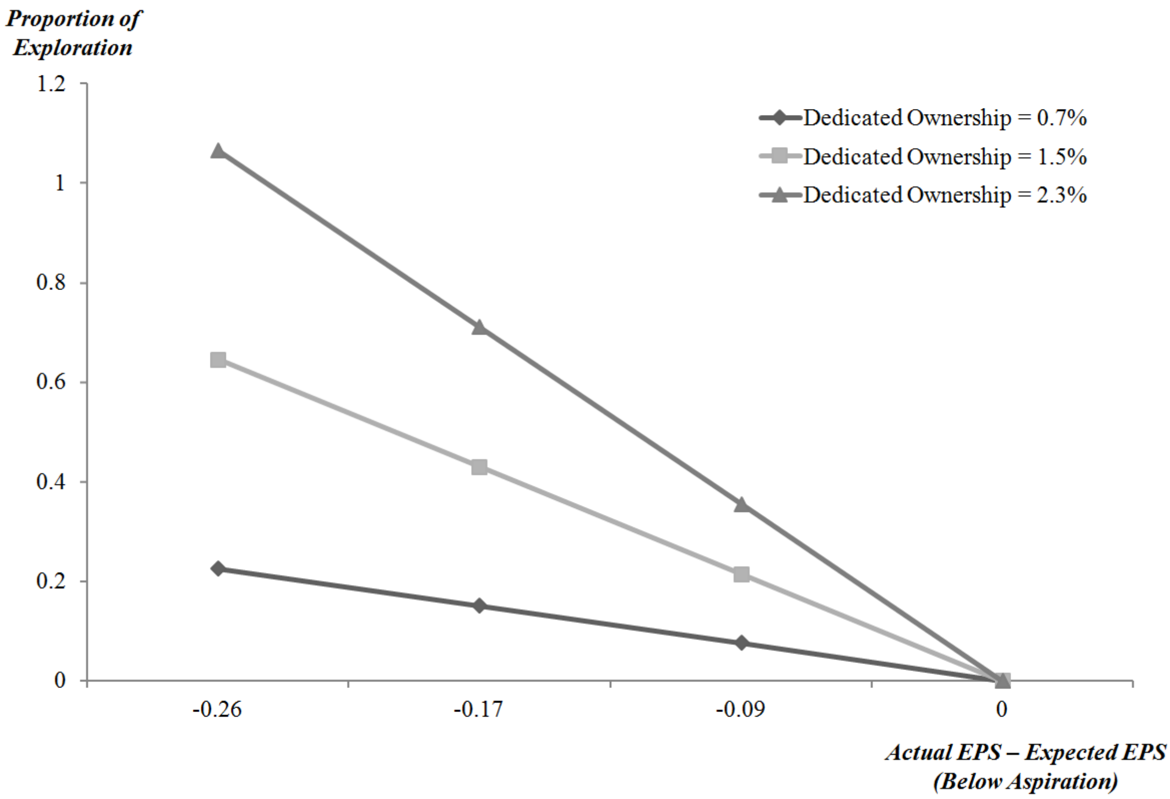
*Significance level: * p < 0.1, ** p < 0.05, *** p < 0.01*

Our third hypothesis predicts that as the level of dedicated ownership increases, declining performance (below the aspiration level) results in a lower proportion of exploitative CVC investments and a concomitant increase in the proportion of explorative investments. First, the results in Models 2, 4, 5, 7 of Table 11 indicate that the level of dedicated ownership significantly increases the proportion of exploration. Results in these models indicate that 1% increase of dedicated ownership will cause 0.03~0.08% increase in the proportion of explorative CVC investment. This result indicates that an increase in dedicated ownership leads the firms to engage in more exploration and less exploitation. Secondly, interaction terms between earnings below aspiration and dedicated ownership in Models 3 and 6 are consistently positive and statistically significant at 1% and 5% levels. These results provide support for H3.

On the other hand, the results in Models 4 and 7 of Table 11 do not support H4, which predicts that as the level of transient ownership increases, declining performance (below the aspiration level) results in a greater proportion of exploitative CVC investments and a concomitant decrease in the proportion of explorative investments. Both the estimated coefficients of the transient ownership and the interaction term between earnings gap and transient ownership are not statistically significant.

In addition to the previous hypothesis testing, we examine the plots of the interaction effect between dedicated ownership and earnings gap (below aspiration) on the proportion of exploration in Figure 10. We have used the average value of the estimated coefficients from Models 3 and 6 of Table 11 to plot the interaction effects. In our x-axis we have used the performance minus the aspiration variable (below aspiration) in the range from one standard deviation below its mean up till the upper bound of zero. The marginal effect is plotted at different values of dedicated ownership ranging from 0.7% ownership to one standard deviation above its mean, which is 2.3% ownership. As shown in Figure 10, the marginal effect of performance shortfall on the proportion of exploration is consistently positive and increasing when dedicated ownership increases from 0.7% to 2.3%.

Figure 10. Effect of Dedicated Ownership (from Table 11, Models 3 & 6)



We also find interesting results concerning the effects of the control variables on CVC intensity in Model 1 of Table 11. In line with the BTF literature, we find that not only performance below aspirations but also performance above aspirations increases a firm's CVC intensity. The estimated coefficients of actual earnings above expected earnings and those of actual earnings below expected earnings are statistically significant at 1% level in Model 1 of Table 11. When actual earnings are above expected earnings, positive earnings gap of 1 US dollar increases the CVC intensity by 51.5%. When actual earnings are below expected earnings, negative earnings gap of 1 US dollar increases the CVC intensity by 218.2%. These results indicate that while both the negative and positive performance feedbacks trigger organizational change, the effect of negative performance feedback is stronger than that of positive performance feedback. These results are consistent with the findings from the BTF literature which suggest negative performance feedback has a stronger impact on organizational change than the positive performance feedback (e.g. Greve, 2003a; Greve, 1998).

In Model 1 of Table 11, we find that the firms with greater unabsorbed slack have greater CVC intensities. Unabsorbed slack refers to uncommitted ready-to-deploy financial resources, and it is measured by the ratio of current assets to current liabilities (Singh, 1986). The estimated coefficient of unabsorbed slack is positive and statistically significant at 5% level. This result conforms to the results found in the CVC literature (Gaba & Bhattacharya, 2012; Basu et al., 2011). For instance, CVC research found that greater unabsorbed slack increases the likelihood of setting up CVC programs (Gaba & Bhattacharya, 2012) and the number of CVC investments (Basu et al., 2011). In addition, we find that the firms with greater potential slack have lower CVC intensities. Potential slack refers to a firm's ability to borrow and inject new financial resources, and it is measured by the ratio of debt to equity. (Bourgeois, 1981). The estimated coefficient of potential slack is negative and statistically significant at 1% level. These findings on the effect of unabsorbed slack and potential slack indicate that different type of slacks can have opposite effects on either increasing or decreasing the firm's CVC intensity.

We find that older firms have lower CVC intensities. In Model 1 of Table 11, the estimated coefficient of firm age is negative and statistically significant at 5 % level. This result is in line with the CVC literature which suggests that older firms face greater difficulties in adapting to the technological changes and adopting CVC programs (Basu et al., 2011; Gaba & Bhattacharya, 2012). Gaba and Bhattacharya (2012) also found that older firms have a decreased likelihood of adopting CVC programs. Furthermore, we find that as the CEO becomes older, the firm's CVC intensity decreases. The estimate of the CEO age effect is negative and statistically significant at 5 % level. This result is in line with the literature which indicates that managers tend to become more risk-averse as they get older (Miller & Shamsie, 2001).

We also find interesting results concerning the effects of the control variables on the proportion of explorative CVC investment over total CVC investment. In Models 2–7 of Table 11, the estimated coefficients of actual earnings above expected earnings are positive and statistically significant at 1% or 5 % level. The estimated coefficients of actual earnings below expected earnings are negative and statistically significant at 10% level in Models 2–3 of Table 11. These results indicate that, in line with the BTF literature, while performance below aspirations increases the firm's exploitation share, performance above aspirations increases the firm's exploration share (Cyert & March, 1963; Levinthal & March, 1981). BTF theory argues that performance below aspirations triggers problemistic search and likelihood of engaging in more exploitation, whereas performance above aspirations triggers slack search and likelihood of engaging in more exploration (Cyert & March, 1963; Levinthal & March, 1981). It is interesting to note that the effect of negative performance feedback on triggering more exploitation is stronger than the effect of positive performance feedback on triggering more exploration. This result conforms to the findings of the BTF research indicating that the negative performance feedback has a stronger effect on triggering organizational search and behavioral changes than that of the positive performance feedback (e.g. Greve, 2003a; Greve, 1998).

In Models 6–7 of Table 11, we find that the firms with greater unabsorbed slack lead to greater exploration shares. The estimated coefficients of unabsorbed slack are positive and statistically significant at 10% level. Furthermore, in Models 2–7 of Table 11, we find that the firms with greater absorbed slack leads to lower exploration shares. The estimated coefficients of absorbed slack are negative and statistically significant at 10% level. Also, in Models 2, 3, 4, 7 of Table 11, we find that the firms with greater potential slack leads to greater exploration shares. The estimated coefficients of potential slack are positive and statistically significant at 5% or 10% level. These findings show that different types of slacks can have different effects on either allocating more resources to exploitation or exploration. These findings are in consonance with the results from the slack effect literature (Voss, Sirdeshmukh, & Voss, 2008).

In Models 2–7 of Table 11, we find that the firms operating in industries with greater technological dynamism pursue lower exploration shares (and concomitantly greater exploitation shares). The estimated coefficients of technological dynamism are negative and statistically significant at 1% level. This result is opposite of what we have expected because the literature suggests that increased level of technological dynamism of a firm's competitive environment increases the benefits of exploration and thus, encourages more exploration (Basu et al., 2011). Moreover, in Models 2–7 of Table 11, we find that larger firms pursue lower exploration share (and concomitantly greater exploitation share). The estimated coefficients of firm size are negative and statistically significant at 5% level. This result may be because larger firms have greater organizational inertia, which is the tendency to resist significant changes at any given point of time (Hannan & Freeman, 1984) and thus, prefer to exploit rather than explore.

All of the effects of the control variables that are shown in Table 11 are consistently found in Table 12, which shows the results of the robustness check that was carried out on a sub-sample of firms operating under dedicated ownership that has at least the average level of ownership. The only difference between the results shown in Table 11 and Table 12 are that in Table 12, the estimated coefficients of CVC intensity and diversification turned out to be negative and statistically significant. For instance, the results in Models 1–6 of Table 12 indicate that greater CVC intensity decreases the firm's allocation of resources to exploration share (and concomitantly increases exploitation share). Increasing CVC intensity reflects that the level of attention given to the CVC program by the investing community and their scrutiny are increasing. Also, the results in Models 2, 3, 6 of Table 12 show that a firm's greater diversification level leads to lower exploration share and concomitantly greater exploitation share. This finding indicates that while increased level of diversification increases the opportunities for CVC investing, it rather decreases the allocation of resources to exploration.

5.4.1. Robustness Check

To check the robustness of the results for H2-H4, we ran the same empirical models for a sub-sample where dedicated shareholders have ownership greater than or equal to 0.09% to test whether there is a *threshold effect* of dedicated ownership (refer to Table 12). We have used the 0.09% equity share as the cut-off level as it is the mean value of dedicated ownership. If there is a threshold effect of dedicated shareholders, dedicated ownership greater than the threshold will have a stronger impact on the proportion of explorative CVC investment. The results in Table 12 are consistent with those from Table 11 but have stronger effects size for H2. Results across all models in Table 12 significantly supports H2 that performance shortfall relative to aspiration decreases the proportion of exploration. Results in Table 12 show that a performance shortfall by 1 USD earnings per share relative to the average analyst forecasts will decrease the proportion of exploration by 0.47 ~ 2.70 %.

The results in Models 2 and 5 in Table 12 support H3 that as the level of dedicated ownership increases, declining performance (below the aspiration level) results in a lower proportion of exploitative CVC investments and a concomitant increase in the proportion of explorative investments. Interaction terms between earnings gap (below aspiration) and dedicated ownership in Models 2 and 5 are positive and statistically significant at 1% level. Moreover, the results in Models 3 and 6 indicate that an increase in dedicated ownership directly and positively impacts the proportion of exploration. The results in Models 3 and 6 show that a 1% increase in dedicated ownership will increase exploration share by 0.03 ~ 0.09%. On the other hand, the results in Models 3 and 6 indicate that H4, which predicts as the level of transient ownership increases, declining performance (below the aspiration level) results in a greater proportion of exploitative CVC investments and a concomitant decrease in the proportion of explorative investments, is not supported. Neither the direct effect of transient ownership on exploration share nor the interaction effect between earnings gap and transient ownership is significant.

Table 12. Effect on Proportion of Explorative CVC Investment (Dedicated Ownership > 0.9%)

	GEE Fractional Probit			Random Effects		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Earnings Gap (above aspiration) $_{t-1}$	0.217* (0.131)	0.313* (0.163)	0.246* (0.131)	0.059** (0.029)	0.062** (0.030)	0.063* (0.032)
H2: Earnings Gap (below aspiration) $_{t-1}$	-1.512** (0.643)	-2.697*** (0.912)	-1.801* (0.941)	-0.465*** (0.177)	-0.826*** (0.301)	-0.587* (0.309)
Dedicated ownership $_{t-1}$	7.363 (4.889)	4.524 (4.873)	8.819* (5.139)	2.34 (1.722)	1.326 (1.585)	3.158* (1.772)
Transient Ownership $_{t-1}$	109.98 (110.888)	133.972 (108.749)	58.428 (112.809)	32.765 (39.781)	28.329 (42.264)	16.936 (40.140)
H3: Below aspiration $_{t-1}$ × Dedicated Ownership $_{t-1}$		506.270*** (169.410)			149.546*** (53.757)	
H4: Below aspiration $_{t-1}$ × Transient Ownership $_{t-1}$			1599.64 (2260.586)			432.507 (724.072)
Technological Dynamism $_{t-1}$	-2.604** (1.013)	-2.624*** (1.004)	-2.222** (1.005)	-0.669** (0.332)	-0.545 (0.343)	-0.643* (0.337)
Firm Size $_{t-1}$	-0.000** (0.000)	0 (0.000)	-0.000* (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000* (0.000)
Firm Age $_{t-1}$	0.001 (0.003)	-0.001 (0.003)	0.001 (0.003)	0 (0.001)	-0.001 (0.001)	0 (0.001)
External CVC Structure $_{t-1}$	0.171 (0.163)	0.186 (0.165)	0.206 (0.179)	0.062 (0.067)	0.105 (0.070)	0.069 (0.065)
Unabsorbed Slack $_{t-1}$	0.101** (0.044)	0.104** (0.042)	0.098** (0.046)	0.03 (0.019)	0.028 (0.021)	0.034** (0.017)
Absorbed Slack $_{t-1}$	-2.078** (1.043)	-2.378** (1.110)	-2.074** (1.029)	-0.375** (0.187)	-0.404* (0.208)	-0.388** (0.192)
Potential Slack $_{t-1}$	0.215* (0.126)	0.203 (0.127)	0.188 (0.130)	0.054* (0.029)	0.056* (0.028)	0.050* (0.030)
R&D Intensity $_{t-1}$	-0.009 (0.016)	-0.011 (0.017)	-0.009 (0.017)	0.003 (0.003)	0.002 (0.003)	0.003 (0.003)
CVC Intensity $_{t-1}$	-0.097** (0.044)	-0.109** (0.045)	-0.096** (0.045)	-0.029* (0.015)	-0.030** (0.014)	-0.032** (0.015)
Diversification $_{t-1}$	-0.045 (0.028)	-0.053** (0.026)	-0.051* (0.028)	-0.014 (0.011)	-0.017 (0.011)	-0.016* (0.010)
Return on Sales $_{t-1}$	-0.433 (0.471)	-0.312 (0.505)	-0.485 (0.518)	-0.103 (0.147)	-0.095 (0.164)	-0.15 (0.161)
CEO age $_{t-1}$	0.005 (0.011)	0.001 (0.010)	0.005 (0.012)	0.004 (0.004)	0.004 (0.005)	0.003 (0.004)
Constant	0.508 (1.074)	1.116 (1.048)	0.52 (1.096)	0.262 (0.352)	0 (.)	0 (.)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
No. Obs	416	396	405	443	423	432
No. Cluster				55	54	55
R-Squared				0.381	0.368	0.38
Chi-Squared	704.436	1187.997	671.662	.	.	.

*Significance level: * p < 0.1, ** p < 0.05, *** p < 0.01*

5.5. DISCUSSION

The Behavioral Theory of the Firm has provided critical insights into why and how organizations search for alternatives and change their behaviors (Cyert & March, 1963). Specifically, the BTF has been useful in explaining how performance shortfall relative to aspiration levels triggers organizations to search for and adopt a variety of organizational changes (Shinkle, 2012). While this research has convincingly shown how negative performance feedback affects whether and when firms change, it provides little insight into the direction of organizational change and how the direction of change may be influenced by a firm's shareholders. By drawing on insights from corporate governance and decision risk research, we examine how poor firm performance influences the direction of change and how the concentration of a firm's dedicated and transient shareholders influence this relationship. We find that poor firm performance motivates firms to increase their CVC investment intensity and that this change is directed at exploitative investments. We also find that as the concentration of dedicated ownership in a poor performing firm increases, the firm alters its search trajectory by exploring more and exploiting less.

This study contributes to research on the Behavioral Theory of the Firm and Corporate Venture Capital. While BTF traditionally examined when and how firms will change, our study moves beyond this focus and explores the direction of such changes (Kuusela et al., 2016). We do so by building on recent research that suggests where firms search for solutions, and thus the direction of organizational change, depends on the risk preferences of managers implementing the change. We argue that CVC program managers are typically risk averse because they are rarely paid incentive compensation (Block & Ornati, 1987; Dushnitsky & Shapira, 2010), leading to systematic risk aversion in their investments (Dushnitsky & Shapira, 2010), and a preference for exploitation over exploration (March

1991). We find that when the need to change is triggered by negative firm-level performance feedback, CVC program managers search locally by investing in ventures from nearby sectors. By focusing on managerial risk preferences, we improve our understanding of where organizations search for solutions to solve the problem of poor performance.

We also contribute to the BTF by highlighting how different types of influential shareholders can influence the direction of organizational search. Because the BTF research typically assumes organizational decision making is the sole purview of a dominant coalition of managers (Desai, 2016) it provides little insight into how influential external constituencies, such as shareholders, can affect organizational decision making during times of poor performance (Gavetti et al., 2012). We integrate insights from corporate governance research and show how the direction of organizational change in response to negative performance feedback is influenced by the concentration of dedicated ownership.

We also contribute to research on corporate venture capital by showing that poor firm performance, in addition to influencing the adoption and termination of CVC programs (Gaba & Bhattacharya, 2012), also motivates increasing CVC investment activity. This study is also one of the first to explore the influence of corporate governance on CVC investing (see also Anokhin et al. 2016) and the first to show that corporate ownership structure influences where firms invest CVC. As such, it complements prior research on corporate entrepreneurship that shows the composition of a firm's shareholders influences its corporate venturing efforts (Zahra, 1996).

Our study has several limitations that represent interesting avenues for future research. First, while we theorize on how performance shortfall relative to aspiration levels restrains managerial discretion through shareholders' interaction with managers, we do not directly observe how managers will impact the causal link between performance shortfall and resource allocations to exploration and exploitation. Examining the direct impact of managers on resource allocation decisions will further our understanding of the micro-level mechanism that is taking place and it will be an interesting topic to pursue for future research. For example, recent developments from the cognitive science can shed light on how managerial risk preferences are shaped and influence decision-making (Schmidt, 2013; Schmidt, 2008). Secondly, while we have discussed shareholders' influence as one of the important drivers of reshuffling the allocation of resources to exploration and exploitation, yet we do not know how shareholders' engagement with managers may impact firm performance and survival. Future research may study the effect of shareholders on the linkage between organizational ambidexterity and firm performance. Thirdly, while we have tested the influence of shareholders on allocation of resources into exploration and exploitation in the context of CVC investing, it will be interesting to investigate how shareholders interact with managers and allocate resources in other forms of external search such as acquisitions and strategic alliances.

CHAPTER 6. ESSAY 3. PERFORMANCE IMPLICATION OF OSCILLATING BETWEEN EXPLOITATION AND EXPLORATION: EVIDENCE FROM CORPORATE VENTURE CAPITAL INVESTING

ABSTRACT

Review of the CVC literature suggests that research on the intersections among the antecedents, management, and outcomes of CVC is called for. In the previous two essays, I theorized and tested how poor firm performance influences the managerial decision-making with regards to allocating CVC resources to exploitation and exploration and how such decisions are affected by shareholders and board of directors. In this essay, by drawing on insights from the ambidexterity and organizational change research, I examine how and under what conditions oscillating between exploitation and exploration over time impacts a firm's performance in the CVC context. By analyzing data on the ambidextrous nature of 10,261 CVC investments made by 286 companies during 1993-2013, I find that both simultaneous and sequential ambidexterity in CVC investing increase a firm's Tobin's Q. Furthermore, I find that the duration of change has an inverted-U relationship with a firm's Tobin's Q. This study contributes to research on ambidexterity and CVC by showing how sequential ambidexterity and its duration influence firm performance.

Keywords: Sequential Ambidexterity, Organizational Change, Performance, Corporate Venture Capital.

6.1. INTRODUCTION

Review of the corporate venture capital (CVC) literature suggests that research on the intersections among the antecedents, management, and outcomes of CVC is called for. In the previous two essays, I theorized and tested how poor firm performance influences the managerial decision-making with regards to allocating CVC resources to exploitation and exploration and how such decisions are affected by shareholders and board of directors. In this essay, by building on ambidexterity research, I examine how and under what conditions oscillating between exploitation and exploration over time impacts a firm's performance in the context of CVC investing.

Striking the right balance between exploitation and exploration is critical for firm performance and survival (March, 1991; Levinthal & March, 1993). While organizations exploit their existing resources to enhance efficiency and maximize current cash flows, they explore new knowledge as a means to adapt to the changing competitive conditions and create future cash flows, thereby increasing their chances of survival (March, 1991). Past research has shown that there is complementarity of pursuing both exploration and exploitation in generating high firm performance (He & Wong, 2004; Cao et al., 2009; Raisch & Birkinshaw, 2008; Junni et al., 2013). However, research has shown that it is very difficult to design an organization that delivers both exploitation and exploration together because the structure, incentive, and culture to achieve one activity is completely different from those to achieve the other (Tushman & O'Reilly, 1996; Gibson & Birkinshaw, 2004). Organizations that successfully manage this tension and execute both exploitation and exploration is defined to be ambidextrous (Tushman & O'Reilly, 1996). To resolve such inherent tension, ambidexterity literature suggested firms to establish dual structures (Duncan, 1976; Tushman & O'Reilly, 1996) or temporally separate exploitation and exploration (Nickerson & Zenger, 2002). Despite substantial body of research, opportunity exists to expand our understanding of how and under what conditions ambidexterity can be achieved.

First, the ambidexterity literature provides little insight into how sequentially oscillating between exploration and exploitation over time impacts firm performance (Raisch & Birkinshaw, 2008; Simsek et al., 2009). The ambidexterity literature largely built upon the static assumption that the tension arising from executing both exploitation and exploration is persistent and time invariant (Raisch & Birkinshaw, 2008). In other words, it has been largely assumed that at any given point of time, exploitation competes against exploration for scarce resources (Piao, 2010). However, evidence from the organizational change literature suggests that firms temporally separate exploration and exploitation over time under changing resource constraints (Ancona & Chong, 1992; Gersick, 1994; Brown & Eisenhardt, 1997). Firms oscillate between exploitation and exploration over time to align themselves to the changing external environmental demands and internal organizational conditions (Tushman & Romanelli, 1985; Romanelli & Tushman, 1994; Goossen et al., 2012; Mudambi & Swift, 2014). Moreover, scholars note that exploitation becomes an input to exploration and vice versa (Gilsing and Nooteboom, 2006), which implies that exploration and exploitation are complementary over time with regards to increasing firm performance (Boumgarden et al., 2012). Without a sufficient understanding of the dynamic nature of exploration and exploitation, it is difficult to understand how organizations can achieve a balance of the two activities over time and pursue firm performance. Although the temporal separation of the two activities has been discussed through case studies or anecdotal evidence (Ancona & Chong, 1992; Gersick, 1994; Brown & Eisenhardt, 1997; Boumgarden et al., 2012), there has been a lack of direct empirical evidence through analyzing an extensive longitudinal data except for a few exceptions (Luger, 2014; Goossen et al., 2012; Venkatraman et al., 2007). In particular, by taking a two-stage estimation approach based on the theory and findings of the previous essay (Chapter 5), I take into account of the selection effect that may be driven by unobserved heterogeneity arising from resource allocation decisions to exploitation and exploration.

Secondly, ambidexterity literature provides little insight into how the transition between exploitation and exploration occurs over time and impacts firm performance (O' Reilly & Tushman, 2013). While there is a growing literature that examines the effect of sequential ambidexterity (Luger, 2014; Boumgarden et al., 2012; Goossen et al., 2012; Sasson & Minoja, 2010; Piao, 2010; Venkatraman et al., 2007), yet we do not know under what conditions the positive temporal spillover between exploitation and exploration will arise. In particular, little attention has been given to the continuous oscillation between exploitation and exploration. On the one hand, insights from time-paced evolution and complexity literatures show that a firm's ability to continuously change leads to successful firm performance (Miller & Chen, 1994; Galunic & Eisenhardt, 1996; Eisenhardt & Tabrizi, 1995; Brown & Eisenhardt, 1997; Weick & Quinn, 1999; Klarner & Raisch, 2013). For instance, it has been shown that continuous change that links between the present and future products through rhythmic and time-paced transition processes leads to successful multi-product innovations (Brown & Eisenhardt, 1997). While continuous change can substantially influence firm performance (Miller & Chen, 1994; Galunic & Eisenhardt, 1996; Eisenhardt & Tabrizi, 1995; Brown & Eisenhardt, 1997; Klarner and Raisch, 2013), the ambidexterity literature has not yet examined how the continuous change in exploitation and exploration will impact firm performance. On the other hand, insights from organizational inertia literature indicate that oscillating from one activity to another result in disruption of routines and structures, and thus, increases the likelihood of organizational failure (Hannan & Freeman, 1984; Barnett & Freeman, 2001; Swift, 2015). While continuous change can either boost up the complementarity of the two activities (Brown & Eisenhardt, 1997) or pose a threat to oscillating because of organizational inertia (Swift, 2015), the sequential ambidexterity literature has not yet taken into account of the benefits and risks of continuously oscillating from one activity to another.

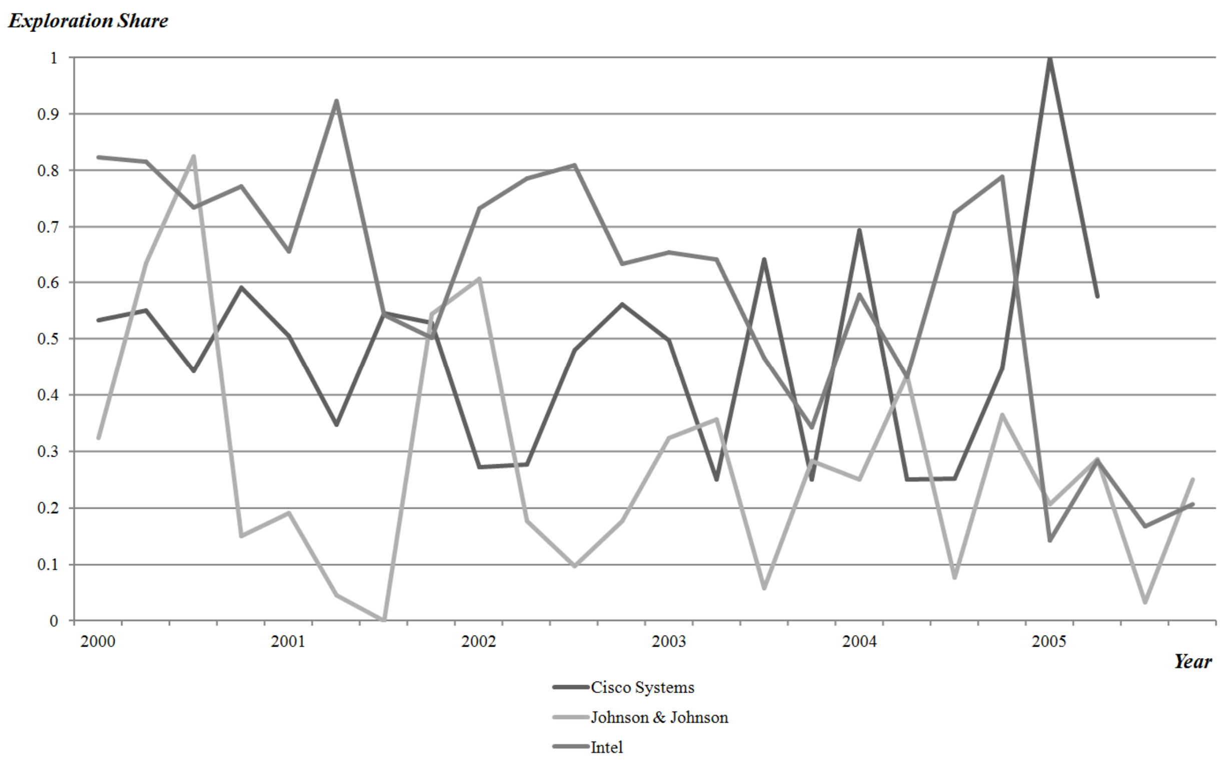
To take into account the impact of continuous oscillation between exploitation and exploration on firm performance, I focus on two dimensions of continuous change: the duration and the amplitude. While *change duration* is defined as the aggregate time taken during continuous transition from one activity to another (i.e. either from exploitation to exploration or from exploration to exploitation), *change amplitude* is defined as the aggregate level of change occurred in allocating resources to exploration and exploitation during continuous transitions. By examining how the change duration and amplitude impact firm performance, I expect to shed light on how the continuous transition from exploitation to exploration (or vice versa) will create or obstruct temporal spillover. Without a sufficient understanding of the effects of change duration and amplitude, it is difficult to understand how organizations oscillate from one activity to another over time and increase or decrease temporal spillovers through such oscillations.

To address the previously discussed limitations of the ambidexterity literature, in this essay, I aim to answer the following research question: *How and under what conditions does oscillating between exploitation and exploration over time in CVC investing influence firm performance?*

I investigate the research question in the context of corporate venture capital (CVC) investing. Corporate venture capital - direct minority equity investments made by established firms in privately held entrepreneurial ventures - is an increasingly important and prevalent means of corporate growth and development (Dushnitsky & Lenox, 2006; 2005; Wadhwa &

Kotha, 2006). While corporate investors may pursue financial returns in making CVC investments, most firms use CVC for strategic reasons to enhance their ability to innovate (Dushnitsky, 2006). As such, CVC programs are widely recognized as a means of externalizing firm R&D (e.g., Dushnitsky & Lenox, 2005; Gaba & Bhattacharya, 2012). CVC investments represent discrete, identifiable commitments of financial resources to strategic relationships that can vary in terms of their exploitative or explorative nature (Wadhwa & Basu, 2013; Schildt et al., 2005). I follow substantial prior research and conceptualize exploration and exploitation as two ends of the same continuum (e.g., Lavie et al, 2010; Phelps, 2010). Whereas explorative CVC relationships represent the commitment of financial resources by corporate investors to ventures with relatively novel knowledge, exploitative relationships represent investments made in ventures with similar and therefore, familiar knowledge (Wadhwa & Basu, 2013).

Figure 11. Proportion of Exploration (Cisco Systems, Johnson & Johnson, Intel)



CVC investing is an appropriate setting to investigate the research question for the following reasons. First, CVC investing has a substantial impact in increasing firm performance (Dushnitsky & Lenox, 2005). For instance, literature has found that CVC investing leads to greater market valuation and increased innovation performance through patent generations and citations (Dushnitsky & Lenox, 2006; Wadhwa & Kotha, 2006). Secondly, CVC literature evidences that there are substantial variation with regards to exploitation and exploration initiatives within and across firms (Wadhwa & Basu, 2013; Jeon, Dussauge, & Phelps, 2017). Also, my data on CVC investing shows that the pursuit of ambidexterity varies within and across firms with respect to focusing on either exploration or exploitation (see Figure 11). For instance, in Figure 11, the proportions of explorative investment over total investment (i.e. the sum of explorative and exploitative investments) substantially vary across Cisco Systems, Johnson & Johnson, and Intel and across time. Furthermore, CVC program managers I have interviewed testify that their investment goals substantially vary with regards to exploitation and exploration.

> "We engage in both exploitative and explorative investments. We make *exploitative investments* in items that will help us to do what we do today and *explorative investments* in items that will affect our business areas in the future so that we want to have some steps in." - Vice President of Investment of a CVC program at a Global Insurance Company
>
> "Our investment thesis is to invest into areas not in our core but in the areas that we don't understand." - Managing Director of a CVC program at a Global Shipping Company

These two initiatives of CVC investing allow us to observe substantial variation in resource allocation to exploration and exploitation over time and thus, the pursuit of ambidexterity and its subsequent impact on firm performance.

To explain how and under what conditions oscillating between exploitation and exploration over time impact firm performance, I draw upon the ambidexterity literature (March, 1991) and continuous change research (Brown & Eisenhardt, 1997). Building on the ambidexterity literature, as a baseline hypothesis, I argue that simultaneous ambidexterity in CVC investing increases firm performance (March, 1991). While *simultaneous ambidexterity* is defined as "the synchronous pursuit of both exploration and exploitation (in the same period) via loosely coupled and differentiated subunits or individuals, each of which specializes in either exploration or exploitation (Gupta et al., 2006)," *sequential ambidexterity* is defined as the sequential pursuit of exploration and exploitation over different periods by transitioning the structures and routines focused on one activity to another (Gupta et al., 2006). Then I argue that sequential ambidexterity in CVC investing increases firm performance by creating positive temporal spillovers. This positive temporal spillover between exploitation and exploration arises when today's exploitation becomes the input for tomorrow's exploration and vice versa. On the one hand, as today's exploitative CVC investing produces incremental innovation that generates tomorrow's slack resources, it triggers more explorative CVC investing tomorrow (Cyert & March, 1963). On the other hand, as today's explorative CVC investing produces radical innovation that generates tomorrow's novel technologies, it triggers more exploitative CVC investing tomorrow (Cyert & March, 1963).

Furthermore, by building on continuous change (e.g., Brown & Eisenhardt, 1997) and organizational inertia research (e.g., Hannan & Freeman, 1984; Barnett & Freeman, 2001), I examine how the continuous change in exploitation and exploration shares influences a firm's performance. On the one hand, I argue that increased change duration will cause positive temporal spillover because it increases the coordinating capability by applying transitioning procedures, creates rhythm, and enhances the firm to well align with the environmental changes (Brown & Eisenhardt, 1997). On the other hand, I argue that too short or too long change durations will cause negative temporal spillover between exploitation and exploration due to increased costs of setting-up, adaptation, and implementation of different routines, mindsets, and structures (Barnett & Freeman, 2001; Siren et al., 2012). Thus, I expect that the change duration has an inverted-U relationship with firm performance. Also, I argue that greater costs for establishing and implementing different routines, mindsets, and structures for exploitation and exploration will be accrued as the change amplitude becomes greater. Thus, I expect that the change amplitude has a negative relationship with the firm performance.

To better understand the phenomenon of interest, I interviewed fourteen CVC Program Managers of the investing firms who participated at the Global Corporate Venturing Symposium, London in 2016 (see Appendix D for the respondent's background). Analysis of these interviews guided my theory development. I tested my predictions on a sample of 286 companies that made 10,261 CVC investments during 1993-2013 and found support for all but one prediction – I did not find support for the effect of change amplitude on firm performance.

This study makes contributions to the ambidexterity and CVC literature as follows. First, while the ambidexterity literature has examined the idea that striking the right balance between exploitation and exploration in the same period improves firm performance (Raisch & Birkinshaw, 2008), I focus on the idea that striking the right balance of two activities over time enhances firm performance. By drawing on ambidexterity literature and, in particular, by removing potential selection biases arising from resource allocation decisions, I show that both simultaneous and sequential ambidexterity in CVC investing increases a firm's Tobin's Q. Secondly, while the ambidexterity literature examined how the transitioning from one activity to another results in substantive organizational change (Romanelli & Tushman, 1994), by building on continuous change research (Brown & Eisenhardt, 1997; Barnett & Freeman, 2001), I examine how the continuous change in exploitation and exploration shares influences the benefits and risks of transitioning the structures and routines focused on one activity to another, and thus, firm performance. I find that increased change duration has an inverted-U relationship with Tobin's Q. Thirdly, I contribute to the CVC literature by showing the positive impact of ambidexterity in CVC investing (Hill & Birkinshaw, 2014). While previous literature has found that simultaneous ambidexterity increases the legitimacy and thus, the survival of the CVC program (Hill & Birkinshaw, 2014), I show that both simultaneous and sequential ambidexterity in CVC investing increases a firm's Tobin's Q. Also, this paper extends the CVC research that examines the performance implications of CVC investing (Dushnitsky & Lenox, 2006; Wadhwa & Kotha, 2006; Allen & Hevert, 2007) by showing how ambidexterity in CVC investing impacts a firm's performance.

6.2. THEORY AND HYPOTHESES

Exploration and exploitation are fundamentally different learning activities to which organizations allocate their resources (March, 1991). While exploration entails activities such as "search, variation, risk taking, experimentation, play, flexibility, discovery, innovation," exploitation entails activities such as "refinement, choice, production, efficiency, selection, implementation, and execution (March, 1991: 71)."

There are three main assumptions in exploration and exploitation in organizational learning (March, 1991; Gupta et al., 2006). First, exploration and exploitation compete for scarce organizational resources. As exploration and exploitation compete for and draw on from the same pool of resources, there is a fundamental trade-off in allocating scarce resources to either exploitation or exploration (March, 1991). Furthermore, I assume that exploration and exploitation are conceptualized as two ends of the same continuum (e.g., Gupta et al., 2006; Phelps, 2010). Accordingly, on the single continuum of search distance, while local search is conceptualized as exploitation, distant search is conceptualized as exploration (Cyert & March, 1963; Nelson & Winter, 1982). Thus, at one static point of time, allocating more resources to exploration implies that lesser resources are allocated to exploitation and vice versa. Secondly, exploration and exploitation are iteratively self-reinforcing. On the one hand, focusing on exploration leads to more exploration, which leads to greater likelihood of failure and decrease in performance. On the other hand, focusing on exploitation leads to more exploitation, which leads the firms' existing technologies to become obsolete and run dry of new technologies. Thirdly, the mindset, organizational routine, and structure needed for exploration are completely different from those needed for exploitation. Thus, exploration and exploitation raise conflicting demands on organizational design for their execution, and this tension makes it difficult for firms to achieve the balance of the two activities (Tushman & O' Reilly, 1996).

The core argument of ambidexterity theory is that balancing exploitation and exploration leads to better performance and survival (March, 1991; Levinthal & March, 1993). While organizations exploit their existing resources to enhance efficiency and maximize current cash flows, they explore new knowledge as a means to adapt to changing competitive conditions and create future cash flows, thereby increasing their chances of survival (March, 1991; Levinthal & March, 1993: 105). While this idea of striking the right balance leads to better performance has been well accepted and evidenced in the literature (e.g. Gupta et al., 2006; Raisch & Birkinshaw, 2008), scholars have been discussing how the balance of the two activities can be achieved through two different mechanisms as follows. The first mechanism is denoted as *simultaneous ambidexterity*, which refers to "the synchronous pursuit of both exploration and exploitation (in the same period) via loosely coupled and differentiated subunits or individuals, each of which specializes in either exploration or exploitation (Gupta et al., 2006)." The second mechanism is denoted as *sequential ambidexterity*, which refers to the sequential pursuit of exploration and exploitation over different periods by transitioning the structures and routines focused on one activity to another (Gupta et al., 2006). In the following, I discuss how these two mechanisms lead to better performance.

6.2.1. Simultaneous Ambidexterity and Performance

While the pursuit of exploitation generates current cash flows, the pursuit of exploration generates future cash flows (March, 1991). Thus, simultaneous pursuit of the two activities enables the firm to generate current and future cash flows, which leads to better short-term and long-term performances (March, 1991). In contrast, engaging in sole exploitation or sole exploration is detrimental to firm performance and survival because these two activities are iteratively self-reinforcing (March, 1991). On the one hand, as sole exploitation drives out exploration, the firm gets caught in a *success trap* or a *competency trap* (Levitt & March, 1988). As the firm continuously engages in exploitation, it develops core capabilities which are useful in the current environment but which later becomes core rigidities (Leonard-Barton, 1995). As the firm becomes rigid, it can no longer respond to the technological changes of the environment (Levitt & March, 1988). As the existing technologies and products that used to be successful become obsolete, the firm's the long-term survival will be threatened. On the other hand, sole exploration drives out exploitation and the firm gets caught in a *failure trap*. As exploration has a high failure rate, it motivates the firm to engage in greater search and change, which leads to more failure. As the firm only engages in exploration, it keeps on failing. Furthermore, scarce resource is injected into exploration without any of these discoveries being followed by product or process innovations (Levinthal & March, 1993). Thus, engaging in either sole exploitation or sole exploration will lead the firm to be caught in either failure or success traps, which will decrease the performance and threaten the survival of the firm.

The literature has found consistent empirical support for the positive effect of simultaneous ambidexterity (Raisch & Birkinshaw, 2008). Scholars found that firms exercising simultaneous ambidexterity by balancing exploration and exploitation in the same period outperform those that only focus on either exploitation or exploration (He & Wong, 2004; Cao et al., 2009; Belderbos et al., 2010; Uotila et al., 2009). For instance, scholars found that the decrease in the absolute difference between exploration and exploitation leads to greater growth in market, sales, and profit, higher operating efficiency, and stronger market reputation (He & Wong, 2004; Cao et al., 2009). Furthermore, scholars found that interaction between exploitative and explorative innovation increases sales growth (He & Wong, 2004). Also, scholars found that relative share of explorative technological innovation over total innovation (i.e. sum of explorative and exploitative innovation) has an inverted U-shape relationship with Tobin's Q, which implies maximum market value is achieved when the share of exploration is balanced with the share of exploitation (Belderbos et al., 2010; Uotila et al., 2009). This evidence suggests that simultaneous pursuit of high exploration and high exploitation leads to greater performance and market valuation.

One of the major objectives of CVC investing is to have windows on emerging technologies that can be strategically and financially beneficial to the investing firm (Dushnitsky & Lenox, 2006). Accordingly, literature has found that CVC investing leads to greater Tobin's Q and increased innovation performance through greater patent generations and citations (Dushnitsky & Lenox, 2005; Dushnitsky & Lenox, 2006; Wadhwa & Basu, 2006). CVC investments can be pursued with either explorative or exploitative initiatives (Wadhwa & Basu, 2013; Hill & Birkinshaw, 2014). On the one hand, established firms make exploitative CVC investments in ventures from nearby sectors with similar and therefore, familiar technology (Wadhwa & Basu, 2013). For example, Baxter International, which is a pharmaceutical company, invested in KaloBios Pharmaceuticals, a biotech start-up that develops a human antibody fragment to fight bacterial infections in cystic fibrosis patients in 2008. Baxter Ventures state that their CVC mandate is to make exploitative and explorative investments.

> "Baxter's focus areas include therapeutic areas complementary to those of Baxter's existing Medical Products and BioScience businesses, as well as cutting-edge technologies and therapies outside of Baxter's current product portfolio that have sustainable long-term growth potential." Philippidis (2014)

On the other hand, established firms make explorative CVC investments in ventures from distal sectors with relatively novel and therefore, unfamiliar technology (Wadhwa & Basu, 2013; Hill & Birkinshaw, 2014). For instance, United Parcel Service (UPS), which is a courier service company, invested in Hublogix, which develops a drop-shipping software platform for online stores, to explore new knowledge. UPS has been well-known for its explorative investments.

> "For UPS, the investment gives it access to and information on a market in which it does not currently compete." Meyer (2016)

Simultaneously engaging in exploitative and explorative CVC investing generates complementarity in enhancing technological innovations. On the one hand, exploitative CVC investing facilitates the investing firm to absorb and integrate the venture's familiar technology to its core businesses and leads to greater incremental innovation (Hill & Birkinshaw, 2014). On the other hand, explorative CVC investing brings in opportunities to the investing firm to access novel technologies developed by the venture, which leads to greater radical innovation (Hill & Birkinshaw, 2014). Thus, simultaneously balancing explorative and exploitative CVC investing provides access to not only familiar technology but also to novel technology, which is helpful for generating incremental and radical innovations, and thus it leads to increased firm performance.

H1: Simultaneous ambidexterity in CVC investing increases firm performance.

6.2.2. Sequential Ambidexterity and Performance

Sequential ambidexterity positively influences firm performance because exploitation and exploration over different periods function as complements in regards to increasing returns (Gupta et al., 2006). While exploitation and exploration compete for the same pool of resources at one static point of time, over time, organizational resources change and its allocation to exploitation and exploration change (Piao, 2010). Exploitation and exploration over different periods work as complements when (1) today's exploitation produces slack resources that can be used for tomorrow's exploration or (2) today's exploration produces new technologies that can be used for tomorrow's exploitation. Either exploitation or exploration in period t will produce an input for the other in period t+1. In other words, exploitation and exploration are interdependent to each other in the sense that each activity in the current period provides an input for the other activity in the future period (Gilsing and Nooteboom, 2006). I elaborate on this interdependencies as follows.

First, exploitation in the current period leads to greater exploration in the future period. Successful exploitation in the current period ensures firm performance to exceed aspiration levels. Accordingly, continued successful exploitation generates excess returns that are continuously accrued as slack. This slack triggers firms to search distally (i.e. slack search) and pursue exploration (Cyert & March, 1963; Levinthal & March, 1981). Slack functions as the buffer to survival pressure arising from technological change and it encourages firms to experiment with novel knowledge outside the domain of competence (Cyert & March, 1963). Through such experimentation of novel technologies, firms adapt and align themselves to the changing environment (Levinthal & March, 1993). Thus, continued successful exploitation in the current period is likely to lead to more exploration in the future period.

Secondly, exploration in the current period leads to greater exploitation in the future period. Continued exploration generates innovative products and technologies (Rosenkopf & Nerkar, 2001). In particular, it has been shown that explorative innovations that span technological and organizational boundaries greatly increase subsequent technological development (Rosenkopf & Nerkar, 2001; Belderbos, Faems, Leten, & Looy, 2010). While the returns from exploration take time until it comes to fruition, once it succeeds, it creates new knowledge and technologies that enable the firm to adapt to the changing environment

(Rosenkopf & Nerkar, 2001). These new technologies that have been developed through exploration will be subsequently exploited in the form of commercializing products and refining processes (Lee et al., 2003; Zhou & Wu, 2010). Thus, continued successful exploration in the current period is likely to lead to more exploitation in the future period.

Empirical literature provides further evidence of the positive effect of sequential ambidexterity on firm performance (Luger, 2014; Mudambi & Swift, 2014; Boumgarden et al., 2012; Goossen et al., 2012; Venkatraman et al., 2007). Based on Dow Jones insurance firms, Luger (2014) shows that a firm's ability to align its exploration-exploitation balance with the changing environmental demands while consistently maintaining the two activities increases both Return on Equity and Total Shareholder Return. Based on software firms, Venkatraman et al. (2007) show that sequentially ambidextrous firms have greater sales growth. Based on Fortune 500 firms, Goossen et al. (2012) show that resource-rich firms can benefit from sequential ambidexterity by increasing Tobin's Q. Based on case studies on Hewlett-Packard and USA Today, Boumgarden et al. (2012) suggest that oscillating between exploitation and exploration over time enhances a firm's long-term performance.

I expect that sequentially balancing exploitation and exploration in CVC investing will lead to increased firm performance. Exploitative CVC investing facilitates the investing firm to absorb and integrate the venture's knowledge to its core businesses, which results in sourcing in exploitative technology (Hill & Birkinshaw, 2014). Accordingly, exploitative CVC investing facilitates incremental innovation of the investing firm and this results in increased efficiency and generation of short-term cash flows, which generates slack. Firms with slack will pursue more exploration in the future period (Levinthal & March, 1981). On the other hand, explorative CVC investing enables the investing firm to access novel technologies of the ventures, which results in generating radical innovation (Hill &

Birkinshaw, 2014). Thus, explorative CVC investing facilitates radical innovation of the investing firm and this results in increased opportunities for future exploitation. Accordingly, exploitative and explorative CVC investing are complementary over time in facilitating incremental and radical innovations. Thus, I expect that sequentially engaging in both activities will increase firm performance.

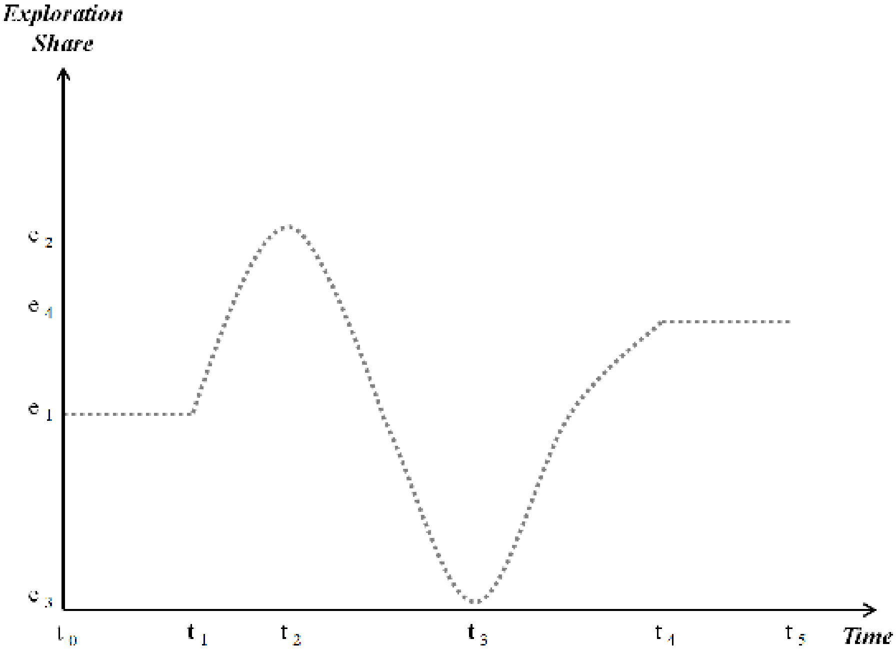
H2: Sequential ambidexterity in CVC investing increases firm performance.

6.2.3. Change Duration, Amplitude and Performance

In the following, I discuss how the oscillation between exploitation and exploration over time occurs and how it impacts firm performance. In particular, I examine the impact of duration and amplitude of the continuous oscillation on firm performance. As discussed previously in the introduction, while *change duration* is defined as the aggregate time taken during continuous transition from one activity to another (i.e. either from exploitation to exploration or from exploration to exploitation), *change amplitude* is defined as the aggregate level of continuous occurred in the proportion of exploration (or that of exploitation) during continuous transitions.

Following the time-paced evolution literature (Klarner & Raisch, 2013; Brown & Eisenhardt, 1997), I assume that oscillation between exploitation and exploration over time consists of periods of continuous continuous change and stability. For example, in Figure 12, a hypothetical firm Alpha changes its exploration share over time. The periods between t_0 and t_1 and between t_4 and t_5 illustrate the periods of stability, in which the firm does not change its allocation of resources to exploitation and exploration over time. On the other hand, periods from t_1 to t_4 correspond to the periods of continuous change, in which the firm changes its allocation of resources to exploitation and exploration over time. Thus, change duration of the firm Alpha is time between t_1 and t_4. On the other hand, change amplitude captures the magnitude of change in exploration share between t_1 and t_4, which can be calculated by taking the summation of e_2-e_1, e_2-e_3, and e_4-e_3. For further elaboration, e_2-e_1 refers to the level of change in exploration share between periods t_1 and t_2, e_2-e_3 refers to the level of change in exploration share between periods t_2 and t_3, and e_4-e_3 refers to the level of change in exploration share between periods t_3 and t_4.

Figure 12. Conceptualization of Change Duration and Amplitude



I draw upon continuous change (e.g., Brown & Eisenhardt, 1997) and organizational inertia research (e.g., Hannan & Freeman, 1984; Barnett & Freeman, 2001) to examine how the continuous change in resource allocation to exploitation and exploration influences a firm's performance. Insights from time-paced evolution and complexity literature show that a firm's ability to change continuously leads to successful performance (Miller & Chen, 1994; Galunic & Eisenhardt, 1996; Eisenhardt & Tabrizi, 1995; Brown & Eisenhardt, 1997; Weick & Quinn, 1999; Klarner & Raisch, 2013). For instance, it has been shown that continuous change that links between the present and future products through rhythmic and time-paced transition processes leads to successful multi-product innovations (Brown & Eisenhardt, 1997). Continuous change creates value by increasing coordination between different periods through the use of transitioning procedures, creating rhythms that increase focused attention, and aligning the firm well with the environmental changes (Brown & Eisenhardt, 1997). Thus, I expect that positive temporal spillover will arise as a firm continuously changes its allocation of resources to exploitation and exploration.

On the other hand, insights from organizational inertia literature indicate that transitioning from one activity to another results in disruption of routines and structures, and thus, increases the likelihood of organizational failure (Hannan & Freeman, 1984; Barnett & Freeman, 2001; Swift, 2015). Organizational inertia theory suggests that organizations tend to resist significant changes at any given point of time (Hannan & Freeman, 1984). In particular, inertia is greatest when core functions require new or different (1) routines and structures, (2) roles and procedures for organizational members, and (3) relationships with external organizations (Hannan & Freeman, 1984). Furthermore, time and resources are required to build informal internal networks and external organizational ties to support the newly set-up structures and routines (Barnett & Freeman, 2001). Thus, significant time and resources are required to implement the changes in structure and routine and overcome organizational inertia (Barnett & Freeman, 2001). Moreover, the transition process not only accompanies significant challeges to learning new routines and mindsets but also to unlearning extant routines and mindsets (Durand, 1992). Thus, continuous change can either boost up the complementarity of the two activities over time (Brown & Eisenhardt, 1997) or pose a threat to transitioning because of organizational inertia (Swift, 2015).

As exploitation and exploration in CVC investing are fundamentally different activities, these activities require completely different sets of routine, mindset, and structure for their execution (March, 1991). On the one hand, exploitative CVC investing requires the CVC managers to search locally for ventures from nearby sectors to make better use of the investing firm's existing technology and knowledge (Hill & Birkinshaw, 2014). On the other hand, explorative CVC investing requires the CVC managers to search distally for ventures from unfamiliar sectors to source in breakthrough technologies and have windows on emerging technologies (Hill & Birkinshaw, 2014). As exploitative and explorative CVC investing require completely different sets of routine, mindset, and structure (March, 1991), it takes substantial time, resource, and attention to oscillate from one to another (Kotter, 1995; Duncan, 1976). Transitioning the focus from one activity to another requires time (i.e. change duration) to set up, adapt to, and implement different routines and structures (Siren et al., 2012; Hannan & Freeman, 1984; Stinchcombe, 1965).

When the change duration is too short, the CVC program will not have sufficient time to set up adequate structures and routines for either exploitation or exploration (Levitt & March, 1988) and managers will be overloaded with tasks of implementing sequential ambidexterity (Huber, 1991). As the firm will not have enough resource and time injected to either exploitation or exploration in the current period, insufficient incremental or radical innovations will be generated. As a result, there will be a lack of slack generated from scarce exploitative CVC investing or new technologies produced from scarce explorative CVC investing. As the firm does not have enough slack or new technologies produced in the current period, it will not be able to engage in either explorative or exploitative CVC investing in the future period. Moreover, when the change duration is short, the transition from one activity to another is likely to face a greater level of resistance to change and the risk of failing to implement such changes (Barnett & Freeman, 2001; Hannan & Freeman, 1984). Thus, when the change duration is short, it is difficult to achieve complementarity between exploitation and exploration over time.

On the other hand, when the change duration is too long, the complementarity of exploration and exploitation over time will dissipate. For instance, while a firm's continued exploitation in the current period generates slack, without allocating enough of this slack resources to exploration in the next periods, transitioning from exploitation to exploration will not be efficient. Also, while exploration in the current period produces new technologies, if sufficient resource is not allocated to exploitation in the future period, these new technologies will not be exploited at all and transitioning from exploitation to exploration will not be efficient. Thus, when the change duration is too long, inefficient allocation of resources to either exploitation or exploration will be made in future periods, which will dissipate the complementarity of exploitative and explorative CVC investing over time.

When the change duration is in the intermediate range, the firm is most likely to benefit from the complementarity of sequentially engaging in explorative and exploitative CVC investing over time. As previously discussed, on the one hand, exploitative CVC investing facilitates incremental innovation of the investing firm and this results in increased efficiency and generation of short-term cash flows, which generates slack (Hill & Birkinshaw, 2014). Given the intermediate time for transition, a firm that has accrued an adequate level of slack will pursue more exploration in the future period. When the investing firm changes its focus to exploration with enough slack, it will produce novel technologies and products in the future period. On the other hand, explorative CVC investing facilitates radical innovation of the investing firm and this results in increased opportunities for future exploitation (Hill & Birkinshaw, 2014). Given the intermediate time for transition, with a sufficient number of novel technologies, a firm will pursue more exploitation in the future period. When the investing firm changes its focus to exploitation in the future period, as it generates novel technologies from the former period of exploration, this results in increased generation of cash flows through future exploitation. Thus, when the change duration is intermediate, efficient allocation of resources to exploitation and exploration over time will be made. Furthermore, sufficient time will be given to deal with organizational inertia, conflict, and stress caused from transitioning from a structure and routines focused on one activity to another (Barnett & Freeman, 2001). Thus, when the change duration is in the intermediate range, I expect that the greatest level of complementarity between exploitative and explorative CVC investing over time will be achieved.

H3: Increased duration of the change in exploitation and exploration in CVC investing has an inverted-U relationship with firm performance.

Along with change duration, I expect change amplitude will impact firm performance. Transitioning from exploitation to exploration involves significant changes in structure and routine to implement flexibility, adapt to the new form of innovation, and to carry out experimentation that involves high risk (Swift, 2015). For instance, Swift (2015) finds that transitioning from exploitation to exploration, through compact and significant increases in R&D spending, increases the firm's likelihood of bankruptcy or liquidation. Transitioning from exploration to exploitation is also risky as it requires not only new skills but also there is a likelihood of finding no value in the prior exploration and failing to commercialize and exploiting it (Swift, 2015). For instance, Swift (2015) finds that transitioning from exploration to exploitation, through compact and significant decreases in R&D spending, increases the firm's likelihood of bankruptcy or liquidation. Thus, greater change amplitude will substantially raise the level of risk and cost involved in carrying out organizational change.

Furthermore, as the change amplitude becomes larger, the difference in structure, routine, mindset required for exploitation and those required for exploration becomes greater. As the difference in structure and routines becomes greater, stronger integration mechanisms are needed to coordinate the two activities over different periods (Mom et al., 2009; Jansen et al., 2009). Stronger integration mechanisms for the two activities increases the cost of coordination (Mom et al., 2009; Jansen et al., 2009). This line of reasoning suggests that greater change amplitude increases the costs of coordinating exploitation and exploration over time.

Thus, a greater change amplitude in allocating resources to exploitative and explorative CVC investing over time increases the risks of carrying out either exploitation or exploration ineffectively and the risks of unsuccessfully coordinating the different routines and structures of the two activities. Accordingly, I expect greater change amplitude will increase the risk of failure and cost of coordination, which will decrease the firm performance.

H4: When the amplitude of the change in exploitation and exploration in CVC investing increases, firm performance decreases.

6.3. DATA AND METHODS

6.3.1. Empirical Setting

I test my theory in the empirical context of CVC investing (refer to Appendix E for the list of Hypotheses). CVC refers to direct minority equity investment made by established firms in privately held entrepreneurial ventures (Dushnitsky & Lenox, 2005). CVC investing is an appropriate setting to test the theory for the following two reasons. First, CVC investing has a substantial impact in increasing long-term performance (Dushnitsky & Lenox, 2006). In particular, CVC investing provides strategic benefits to the investing firm by functioning as windows on new technologies, means to absorb knowledge, stepping-stones for future alliance opportunities, and alert mechanism of technological discontinuity (Dushnitsky & Lenox, 2005; Wadhwa & Phelps, 2011; Maula et al., 2013). Through these strategic roles, CVC investing leads to greater Tobin's Q and increased innovation performance through patent generations and citations (Dushnitsky & Lenox, 2006; Wadhwa & Basu, 2006). Secondly, CVC investing vary on its exploitative or explorative initiatives within and across firms (Schildt et al., 2005; Wadhwa & Basu, 2013; Jeon et al., 2017). Explorative CVC investments are aimed at searching externally for new and unfamiliar knowledge that might be technology or market related (Wadhwa & Basu, 2013). On the other hand, exploitative CVC investments are meant to search for existing and familiar knowledge (that are technology or market related) in which the corporate investor has prior experience (Wadhwa & Basu, 2013). These two aspects of CVC allow us to observe the change of focus on exploration or exploitation across and within firms and their impact on firm performance.

6.3.2. Sample

To gain a better understanding of the phenomenon and ground the theory development, I conducted interviews with fourteen CVC program managers from companies with active CVC programs. I used a semi-structured interview protocol. I inquired about the explorative and exploitative natures of CVC investing, decision makers who are involved in CVC investing, and how CVC performance is measured. I selected the interview respondents from the participants from the Global Corporate Venturing Symposium held in London, United Kingdom in 2016 (see Appendix D for the respondent's background). On average, each interview lasted about 30 minutes and all interview generated about 20 pages of summarized transcript.

To test the hypotheses, I constructed a sample by identifying companies that made at least one CVC investment during 1993-2013, had variation in exploration share, and with trackable Tobin's Q. I used Thomson Reuters' VentureXpert database to collect CVC investment data for each sample company. I collected Tobin's Q data from Compustat. Historical standard industrial classification (SIC) code data of the sample companies was collected from Lexis Nexis Corporate Affiliations database and SIC code of the ventures were collected from VentureXpert database. The parent-subsidiary relationship data of the parent corporation and the CVC program were collected from Lexis Nexis Corporate Affiliations, Factiva newspaper, and homepages of the CVC programs. Furthermore, I collected institutional ownership and performance data to take into account of self-selection bias. Accordingly, sample companies included whose equity shares were held by large institutional shareholders with investments of at least US$100 million. I used Thomson Reuters' Institutional Holdings 13F database to collect institutional ownership data. Institutional shareholders that operate with at least $100 million of investments are required to report their holdings to the U.S. Securities and Exchange Commission through 13F filings every quarter. All common stock positions greater than 10,000 shares or $200,000 are required to be reported in 13F filings. I collected dedicated and transient ownerships classification data from Brian Bushee's website. Also, performance data was collected by earnings per share (EPS) data from Thomson Reuters' Institutional Brokers' Estimate System (I/B/E/S) database, and Financial statement and executive data were collected from Compustat and Execucomp databases. Merging data from these databases resulted in a sample that consists of 10,261 CVC investments made by 286 companies during 1993-2013 (refer to Appendix B for the list of sample firms). By using the quarter as my observation period, the final sample consists of 1,809 company-quarter observations.

6.3.3. Measures

Dependent Variable

Tobin's Q $_t$

The dependent variable, firm performance is measured by quarterly Tobin's Q. Tobin's Q is an appropriate performance measure to capture the effect of exploitation and exploration as it reflects not only the firm's short-term performance but also its long-term performance (Uotila et al., 2009). Tobin's Q not only accounts for risk but also captures future expected earnings and it is likely to be free from reporting distortions (Lindenberg and Ross, 1981). Thus, Tobin's Q captures a firm's competitive advantage and market valuation (Montgomery and Wernerfelt, 1988). Furthermore, it is a particularly useful performance measure in the CVC context as the literature finds that a firm's CVC investing has a substantial impact in increasing Tobin's Q (Dushnitsky & Lenox, 2006). A Tobin's Q greater than 1.0 implies that the market has a positive outlook for the firm's growth opportunities. Accordingly, firms with higher Tobin's Q have better market valuations and growth opportunities than those with lower values.

Following Chung & Pruitt (1994), I computed Tobin's Q by using the following equation.

$$\text{Tobin's Q} = \frac{\text{MVE}_{\text{it}} + \text{PS}_{\text{it}} + \text{DEBT}_{\text{it}}}{\text{AT}_{\text{it}}}$$

MVE is measured by multiplying the firm's closing share price with the total outstanding common stock shares in a given quarter t. PS is measured by the liquidating value of the firm's outstanding preferred stock in a given quarter t. DEBT is measured by taking the sum of long-term debt with current liabilities and then subtracting it with current asset for a given quarter t. AT is measured by the value of the total asset in a quarter t. Financial and accounting data that are used to calculate Tobin's Q were collected from Compustat

Independent Variables

Simultaneous and Sequential Ambidexterity $_{t-1}$

Prior to operationalizing the ambidexterity variable, following the previous chapter, I first measure the share of exploration and the share of exploitation (see pp.163-164 for the detailed operationalization of the exploration share). *Exploration Share $_t$*, is defined as the proportion of explorative CVC investment over total CVC investment (i.e. $\frac{\text{Exploration}_{it}}{\text{Exploration}_{it}+\text{Exploitation}_{it}}$). As the sum of the proportion of exploration and that of exploitation adds up to one, exploitation share is computed by subtracting the exploration share from the value of one. Accordingly, for firm Alpha in Table 9 of Chapter 5 (p.174), its exploration share is 0.70 and its exploitation share is 0.30. Increasing values of exploration share indicate a firm's increasing allocation of resources to exploration and concomitantly decreasing allocation to exploitation. Decreasing values of exploration share indicate a firm's decreasing allocation of resources to exploration and concomitantly increasing allocation to exploration.

I measure *Simultaneous Ambidexterity* $_{t-1}$ by multiplying the proportion of exploration and the proportion of exploitation in quarter t-1. As the proportion of exploration or that of exploitation ranges from 0 to 1 and these two values add up to 1, the simultaneous ambidexterity variable ranges from 0 to 0.25. For instance, if firm Beta invested its 30% of resource to exploration and 70% to exploitation, simultaneous ambidexterity value will be $0.3 \times 0.7 = 0.21$. When the proportion of exploration is 1.0 and that of exploitation is 0, the simultaneous ambidexterity value will be $1.0 \times 0 = 0$. When the proportions of exploration and exploitation are equally 0.5, the ambidexterity value will be $0.5 \times 0.5 = 0.25$. While simultaneous ambidexterity value of 0 represents that the resources invested in exploration and exploitation are not balanced, ambidexterity value of 0.25 represents that it is well-balanced.

I measure *Sequential Ambidexterity* $_{t-1}$ by (1) multiplying the proportion of exploration in quarter t and proportion of exploitation in quarter t-1, (2) multiplying the proportion of exploitation in quarter t and proportion of exploration in quarter t-1, and (3) taking the average of the previous two values. For instance, if firm Beta invested in 30% of exploration and 70% of exploitation in quarter t and it invested in 50% of exploration and 50% of exploitation in quarter t-1, sequential ambidexterity value will be $(0.3 \times 0.5 + 0.7 \times 0.5)/2= 0.25$. This value captures the complementarity between the exploration and exploitation in quarter t and quarter t-1. As exploration or exploitation is a proportional value ranging from 0 to 1, sequential ambidexterity variable ranges from 0 to 0.25. Greater value of sequential ambidexterity reflects that there was a greater change in the proportions of exploration and exploitation between quarter t and quarter t-1.

Change Duration $_{t-1}$ and Amplitude $_{t-1}$

Three steps are taken to measure change duration and change amplitude. First, I measure the change of the proportion of exploration in quarter t and quarter t-1. Secondly, I take the absolute value of this change. To measure the *change duration*, I count the number of quarters in which absolute change value was greater than zero. To measure the *change amplitude*, I take the total of the absolute change values during the one oscillation of change.

For example, let us suppose that firm Gamma had exploration share as shown in the following Table 13. Absolute change is measured by taking the difference in exploration share in quarter t and quarter t-1. Change Duration (Π) is measured by counting the number of continuous periods of changes. For instance, firm Gamma continuously changed its exploration share for five consecutive quarters from 2007 Q3 to 2008 Q3. Thus, Change Duration variable has the value of 5 during 2007 Q3 to 2008 Q3. On the other hand, Change Amplitude (Θ) is measured by adding up all the absolute changes during 2007 Q3 to 2008 Q3, which is 1.5. Thus, during 2007 Q3 to 2008 Q3, firm Gamma experienced change for five consecutive quarters and its amplitude of change was 1.5.

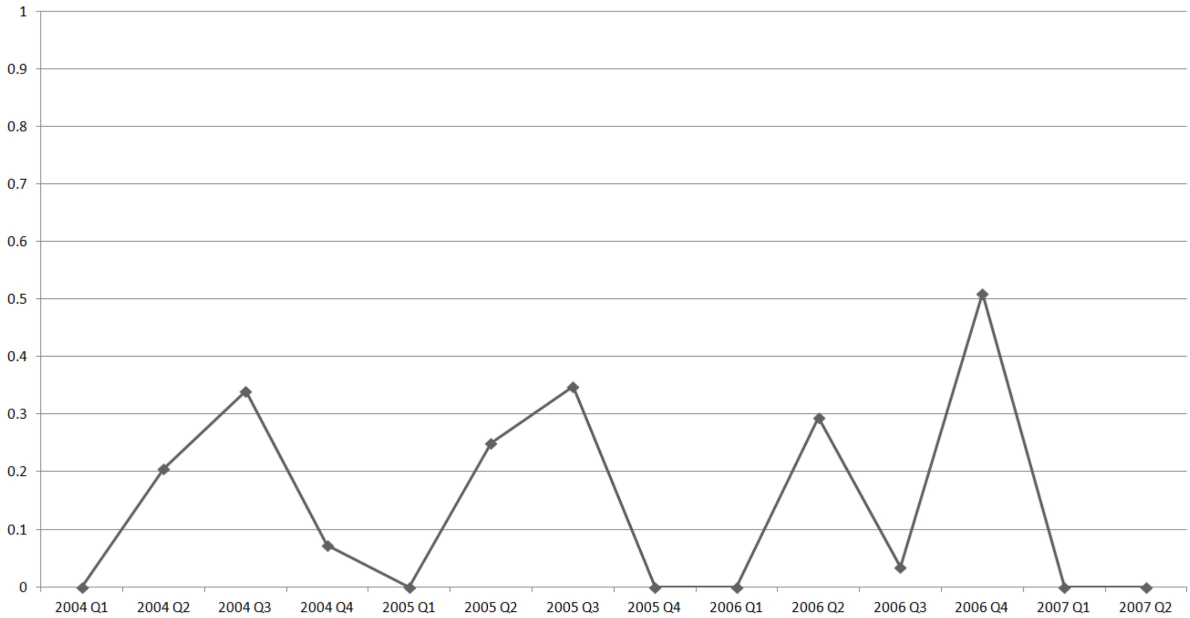
Table 13. Change Duration and Amplitude (example)

	2007 Q1	2007 Q2	2007 Q3	2007 Q4	2008 Q1	2008 Q2	2008 Q3	2008 Q4
Exploration Share	0.5	0.5	0.3	0.1	0	0.4	1.0	1.0
Absolute Change		0	0.2	0.2	0.1	0.4	0.6	0
Change Duration (Π)			5	5	5	5	5	
Change Amplitude (Θ)			1.5	1.5	1.5	1.5	1.5	

For a real firm example, Boston Scientific's exploration shares during 2004 Q1 - 2007 Q2 are illustrated in Figure 13. From 2004 Q1 to 2005 Q4, Boston Scientific changed its exploration share continuously. During these periods, the change duration is recorded as 7 Quarters and change amplitude is recorded as 1.38. From 2005 Q4 to 2006 Q1, Boston

Scientific did not change its exploration share and it was undergoing a period of stability. Again, from 2006 Q1 to 2007 Q1, Boston Scientific changed its exploration share continuously. During these periods, the change duration is recorded as 4 Quarters and change amplitude is recorded as 1.54.

Figure 13. Boston Scientific Corporation's Exploration Share (2004-2007)



Control Variables

To rule out alternative explanations and potential confounding factors, I controlled for environmental and organizational variables that may influence a firm’s CVC activity and Tobin's Q.

I use a set of variables to control for environmental antecedents of CVC activity. Because the technological dynamism of a firm’s competitive environment increases the benefits of exploration and encourages firm CVC investing (Basu et al., 2011), I control for *technological dynamism* by following Basu et al.’s (2011) approach. First, I identify in which industry(ies) firm i operates in period t using 4-digit SIC codes. I then compute average (quarterly) R&D intensity for all publicly-traded firms operating in each 4-digit SIC code using Compustat data (Basu et al., 2011). Finally, I select the maximum average R&D

intensity for all industries in which the firm operates to proxy for technological dynamism. As an alternative measure, I use the average technological dynamism across all industries in which the firm operates and obtain similar results. To control for potential confounding effects generated by different firms' CVC programs operating in different geographies, I include *dummy variables that reflect the region* in which a company's CVC program is based: the United States, non-U.S. developed countries, and emerging economies based on the classification by Dow Jones and Standard & Poor's. To control for industry variation in CVC activity, I include *industry dummies* based on two-digit level SIC codes. These dummies distinguish 34 different industries in which the sample companies primarily operate. Finally, to control for time-varying sources of unobserved heterogeneity common to all sample firms (e.g., macroeconomic conditions) I included *year dummies* for the years from 1993 to 2013.

I also include a set of variables to control for firm-level antecedents of CVC activity and those that influence Tobin's Q. It is well evidenced in the corporate governance literature that dedicated and transient shareholders influence firm performance (Borochin & Yang, 2016; Ramalingegowda, 2006; Bushee & Noe, 2000). For instance, firms held by dedicated shareholders have positive abnormal return in the four quarters holding period, whereas those held by transient shareholders have positive abnormal return in the first quarter holding period (Borochin & Yang, 2016). Thus, I control for dedicated and transient ownership as I expect it will impact the firm's Tobin's Q. I measured *Dedicated Ownership* as the proportion of total outstanding shares in firm *i* in quarter *t-1* held by dedicated institutional shareholders. Likewise, I measured *Transient Ownership* as the proportion of total outstanding shares in firm *i* in quarter *t-1* held by transient institutional shareholders. I used Thomson Reuter's Institutional Holdings 13F database to identify institutional shareholders, equity shares held by these shareholders, and total outstanding shares in each quarter. I used the classification of transient and dedicated ownership developed by Brian Bushee (see the Appendix A for a description of this approach). I merged Brian Bushee's ownership classification data with 13F data to construct the ownership variables.

I control for *firm size* using the total number of firm employees from Lexis Nexis Corporate Affiliations data. For instance, larger firms can make use of economies of scope and scale, diverse capabilities, and formalized structure to increase performance (Penrose, 1959). On the other hand, larger firms can have lesser competition, lack the incentive to control costs, and become X efficient, and thus have lesser performance than smaller firms (Leibenstein, 1976). As an alternative measure of firm size, I use quarterly net sales from the Compustat database and obtain similar results. I control for *firm age* as it influences firm performance (Stinchcombe, 1965; Hannan & Freeman, 1984). On the one hand, older firms have more experience and are not subject to the liability of newness, and thus, have better performance than younger firms (Stinchcombe, 1965). On the other hand, older firms are subject to organizational inertia and unable to adapt to the changing environment and thus, perform worse than younger firms (Hannan & Freeman, 1984). I control for *firm age*, which is measured by subtracting the founding year of the company from the current year.

A firm's R&D expenditure reflects internal search for innovations (Greve, 2003a) and can increase its ability to absorb knowledge from external sources, which impacts the firm's innovation performance (Cohen and Levinthal, 1990). Accordingly, I control for quarterly *firm R&D intensity*, measured as quarterly R&D expenditures divided by quarterly sales. I collected these data from Compustat.

Next, I control for the governance structure of a sample firm's CVC program because it may influence the misappropriation risk perception of the venture and thus, the investing performance (Dushnitsky, 2006). If the CVC program is a separate legal entity in the form of a wholly owned subsidiary, greater distance between the program and the parent firm can ensure the ventures to perceive lower level of misappropriation risk (Katila et al., 2016). Lower misappropriation risk motivates the ventures to increase their commitment to the investing relationship and thus, results in greater innovation performance. Also, CVC programs with greater distance from the parent firm ensure greater autonomy, independent incentive systems, and better investing performance (Siegel et al., 1988). Thus, I control for *CVC program structure* using a dummy variable, coded as 1 if the program is governed by a separate, wholly-owned subsidiary and 0 otherwise. I checked whether the CVC program is held as a wholly owned subsidiary using Lexis Nexis Corporate Affiliations, SEC 10-K reports, and Factiva news searches.

By operating many businesses, diversified firms may pursue more CVC investment opportunities and have access to more investment opportunities, thereby affecting their CVC activity. I measure *diversification* as the number of four-digit SIC codes in which firm i operated in period t. Firm growth can impact Tobin's Q (Dushnitsky & Lenox, 2006). I control for *firm growth* by calculating growth in return on sales (ROS). ROS is measured by dividing quarterly operating income after depreciation by net sales. Because the intensity of a firm’s CVC investment may affect the visibility of the CVC program and the attention given to it by stakeholders, I control for *CVC intensity*, which is operationalized as the ratio of the quarterly firm-level CVC investments (in US dollars) to quarterly sales. This variable was log transformed due to high skewness. Because managers tend to become more risk-averse and their risk propensity influences firm performance (Simsek, 2007), I control for *CEO age* (in years). I collected the data for this variable from the Execucomp module of Compustat.

Research has discussed various forms of slack resources and their influence on firm performance (Daniel et al., 2004). For instance, from the Behavioral Theory of the Firm (BTF) perspective, slack absorbs the environmental variability and improves the stability and adaptability of the firm, which positively influences firm performance (Cyert & March, 1963). I control for three different types of slack: absorbed slack, unabsorbed slack, and potential slack. *Absorbed slack* refers to administrative resources that are left over from short-term operations and maintenance of the organization. Following Singh (1986), I measure a firm's absorbed slack using the ratio of quarterly selling, general, and administration expenses to quarterly sales. *Unabsorbed slack* refers to uncommitted ready-to-deploy financial resources such as cash funds. Unabsorbed slack encourages managers to take more risk (Greve, 2007). I measure unabsorbed slack using a firm's quick ratio: the ratio of current assets to current liabilities (Singh, 1986). *Potential slack* refers to a firm's ability to borrow and inject new financial resources (Bourgeois, 1981). Following Bourgeois (1981), I compute potential slack using a firm's debt to equity ratio. I collected the data to compute these different measures of slack from Compustat. Refer to Appendix C for an overview of how the variables were measured and the data sources.

6.3.4. Estimation Approach

As the dependent variable, Tobin's Q is a continuous variable and the data set is in the form of a panel with CVC investing data of 286 firms during 1993-2013, I used panel linear regression models. To deal with the potential self-selection bias, which arises from unobserved heterogeneous variables influencing the Tobin's Q, I use a two-stage panel linear regression model. For instance, in Chapter 5, I find that dedicated shareholders influence the direction of change by encouraging managers to engage in more exploration over exploitation under negative performance feedback. This line of reasoning suggests that institutional shareholders, earnings gap above and below aspirations, and control variables in Chapter 5 will influence the resource allocation decisions to exploration and exploitation. To remove unobserved heterogeneity that may be driving the self-selection effects, in the first stage of the estimation, I regress of exploration share on the main independent and control variables used in Chapter 5 (refer to pp. 179-180 for details of the estimation). As in Chapter 5, I use two estimation techniques to estimate the exploration share: Generalized Estimating Equations and Random Effects panel linear regression models.

In the second stage, as the dependent variable is Tobin's Q, I use linear panel regression with random effects. Random effects panel regression was used based on the result of the Hausman test. In the second stage, I use a predicted value of the simultaneous ambidexterity variable based on the predicted variables of the exploration share and exploitation share from the first stage. By using the predicted values of exploration and exploitation shares in the second stage, I expect to remove the unobserved heterogeneity that drives the decisions of allocating resources to exploitation and exploration.

6.4. RESULTS

Table 14 shows the summary statistics and Pearson-correlation matrix. On average, the firms in the sample had Tobin's Q value of 1.79, which is greater than 1.0 implying that the investors have a positive outlook for the sample firm's growth opportunities (Montgomery & Wernerfelt, 1988). The average simultaneous ambidexterity value of the sample firms is 0.12. Approximately, simultaneous ambidexterity value of 0.12 can be achieved when 86% of resource is allocated to one activity and 14% of resource is allocated to another activity (e.g. either exploration share is 86% and exploitation share is 14% or exploitation share is 86% and exploration share is 14%). This implies that on average, the sample firms are out of balance from achieving the perfect simultaneous ambidexterity value of 0.25. The average sequential ambidexterity value of the sample firms is 0.19. As the maximum sequential ambidexterity value a firm can achieve is 0.50, this implies that on average, the samples firms lacked the capability of creating positive temporal spillover by balancing exploitation and exploration over quarters. These average values of simultaneous and sequential ambidexterity are consistent with the literature that firms face inherent difficulties in achieving the balance between exploitation and exploration (March, 1991; Levinthal & March, 1993; March, 2003).

Table 14. Summary Statistics and Correlations (Essay 3)

	N	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Tobin's Q $_{t}$	1,809	1.793	1.057	1.000																	
2. Change Duration $_{t-1}$	1,126	14.144	18.653	0.254*	1.000																
3. Change Amplitude $_{t-1}$	1,431	2.555	3.568	0.261*	0.940*	1.000															
4. Sequential Ambidexterity $_{t-1}$	1,028	0.188	0.113	0.035	0.047	0.231*	1.000														
5. Simultaneous Ambidexterity $_{t-1}$	1,477	0.124	0.100	0.056	0.167*	0.264*	0.419*	1.000													
6. Dedicated Ownership $_{t-1}$	1,393	0.009	0.014	-0.077*	-0.265*	-0.272*	-0.072*	-0.132*	1.000												
7. Transient Ownership $_{t-1}$	1,525	0.001	0.001	-0.184*	-0.278*	-0.285*	-0.070*	-0.114*	0.353*	1.000											
8. Technological Dynamism $_{t-1}$	1,528	0.105	0.089	0.223*	0.198*	0.259*	0.160*	0.108*	-0.136*	-0.246*	1.000										
9. Firm Size $_{t-1}$	1,491	71,700	88,380	-0.023	0.103*	0.121*	0.011	0.082*	-0.168*	-0.297*	-0.029	1.000									
10. Firm Age $_{t-1}$	1,528	18.468	22.407	-0.038	0.042	0.016	0.004	-0.018	-0.005	0.005	0.023	-0.003	1.000								
11. External CVC Structure $_{t-1}$	1,528	0.335	0.472	0.135*	0.449*	0.407*	0.064*	0.122*	-0.187*	-0.215*	0.106*	0.213*	-0.068*	1.000							
12. Unabsorbed Slack $_{t-1}$	1,130	2.437	2.844	-0.022	-0.057	-0.043	0.013	0.019	0.127*	0.338*	-0.032	-0.208*	0.066*	0.011	1.000						
13. Absorbed Slack $_{t-1}$	1,102	0.355	0.190	0.263*	0.035	0.059	0.019	0.003	-0.019	0.115*	0.284*	-0.177*	-0.056	-0.118*	0.192*	1.000					
14. Potential Slack $_{t-1}$	1,294	1.778	2.767	-0.223*	-0.159*	-0.155*	-0.036	-0.014	0.067*	-0.051	-0.164*	0.475*	0.143*	0.091*	-0.144*	-0.214*	1.000				
15. R&D Intensity $_{t-1}$	920	12.337	20.164	-0.241*	-0.105*	-0.105*	-0.061	-0.037	0.017	-0.032	-0.096*	0.029	0.024	-0.001	-0.191*	-0.416*	0.142*	1.000			
16. CVC Intensity $_{t-1}$	1,239	1.998	1.910	0.195*	0.106*	0.049	-0.043	0.052	0.166*	0.344*	0.077*	-0.415*	-0.119*	-0.031	0.386*	0.364*	-0.170*	-0.143*	1.000		
17. Diversification $_{t-1}$	1,528	3.890	3.338	-0.119*	-0.061*	-0.018	0.060	0.105*	-0.101*	-0.150*	0.185*	0.432*	0.080*	0.235*	-0.095*	-0.246*	0.404*	0.166*	-0.222*	1.000	
18. Return on Sales Growth $_{t-1}$	1,244	0.182	4.097	-0.063	0.013	-0.029	0.027	-0.056	0.008	0.079*	0.055	-0.035	0.052	-0.026	0.110*	0.029	-0.013	-0.012	0.038	0.011	1.000

*Significance Level: *p<0.05*

The average change duration of the sample firms is 14.14 quarters, which is equivalent to 42.42 months. This implies that on average, firms continuously changed their proportions of exploitation and exploration over the period of 42 months. The average change amplitude of the sample firms is 2.56. A firm's change amplitude of 1.0 implies that a firm oscillated from an extreme proportion of exploitation (i.e. exploration share of 0) to an extreme proportion of exploration (i.e. exploration share of 1.0) or vice versa. This implies that on average, firms underwent 2.56 cycles of change, in which one cycle is equivalent to oscillating from extreme exploitation to extreme exploration (i.e. changing from exploration share of 0 to 1) or vice versa (i.e. changing from exploration share of 1 to 0).

There was no serious multicollinearity issue based on Pearson correlation matrix or the variance inflation factor (VIF) values except for the change duration and change amplitude variables. These two variables had high and significant correlation estimate of 0.94 and increased VIFs when entered into the same regression together. To avoid such multicollinearity issue, I separately estimated for change duration and change amplitude variables.

The main models and results are shown in Table 15. For models 1 and 3, I ran the Random Effects Panel Estimation at the first and second stages. For models 2 and 4, I ran the GEE Fractional Probit Estimation at the first stage and Random Effects Panel Estimation at second stage. In models 1 and 3, the results support for H1 that simultaneous ambidexterity in CVC investing increases Tobin's Q. The estimated coefficients in models 1 and 3 for the effect of simultaneous ambidexterity is positive and significant at 5% and 10 % levels. For an average firm that had a simultaneous ambidexterity value of 0.124 would enhance its Tobin's Q by 0.36. When a firm strikes a perfect balance of exploration and exploitation at the same quarter (i.e. when simultaneous ambidexterity is maximum at 0.25), it increases Tobin's Q by

0.72. The marginal effect of simultaneous ambidexterity on Tobin's Q is depicted in Figure 14.

The result in model 4 supports H2 that sequential ambidexterity in CVC investing increases Tobin's Q. In model 4, the estimated coefficient for the effect of sequential ambidexterity is positive and significant at 10 % level. For an average firm that had a sequential ambidexterity value of 0.113 would enhance its Tobin's Q by 0.08. When a firm strikes a perfect balance of exploration and exploitation over different quarters (i.e. when sequential ambidexterity is maximum at 0.5), it increases Tobin's Q by 0.37. The marginal effect of sequential ambidexterity on Tobin's Q is illustrated in Figure 14.

Figure 14. Marginal Effect of Ambidexterity (from Table 15, Models 1, 3, 4)

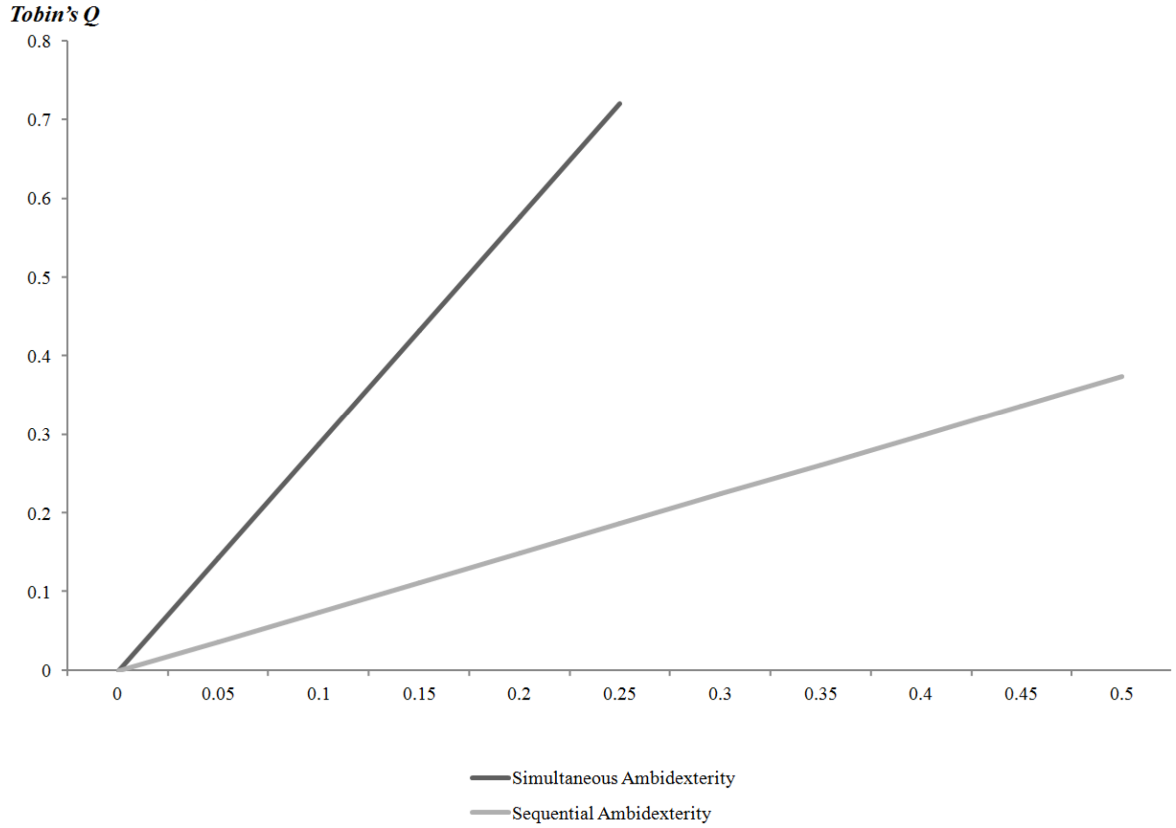


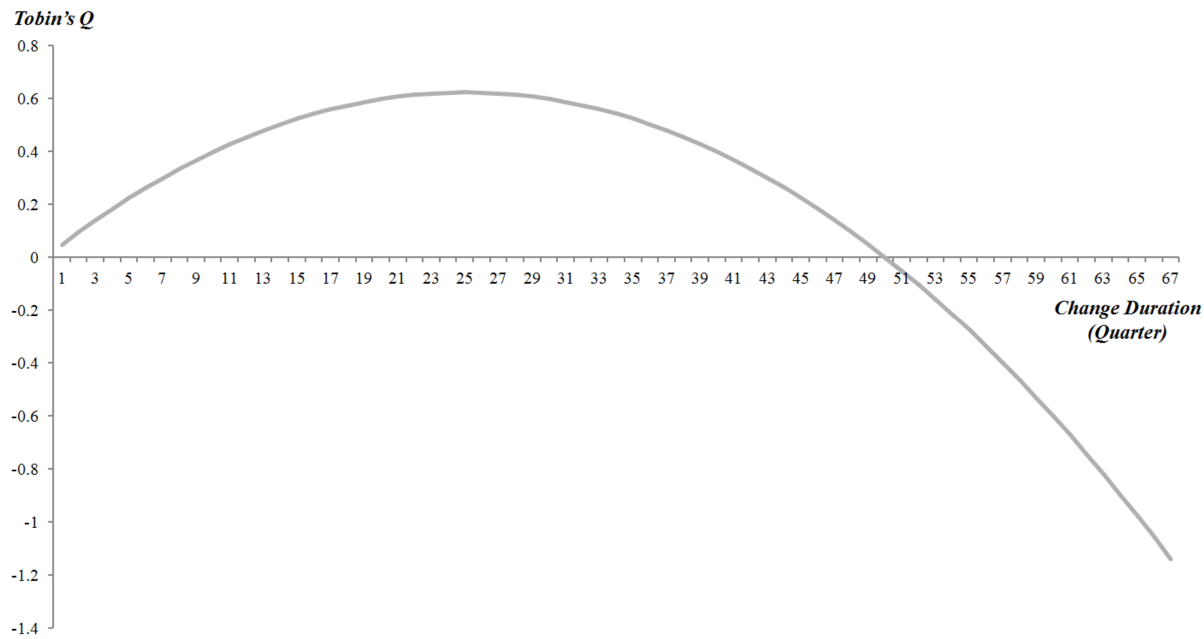
Table 15. Effect on Tobin's Q

	Model 1	Model 2	Model 3	Model 4
H1: Predicted Simultaneous Ambidexterity (RE) $_{t-1}$	3.244** (1.619)		2.525* (1.372)	
H1: Predicted Simultaneous Ambidexterity (GEE) $_{t-1}$		-0.010 (0.146)		-0.030 (0.097)
H2: Sequential Ambidexterity $_{t-1}$	0.402 (0.521)	0.560 (0.558)	0.648 (0.451)	0.749* (0.437)
H3: Change Duration $_{t-1}$	0.049*** (0.016)	0.051*** (0.017)		
H3: Change Duration Squared $_{t-1}$	-0.001*** 0.000	-0.001*** 0.000		
H4: Change Amplitude $_{t-1}$			0.014 (0.027)	0.014 (0.028)
Dedicated Ownership $_{t-1}$	1.161 (5.146)	0.135 (4.280)	-3.649 (4.610)	-4.214 (4.630)
Transient Ownership $_{t-1}$	-462.845*** (145.749)	-435.958*** (139.627)	-449.247*** (117.778)	-436.233*** (117.526)
Technological Dynamism $_{t-1}$	0.343 (1.147)	-0.147 (1.448)	-0.123 (0.837)	-0.52 (0.809)
Firm Size $_{t-1}$	0 0.000	0 0.000	0 0.000	0 0.000
Firm Age $_{t-1}$	0.004 (0.005)	0.005 (0.005)	0.001 (0.005)	0.003 (0.005)
External CVC Structure $_{t-1}$	0.454*** (0.161)	0.439** (0.196)	0.330 (0.274)	0.323 (0.294)
Unabsorbed Slack $_{t-1}$	-0.094 (0.079)	-0.08 (0.078)	-0.081 (0.101)	-0.067 (0.100)
Absorbed Slack $_{t-1}$	0.933 (0.668)	0.703 (0.845)	0.996* (0.571)	0.592 (0.711)
Potential Slack $_{t-1}$	-0.214 (0.203)	-0.226 (0.217)	-0.376*** (0.117)	-0.395*** (0.130)
R&D Intensity $_{t-1}$	-0.014 (0.011)	-0.018 (0.016)	-0.006 (0.007)	-0.012 (0.009)
CVC Intensity $_{t-1}$	-0.019 (0.038)	-0.032 (0.042)	-0.046 (0.034)	-0.059* (0.033)
Diversification $_{t-1}$	-0.013 (0.046)	-0.012 (0.052)	0.015 (0.038)	0.014 (0.041)
Return on Sales Growth $_{t-1}$	0.018 (0.051)	0.032 (0.047)	0.053 (0.032)	0.060* (0.034)
Constant	2.823*** (0.672)	3.017*** (0.710)	3.082*** (0.952)	3.485*** (1.039)
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes
No. Obs	334	334	380	380
No. Cluster	37	37	41	41
R-Squared	0.682	0.670	0.623	0.615

*Significance Level: *p<0.1, **p<0.05, ***p<0.01*

As change duration and amplitude causes multicollinearity (with high significant correlation estimates and high variance inflation factor value), these variables are separately estimated in Table 15. While the effect of change duration is estimated in models 1 and 2, the effect of change amplitude is estimated in models 3 and 4. Results in models 1 and 2 support H3 that the change duration has an inverted-U relationship with Tobin's Q. The coefficient estimate of change duration is positive and significant at 1% level and that of the squared change duration is negative and significant at 1% level. A firm with an average change duration of 14.14 quarters (i.e. 42.42 months) would enhance its Tobin's Q by 0.51. The marginal effect of change duration on Tobin's Q is depicted in Figure 15. Firms with change duration of 25 quarters (i.e. 75 months) had the maximum marginal effect on Tobin's Q by increasing it by 0.63.

Figure 15. Marginal Effect of Change Duration (from Table 15, Models 1 & 2)



Results in models 3 and 4 do not support H4 that a greater change amplitude has a negative relationship with Tobin's Q. The coefficient estimate of change amplitude is positive and not significant.

I also find interesting results concerning the effects of the control variables on Tobin's Q in Table 15. From Models 1 to 4 show that transient ownership negatively influences the firm's Tobin's Q. The coefficient estimate of the transient ownership variable was negative and statistically significant at 1 % level. While the literature provides evidence that transient ownership increases the risk of the company and results in greater stock return volatility (Bushee & Noe, 2000), this study's finding indicates that transient ownership decreases the valuation of the company.

Results from Models 1 and 2 show that having an external CVC structure increases a firm's Tobin's Q. The coefficient estimate of external CVC structure was positive and significant at both 5% and 1% levels. This implies that when the company manages its CVC program in the form of a wholly owned subsidiary, the Tobin's Q increases by 0.45 on average. This positive performance effect arises because the ventures perceive lower misappropriation risk of the corporate investor, which motivates the ventures to commit to the CVC relationship (Katila et al., 2016). Also, CVC programs with an independent structure tends to have greater autonomy, independent incentive systems, and better investing performance (Siegel et al., 1988).

Results from Models 3-4 show that greater potential slack decreases a firm's Tobin's Q. The coefficient estimate of potential slack was negative and significant at 1% level. This result implies that a firm’s ability to borrow and inject new financial resources have a negative impact on the firm's Tobin's Q. This finding is in line with the agency theory, which views that slack triggers self-serving managerial behaviors that result in decreased firm performance (Jensen, 1986).

6.5. DISCUSSION

The ambidexterity literature has been insightful in explicating the idea that striking the right balance between exploitation and exploration is critical for firm performance and survival (March, 1991; Levinthal & March, 1993). While this idea has been well accepted and evidenced in the ambidexterity literature (Raisch & Birkinshaw, 2008; Junni et al., 2013), it provides little insight into how and under what conditions temporal separation of exploitation and exploration leads to positive firm performance. By drawing on insights from the ambidexterity literature (March 1991) and continuous change research (Brown & Eisenhdart, 1997), I examine how sequential ambidexterity and its nature of oscillation impacts firm performance. I find that both simultaneous and sequential ambidexterity in CVC investing increases a firm's Tobin's Q. Furthermore, I find that the duration of (continuous) change has an inverted-U relationship with a firm's Tobin's Q.

This study makes contributions to the ambidexterity and CVC literature as follows. First, while the ambidexterity literature has examined the idea that striking the right balance between exploitation and exploration in the same period improves firm performance (Raisch & Birkinshaw, 2008), I focus on the idea that striking the right balance of two activities over time enhances firm performance. By drawing on the ambidexterity literature, I argue that positive temporal spillover between exploitation and exploration occurs when today's exploitation becomes the input for tomorrow's exploration and vice versa. By removing potential selection biases arising from prior resource allocation decisions to exploitation and exploration, I show that both simultaneous and sequential ambidexterity in CVC investing increases a firm's Tobin's Q.

Secondly, while the ambidexterity literature examined how the transitioning from one activity to another results in substantive organizational change (Romanelli & Tushman, 1994), it has provided little insight on the benefits and risks of continuously transitioning the structures and routines focused on one activity to another. By building on continuous change (e.g., Brown & Eisenhardt, 1997) and organizational inertia research (e.g., Hannan & Freeman, 1984; Barnett & Freeman, 2001), I examine how the continuous change in exploitation and exploration shares influences a firm's performance. On the one hand, I argue that increased change duration will cause positive temporal spillover because it increases the coordinating capability by applying transitioning procedures, creates rhythm, and enhances the firm to well align with the environmental changes (Brown & Eisenhardt, 1997). On the other hand, I argue that too short or too long change durations will cause negative temporal spillover between exploitation and exploration due to increased costs of setting-up, adaptation, and implementation of different routines, mindsets, and structures (Barnett & Freeman, 2001; Siren et al., 2012). I find that the (continuous) change duration has an inverted-U relationship with a firm's Tobin's Q.

Thirdly, I contribute to the CVC literature by showing the positive impact of ambidexterity in CVC investing (Hill & Birkinshaw, 2014). While the previous literature finds that simultaneously balancing exploitation and exploration increases the legitimacy and thus, the survival of the CVC program (Hill & Birkinshaw, 2014), I show that both simultaneous and sequential ambidexterity in CVC investing increases Tobin's Q. Moreover, by showing how ambidexterity in CVC investing impacts a firm's performance, this paper adds to the CVC research that examines the performance implications of CVC investing (Dushnitsky & Lenox, 2006; Wadhwa & Kotha, 2006; Allen & Hevert, 2007).

This study has several limitations that will be interesting avenues to pursue for future research. First, I did not directly observe how the structures and routines of the CVC program evolve over time. Qualitative inquiries of this micro-level data can shed insight on how oscillating firms design their structures, routines, and mindsets. Secondly, while I examined how the continuity of change influences firm performance, I have not directly observed how this nature of oscillation may align with the internal rhythm and with the changes of the external environment. Accordingly, it will be interesting to examine how entrainment with the internal or external changes impact firm performance. Thirdly, while this study examined the duration and amplitude of oscillation in the context of CVC investing, this nature of oscillations may be applied to strategic alliances or acquisitions for the following reasons. The literature has shown that alliances and acquisitions are effective means of external technology sourcing (e.g. Ahuja & Katila, 2001; Stuart, 2000), they have substantial variation in exploitation and exploration within and across firms (e.g., Karim & Mitchell, 2000), and ambidextrous firms have greater alliance or acquisition performances (e.g., Luger, 2014).

CHAPTER 7. CONCLUSION

This dissertation investigates how negative performance feedback and corporate governance influence the direction of organizational change and how balancing such change over time influences firm performance. To answer this broad research question, I integrated insights from the literature on CVC, Behavioral Theory of the Firm, Corporate Governance, and Ambidexterity with those I gained from qualitative data analysis. Qualitative data were collected by performing over twenty-five interviews with CVC Managers, Institutional Shareholders, and Investor Relations Managers. This approach provided rich insights into the CVC decision-making process and how and when the senior executives take into account the shareholders' voice. By combining the insights from the interviews and the literature, I developed a model where resource allocation decisions on exploitation and exploration are influenced by the interaction between negative performance feedback and shareholders and where the firm's valuation is affected by oscillating between exploitation and exploration over time. Subsequently, this model was empirically tested based on the explorative and exploitative nature of 10,261 CVC deals made by 286 corporate investors during 1993-2013. Overall, the three essays of this dissertation are complementary with regards to developing and testing new theory on the antecedents and consequences of exploitative and explorative CVC investing.

In the first essay, I examined how negative performance feedback affects the direction of organizational change and how this relationship is moderated by the board of directors and shareholders. As a baseline proposition, following the predictions of the Behavioral Theory of the Firm (Cyert & March, 1963), I argued that negative performance feedback results in an increased likelihood of organizational change. By drawing from decision risk research (Kacperczyk et al., 2015), I then examined how the interaction between poor firm performance and managerial risk preferences influence the direction of change with respect to allocating resources to exploitation and exploration. I theorized that poor firm performance and risk-averse managers trigger more resources to be allocated to exploitation, whereas poor firm performance and risk-seeking managers prompt more resources to be allocated to exploration. Furthermore, by drawing on insights from corporate governance research, I developed theories that consider the influence of shareholders and board of directors on the direction of organizational change. Assuming that managers are largely risk-averse, I predicted that as the concentration of dedicated ownership increases in a poorly performing firm, the firm will alter its search trajectory by exploring more and exploiting less because dedicated shareholders prefer long-term growth in value creation and are more inclined to voice their interests when firm performance misses their expectations. In contrast, because transient shareholders prefer short-term returns and are more inclined to pose a credible threat of exiting their positions if performance misses their expectations, I argued that as the concentration of transient ownership increases in a poorly performing firm, the firm will alter its search trajectory by exploiting more and exploring less. Moreover, I argued that as the level of the board's monitoring intensity increases in a poorly performing firm, the firm will shift its allocation of resources to more exploitation and lesser exploration because monitoring-intensive boards rely on financial controls, which motivates managers to become myopic and risk-averse. Lastly, I argued that as the level of the board's advising intensity increases in a poorly performing firm, the firm will allocate more resources to exploration and less resources to exploitation because advising-intensive boards rely on strategic controls, which motivates managers to become long-term oriented and risk-tolerant.

In the second essay, I tested the theories developed in the first essay. More specifically, I empirically examined how negative performance feedback affects the direction of organizational change and how this relationship is moderated by the dedicated and transient shareholders in the context of CVC investing. By extending the propositions developed in the first essay to the CVC context, in the second essay, I argued that negative firm-level performance feedback leads to increased CVC investment intensity. Then, assuming that CVC program managers are typically risk-averse, I argued that negative performance feedback leads to allocating resources to more exploitation and lesser exploration. I predicted that as the concentration of dedicated ownership increases in a poorly performing firm, the firm will allocate more CVC resources to exploration over exploitation. In contrast, I hypothesized that as the concentration of transient ownership increases in a poorly performing firm, the firm will allocate more CVC resources to exploitation over exploration. The results confirm that poor firm performance motivates firms to increase their CVC investment intensity and that this change is directed at exploitative investments. Furthermore, the results show that as the concentration of dedicated ownership increases in a poorly performing firm, the firm alters its search trajectory by exploring more and exploiting less. On the contrary, the concentration of transient ownership had no effect.

In the third essay, I examined how and under what conditions oscillating between exploitation and exploration over time in CVC investing influences firm performance. As a baseline hypothesis, drawing from the ambidexterity research (e.g. Raisch & Birkinshaw, 2008), I argued that the synchronous pursuit of both exploitation and exploration (in the same period) leads to greater performance. Also, I argued that oscillating between exploitation and exploration over time increases a firm's performance by creating positive temporal spillovers. Furthermore, by building on continuous change and organizational inertia research (e.g., Brown & Eisenhardt, 1997; Hannan & Freeman, 1984), I argued that the duration of change has an inverted-U shaped relationship with firm performance. Also, I argued that the amplitude of change has a negative relationship with firm performance. The results showed that both simultaneous and sequential ambidexterity in CVC investing increases a firm's Tobin's Q. Furthermore, I found that the duration of change has an inverted-U shaped relationship with a firm's Tobin's Q. On the contrary, the effect of the amplitude of change was not found.

7.1. CONTRIBUTIONS

This dissertation mainly contributes to three streams of literature: Corporate Venture Capital, Behavioral Theory of the Firm, and Ambidexterity.

7.1.1. Contributions to Corporate Venture Capital Research

CVC scholars have recognized that CVC investing is an effective tool for organizational learning (Keil et al., 2008), which has primarily two conflicting initiatives: exploitation and exploration (Schildt et al., 2005; Wadhwa & Basu, 2013). Furthermore, CVC research found that resource allocation decisions on exploitation and exploration influence firm performance and survival (Hill & Birkinshaw, 2008). Despite its importance to raising firm performance and survival, CVC research has not yet examined how resource allocation decisions on exploitation and exploration are made. In the second essay, I showed that problemistic search and managerial risk preferences interact and influence the allocation of CVC resources to exploitation and exploration. Assuming that CVC managers are risk-averse, I found that performance shortfall relative to aspirations triggers firms to make greater level of CVC investment relative to sales, and this investment is directed at exploitation. This is an important addition to the literature on how decisions are made in CVC. While the literature found whether and when CVC programs are adopted or terminated (Gaba & Bhattacharya, 2012), in the second essay, I showed whether and when CVC intensity increases and how CVC resources are allocated between exploitation and exploration. More importantly, I contribute to CVC research by investigating how dedicated shareholders participate in the CVC decision-making process. While CVC research showed how the established firm's senior executives, business units, the start-up firms, and the venture capitals (VCs) take part in the CVC decision-making process (e.g. Basu, Phelps, & Kotha, 2016; Keil et al., 2008), I found that dedicated shareholders influence the CVC decisions to allocate more resources to exploration and less resources to exploitation, in particular, when firm performance falls below aspiration levels.

Also, CVC research found that CV units conducting high levels of both exploitation and exploration survive longer (Hill & Birkinshaw, 2014). While this literature largely built on the static assumption that the tension arising from executing both exploitation and exploration is persistent and time invariant, in the third essay, I suggested that firms oscillate between exploitation and exploration over time and such oscillation affects firm performance. I showed that not only striking a balance between exploitation and exploration at the same period but also oscillating between exploitation and exploration across periods enhance a firm's Tobin's Q. Accordingly, while past CVC research has largely focused on the effect of simultaneous ambidexterity, I showed the positive performance effect of sequential ambidexterity. Furthermore, rather than focusing on the incremental interaction between exploitation and exploration over time but by examining the oscillation (i.e. a period when continuous change takes place in allocation of resources to exploitation and exploration) as the unit of analysis, I found that the duration of change has an inverted-U shaped relationship with a firm's Tobin's Q. In brief, I showed that oscillating between exploitation and exploration in CVC investing enhances firm performance, and in particular, that moderate durations of continuous change enhances firm performance the most.

7.1.2. Contributions to Behavioral Theory of the Firm Research

This dissertation contributes to the Behavioral Theory of the Firm (BTF) research by theorizing and showing how constituencies of corporate governance influence the managerial decision-making process and how the interaction between negative performance feedback and managerial risk preferences affects the direction of change.

First, the literature on BTF typically assumed that an organization is composed of a dominant coalition of managers that reigns over the strategic decision-making process, reflecting its own interests and preferences (Desai, 2016). By drawing on insights from corporate governance research, in the second essay, I showed that managerial decision-making process is an outcome of bargaining and negotiation between the managers and the shareholders. In particular, I showed that dedicated shareholders gain legitimacy and voice their interests in the managerial decision-making process when performance falls below aspiration levels. Influence of dedicated ownership resulted in the firm's greater allocation of resources to exploration over exploitation in face of negative performance feedback. Furthermore, in the first essay, I theorized on how the monitoring- and advising-intensive board of directors differentially influence the managerial decision-making process, particularly when performance falls below aspiration levels.

Secondly, BTF research has focused on explaining whether and when organizational change takes place but it lacks the mechanism to predict how problemistic search affects decision-making with regards to the direction of change after the need for and type of change have been established (Greve & Zhang, 2016). In the first essay, by drawing on insights from decision risk research (Kacperczyk et al., 2015), I theorized on how the direction of change is affected by the interaction between the negative performance feedback and the risk preferences of the managers implementing the change. Furthermore, in the second essay, I found that risk-averse managers prefer to allocate more resources to exploitation than exploration when faced with negative performance feedback.

7.1.3. Contributions to Ambidexterity Research

This dissertation contributes to the Ambidexterity research by theorizing and showing how the oscillation between exploitation and exploration enhances a firm's performance and how the 'continuous' change of the oscillation influences a firm's performance.

First, the ambidexterity literature provides little insight into how temporally separating exploitation and exploration impacts firm performance (Raisch & Birkinshaw, 2008). In the third essay, I studied how oscillating between exploitation and exploration over time influences a firm's performance. Although the ambidexterity literature discussed the oscillation based on case studies or anecdotal evidence (e.g. Brown & Eisenhardt, 1997; Boumgarden et al., 2012), evidence based on extensive longitudinal data has not been well established yet (e.g. Luger, 2014; Goossen et al., 2012; Venkatraman et al., 2007). By removing potential selection biases arising from resource allocation decisions, I found that striking the right balance between exploitation and exploration at the same period and over different periods enhances a firm's performance.

Secondly, while the ambidexterity literature lacks the discussion of the costs of oscillating between exploitation and exploration and the potential limits to temporal spillovers resulting from such oscillation (e.g. Luger, 2014; Goossen et al., 2012; Venkatraman et al., 2007), by drawing on insights from the continuous change and organizational inertia literature (e.g. Brown & Eisenhardt, 1997; Hannan & Freeman, 1984), I examined how the 'continuous' nature of oscillation impacts the benefits and costs of oscillation and eventually, firm performance. I found that the duration of continuous change in the resource allocation of exploitation and exploration has an inverted U-shaped relationship with the firm's performance.

7.2. MANAGERIAL IMPLICATIONS

7.2.1. Implication for Corporate Venture Capital Managers

The findings of this dissertation provide insights to the managers who are involved in the CVC decision-making process. These managers primarily include but are not limited to Senior Executives who are participants of the CVC investment committee and the Directors of the CVC program. One of the fundamental problems organizations face is the tendency to over-exploit (March, 2003). Organizations often fall under success traps by being stuck in an endless loop of exploitation. Initially, organizations achieve success through exploitation and tend to keep on exploiting with their success formula. However, if organizations keep on exploiting when the environment demands change, the products and technologies that were once successful become obsolete and organizations are likely to fail. The findings in the second essay suggest that dedicated shareholders can play a role in adjusting such over-exploitative tendencies and altering the direction of search towards exploration when firms are not performing well. This result implies that bringing in stakeholders that value exploration, such as dedicated shareholders, in the managerial decision-making process can be useful in reversing the managerial tendency to over-exploit.

Another fundamental problem that organizations face is how to strike the right balance between exploitation and exploration (Haanaes, 2015). While there has been anecdotal evidence such as how Hewlett-Packard and USA Today oscillated between exploitation and exploration and were successful (Boumgarden et al., 2012), there has been a lack of empirical findings based on longitudinal data. The findings from the third essay suggest that indeed, oscillating between exploitation and exploration over time can be a way to enhance a firm's performance. Also, the findings suggest that how long the continuous oscillation takes place plays an important role in affecting the benefits that arise from enhanced coordination, focused attention, and agile response to environmental change and the costs that arise from changing the structure, routine, and culture of the CVC program. The findings imply that continuously changing the allocation of resources to exploitation and exploration during 6 years returns the maximum performance by raising the firm's ratio of market to book value by 0.63.

The previously discussed managerial implications can be applied in a more general context. For instance, the findings of this dissertation can be applied to acquisition, licensing, strategic alliance, corporate development, and R&D managers who are concerned about the tendency for over-exploitation or how to oscillate between exploitation and exploration.

7.2.2. Implication for Investor Relations Managers

The findings of this dissertation provide insights to Investor Relations (IR) managers. The results of the second essay showed that there are shareholders with different preferences that differently influence managerial decisions. While dedicated shareholders influence managerial decisions by altering the focus of search towards exploration when a firm is poorly performing, transient shareholders have no effect. IR managers may note that dedicated shareholders tend to prefer exploration over exploitation and thus, firms with greater dedicated ownership are likely to allocate more resources to exploration and less to exploitation.

Also, the findings of this dissertation imply that the shortfall between the expected earnings per share (EPS) and actual EPS plays a major role in triggering the shareholder influence to become salient in the managerial decision-making process. This result is in line with the findings from the corporate governance literature which show that underperformance constrains managerial discretion and triggers the shareholders and boards to exert more influence on the managerial decision-making process (Desai, 2016; Dowell et al., 2011;

Tuggle et al., 2010). This result implies that IR manager's role is crucial in mediating the relationship between shareholders and managers with prudence so that the managers do not get overwhelmed during the periods of underperformance.

7.2.3. Implication for Institutional Shareholders

The findings of this dissertation provide insights to Institutional Shareholders. It has been well evidenced and established that striking the right balance between exploitation and exploration influences a firm's performance positively (Raisch & Birkinshaw, 2008). The findings of this dissertation further suggest that oscillating between exploitation and exploration reflects that the firm is constantly changing its structure, routines, and culture to adapt to the changing environment, which creates temporal spillovers. The result implies that the firms that continuously oscillate between exploitation and exploration over an adequate duration can be a lucrative investment opportunity to the shareholders.

7.3. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

In the CVC Review (Chapter 3), I laid out the future research opportunities for CVC research. In the three essays (Chapter 4, 5, 6), I elaborated on how theoretical and empirical extensions can be made for future research in Behavioral Theory of the Firm, Corporate Governance, and Ambidexterity. Here, I finalize this dissertation by briefly discussing the several limitations at a broader level that represent interesting avenues for future research.

First, as the second and third essays are primarily based on empirical analysis of large-scale secondary data, they do not capture the intricate micro-level processes at play. For instance, in the second essay, while I assumed that managers and shareholders interact with each other during the periods of poor firm performance, I did not directly observe this micro-level process of interactions. Further investigation based on such micro-level data will be useful in explaining how managerial discretion is limited in times of poor firm performance and how managers and shareholders bargain or negotiate over the decisions to allocate resources to exploitation and exploration. Also, in the third essay, while I assumed that changes in the allocation of resources to exploitation and exploration involves changes in structures and routines, I did not directly observe this micro-level evolution of the structures and routines of the CVC program over time. I expect that qualitative inquiries of this micro-level data can shed insight on how oscillating firms can better design their structures, routines, and mindsets.

Secondly, in the first essay, I theorized on how negative performance feedback influences managerial decisions to allocate resources to exploitation and exploration and how such relationship is affected by the board of directors and shareholders. While I tested the moderating effects of shareholders in the second essay, it may be interesting for future research to test the propositions developed in the first essay on the influence of the board of directors. Furthermore, taking a broader perspective, it may be interesting to examine the influence of external governance mechanisms, such as the legal system, corporate control, external auditors, governance ratings, stakeholder activism, and media, on managerial decision-making (Aguilera et al., 2015).

Thirdly, while the empirical examination of the second and third essays was made in the context of CVC, it can be extended to alternative contexts of external corporate venturing such as alliances and acquisitions. These contexts meet the conditions required to test the theories developed in this dissertation. For instance, a firm's performance shortfall relative to aspirations may trigger organizational change in the form of making alliances and acquisitions (Baum et al., 2005; Iyer & Miller, 2008). Also, substantial variation in exploitation and exploration is observed within and across firms for alliances and acquisitions (Luger, 2014; Hagedoom & Duysters, 2002; Dussauge et al., 2000). Moreover, ambidexterity is pursued in the context of alliances and acquisitions (Luger, 2014). Lastly, corporate governance entities have substantial influence over managerial decision-making with regards to making alliances and acquisitions (Connelly et al., 2010).

REFERENCE

Adams, R. B., & Ferreira, D. 2007. A theory of friendly boards. *The Journal of Finance*, *62*(1): 217-250.

Adams, R.B., 2009. *Asking Directors about their Dual Roles*. Working Paper. University of Queensland.

Agarwal, R., & Helfat, C. E. 2009. Strategic renewal of organizations. *Organization science*, *20*(2): 281-293.

Aghion P, Bloom N, Blundell R, Griffith R, Howitt P. 2005. Competition and innovation: An inverted-U relationship. *Quarterly Journal of Economics,* 120(2):701–728.

Aguilera, R. V., Desender, K., Bednar, M. K., & Lee, J. H. 2015. Connecting the dots: Bringing external corporate governance into the corporate governance puzzle. *Academy of Management Annals*, 9(1): 483-573.

Ahuja, G., & Katila, R. 2001. Technological acquisitions and the innovation performance of acquiring firms: A longitudinal study. *Strategic Management Journal*, *22*(3): 197-220.

Alexander, J. A., Fennell, M. L., & Halpern, M. T. 1993. Leadership instability in hospitals: The influence of board-CEO relations and organizational growth and decline. *Administrative Science Quarterly*, 38: 74-99.

Allen, S. A., & Hevert, K. T. 2007. Venture capital investing by information technology companies: Did it pay?. *Journal of Business Venturing*, *22*(2): 262-282.

Alvarez-Garrido, E., & Dushnitsky, G. 2016. Are entrepreneurial venture's innovation rates sensitive to investor complementary assets? Comparing biotech ventures backed by corporate and independent VCs. *Strategic Management Journal*, *5*(37): 819-834.

Amburgey, T. L., & Miner, A. S. 1992. Strategic momentum: The effects of repetitive, positional, and contextual momentum on merger activity. *Strategic Management Journal*, *13*(5): 335-348.

Ancona, D. G., & Chong, C. L. 1992. Timing Is Everything: Entrainment And Performance In Organization Theory. *Academy of Management Proceedings*, 1992(1): 166-169.

Anokhin, S., Peck, S., & Wincent, J. 2016a. Corporate venture capital: The role of governance factors. *Journal of Business Research*, *69*(11): 4744-4749.

Anokhin, S., Wincent, J., & Oghazi, P. 2016b. Strategic effects of corporate venture capital investments. *Journal of Business Venturing Insights*, *5*: 63-69.

Argote, L. & Greve, H.R. 2007. A behavioral theory of the firm—40 years and counting: Introduction and impact. *Organization Science*, 18: 337-349.

Baierl, R., Anokhin, S., & Grichnik, D. 2016. Coopetition in corporate venture capital: the relationship between network attributes, corporate innovativeness, and financial performance. *International Journal of Technology Management*, *71*(1-2): 58-80.

Baldenius, T., Melumad, N., & Meng, X. 2014. Board composition and CEO power. *Journal of Financial Economics*, 112(1): 53-68.

Baldi, F., Baglieri, D., & Corea, F. 2015. Balancing Risk and Learning Opportunities in Corporate Venture Capital Investments: Evidence from the Biopharmaceutical Industry. *Entrepreneurship Research Journal*, *5*(3): 221-250.

Balsmeier, B., Fleming, L., & Manso, G. 2017. Independent boards and innovation. *Journal of Financial Economics*, *123*(3): 536-557.

Barnett, W. P., & Freeman, J. 2001. Too much of a good thing? Product proliferation and organizational failure. *Organization Science*, *12*(5): 539-558.

Bartov, E., Givoly, D., & Hayn, C. 2002. The rewards to meeting or beating earnings expectations. *Journal of Accounting and Economics*, 33(2): 173-204.

Basu, S., & Wadhwa, A. 2013. External venturing and discontinuous strategic renewal: An options perspective. *Journal of Product Innovation Management*, *30*(5): 956-975.

Basu, S., Phelps, C. C., & Kotha, S. 2016. Search and Integration in External Venturing: An Inductive Examination of Corporate Venture Capital Units. *Strategic Entrepreneurship Journal*, 10(2): 129-152.

Basu, S., Phelps, C., & Kotha, S. 2011. Towards understanding who makes corporate venture capital investments and why. *Journal of Business Venturing*, *26*(2): 153-171.

Basu, S., Wadhwa, A., & Kotha, S. 2016. Corporate venture capital: important themes and future directions. In S. A. Zahra, D. O. Neubaum, & J. C. Hayton (Eds.), *Handbook of Research on Corporate Entrepreneurship*, 203-233.

Baum, J. A., Li, S. X., & Usher, J. M. 2000. Making the next move: How experiential and vicarious learning shape the locations of chains' acquisitions. *Administrative Science Quarterly*, 45(4), 766-801.

Baum, J. A., Rowley, T. J., Shipilov, A. V., & Chuang, Y. T. 2005. Dancing with strangers: Aspiration performance and the search for underwriting syndicate partners. *Administrative Science Quarterly*, *50*(4): 536-575.

Baysinger, B. D., Kosnik, R. D., & Turk, T. A. 1991. Effects of board and ownership structure on corporate R&D strategy. *Academy of Management Journal*, 34(1): 205-214.

Baysinger, B., & Hoskisson, R. E. 1990. The composition of boards of directors and strategic control: Effects on corporate strategy. *Academy of Management Review*, *15*(1): 72-87.

Belderbos, R., Faems, D., Leten, B., & Looy, B. V. 2010. Technological activities and their impact on the financial performance of the firm: Exploitation and exploration within and between firms. *Journal of Product Innovation Management*, *27*(6): 869-882.

Benner, M. J. 2010. Securities analysts and incumbent response to radical technological change: Evidence from digital photography and internet telephony. *Organization Science*, 21(1): 42-62.

Benson, D., & Ziedonis, R. H. 2009. Corporate venture capital as a window on new technologies: Implications for the performance of corporate investors when acquiring startups. *Organization Science*, *20*(2): 329-351.

Benson, D., & Ziedonis, R. H. 2010. Corporate venture capital and the returns to acquiring portfolio companies. *Journal of Financial Economics*, *98*(3): 478-499.

Bertoni, F., Colombo, M. G., & Croce, A. 2010. The effect of venture capital financing on the sensitivity to cash flow of firm's investments. *European Financial Management*, *16*(4): 528-551.

Bertoni, F., Colombo, M. G., & Grilli, L. 2013. Venture capital investor type and the growth mode of new technology-based firms. *Small Business Economics*, *40*(3): 527-552.

Birkinshaw, J., & Hill, S. A. 2005. Corporate Venturing Units: Vehicles for Strategic Success in the New Europe. *Organizational Dynamics*, *34*(3): 247-257.

Block, Z. & Ornati, O.A. 1987. Compensating corporate venture managers. *Journal of Business Venturing*, 2(1): 41-51.

Boeker, W. 1992. Power and managerial dismissal: Scapegoating at the top. *Administrative Science Quarterly*, 400-421.

Boeker, W., & Goodstein, J. 1993. Performance and successor choice: The moderating effects of governance and ownership. *Academy of Management Journal*, *36*(1): 172-186.

Bolton, M.K. 1993. Organizational innovation and substandard performance: When is necessity the mother of invention? *Organization Science*, 4(1): 57-75.

Borochin, P., & Yang, J. 2016. *The Effects of Institutional Investor Objectives on Firm Valuation and Governance*. SSRN Working Paper.

Bottazzi, L., Da Rin, M., & Hellmann, T. 2008. Who are the active investors?: Evidence from venture capital. *Journal of Financial Economics*, *89*(3): 488-512.

Boumgarden, P., Nickerson, J., & Zenger, T. R. 2012. Sailing into the wind: Exploring the relationships among ambidexterity, vacillation, and organizational performance. *Strategic Management Journal*, *33*(6): 587-610.

Bourgeois, L. J. 1981. On the measurement of organizational slack. *Academy of Management Review*, 6(1): 29-39.

Brown, S. L., & Eisenhardt, K. M. 1997. The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative Science Quarterly*, 42(1): 1-34.

Burns, T. E., & Stalker, G. M. 1961. *The Management of Innovation*. London: Tavistock Publications.

Bushee, B. 2004. Identifying and attracting the "right" investors: Evidence on the behavior of institutional investors. *Journal of Applied Corporate Finance*, 16(4): 28-35.

Bushee, B. J. 1998. The influence of institutional investors on myopic R&D investment behavior. *Accounting Review*, 73(3): 305-333.

Bushee, B. J. 2001. Do institutional investors prefer near-term earnings over long-run value?. *Contemporary Accounting Research*, 18(2): 207-246.

Bushee, B. J., & Miller, G. S. 2012. Investor relations, firm visibility, and investor following. *The Accounting Review*, 87(3): 867-897.

Bushee, B. J., & Noe, C. F. 2000. Corporate disclosure practices, institutional investors, and stock return volatility. *Journal of Accounting Research*, 171-202.

Campbell, A., Birkinshaw, J., Morrison, A., & Van Batenburg, R. 2003: The Future of Corporate Venturing, MIT Sloan Management Review, 45 (1): 30-37.

Cao, Q., Gedajlovic, E., & Zhang, H. 2009. Unpacking organizational ambidexterity: Dimensions, contingencies, and synergistic effects. *Organization Science*, *20*(4): 781-796.

Capron, L., & Guillén, M. 2009. National corporate governance institutions and post-acquisition target reorganization. *Strategic Management Journal*, *30*(8): 803-833.

Cassiman, B., & Veugelers, R. 2006. In search of complementarity in innovation strategy: Internal R&D and external knowledge acquisition. *Management science*, *52*(1): 68-82.

Ceccagnoli, M., Higgins, M. J., & Kang, H. D. 2015. *Corporate venture capital as a real option in the markets for technology* (No. w21424). National Bureau of Economic Research.

Cesaroni, F., Minin, A. D., & Piccaluga, A. 2005. Exploration and exploitation strategies in industrial R&D. *Creativity and Innovation Management*, *14*(3): 222-232.

Champenois, C., Engel, D., & Heneric, O. 2006. What kind of German biotechnology start-ups do venture capital companies and corporate investors prefer for equity investments? *Applied Economics*, 38(5): 505-518.

Chemmanur, T. J., Krishnan, K., & Nandy, D. K. 2011. How does venture capital financing improve efficiency in private firms? A look beneath the surface. *Review of financial studies*, hhr096.

Chemmanur, T. J., Loutskina, E., & Tian, X. 2014. Corporate venture capital, value creation, and innovation. *Review of Financial Studies*, *27*(8): 2434-2473.

Chen, W.R. & Miller, K.D. 2007. Situation and institutional determinants of firms' R&D search

intensity. *Strategic Management Journal*, 28(4): 369-381.
Chesbrough, H.W., 2002. Making sense of corporate venture capital. *Harvard Business Review*, 80(3): 4–11.
Chung, K. H., & Pruitt, S. W. 1994. A simple approximation of Tobin's q. *Financial Management*, 23(3): 70-74.
Cohen, W. M., & Levinthal, D. A. 1990. Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1): 128-152.
Coles, J. L., Daniel, N. D., & Naveen, L. 2012. *Board Advising*. SSRN Working Paper.
Colombo, M. G., & Shafi, K. 2016. Swimming with sharks in Europe: When are they dangerous and what can new ventures do to defend themselves?. *Strategic Management Journal*, *37*(11): 2307-2322.
Connelly, B. L., Tihanyi, L., Certo, S. T., & Hitt, M. A. 2010. Marching to the beat of different drummers: The influence of institutional owners on competitive actions. *Academy of Management Journal*, 53(4): 723-742.
Cooper, R. G. 1993. *Winning at new products*. Cambridge, MA: Perseus.
Crossland, C., & Hambrick, D. C. 2007. How national systems differ in their constraints on corporate executives: A study of CEO effects in three countries. *Strategic Management Journal*, *28*(8): 767-789.
Cyert, R. M., & March, J. G. 1963. *A Behavioral Theory of the Firm*. NJ: Englewood Cliffs.
Da Rin, M., Hellmann, T. F., & Puri, M. 2011. *A Survey of Venture Capital Research* . National Bureau of Economic Research.
Daily, C. M. 1995. The relationship between board composition and leadership structure and bankruptcy reorganization outcomes. *Journal of Management*, 21(6): 1041-1056.
Daily, C. M., & Dalton, D. R. 1994. Corporate governance and the bankrupt firm: An empirical assessment. *Strategic Management Journal*, 15(8): 643-654.
Daily, C. M., Dalton, D. R., & Cannella, A. A. 2003. Corporate governance: Decades of dialogue and data. *Academy of management review*, *28*(3): 371-382.
Daily, C. M., Johnson, J. L., & Dalton, D. R. 1999. On the measurements of board composition: Poor consistency and a serious mismatch of theory and operationalization. *Decision Sciences*, 30(1): 83-106.
Dalton, D. R., Daily, C. M., Ellstrand, A. E., & Johnson, J. L. 1998. Meta-analytic reviews of board composition, leadership structure, and financial performance. *Strategic management journal*, *19*(3): 269-290.
Dalton, D. R., Daily, C. M., Johnson, J. L., & Ellstrand, A. E. 1999. Number of directors and financial performance: A meta-analysis. *Academy of Management journal*, *42*(6): 674-686.
Daniel, F., Lohrke, F. T., Fornaciari, C. J., & Turner, R. A. 2004. Slack resources and firm performance: a meta-analysis. *Journal of Business Research*, *57*(6): 565-574.
Davis, G. F., & Stout, S. K. 1992. Organization theory and the market for corporate control: A dynamic analysis of the characteristics of large takeover targets, 1980-1990. *Administrative Science Quarterly*, 605-633.
Desai, V. 2016. The Behavioral Theory of the (Governed) Firm: Corporate Board Influences on Organizations' Responses to Performance Shortfalls. *Academy of Management Journal*, 59(3): 860-879.
Deutsch, Y. 2005. The impact of board composition on firms' critical decisions: A meta-analytic review. *Journal of Management*, 31(3): 424-444.

Di Stefano, G., Gambardella, A., & Verona, G. 2012. Technology push and demand pull perspectives in innovation studies: Current findings and future research directions. *Research Policy*, 41(8): 1283-1295.

Di Stefano, G., King, A. A., & Verona, G. 2014. Kitchen confidential? Norms for the use of transferred knowledge in gourmet cuisine. *Strategic Management Journal*, 35(11): 1645-1670.

Dittrich, K., & Duysters, G. 2007. Networking as a means to strategy change: the case of open innovation in mobile telephony. *Journal of product innovation management*, 24(6): 510-521.

Dokko, G., & Gaba, V. 2012. Venturing into new territory: Career experiences of corporate venture capital managers and practice variation. *Academy of Management Journal*, 55(3): 563-583.

Dosi, G. 1988. Microeconomic sources, procedures and effects of innovation. *Journal of Economic Literature*, 26 (3): 1120-1171.

Dowell, G. W. S., Shackell, M. B., & Stuart, N. V. 2011. Boards, CEOs, and surviving a financial crisis: Evidence from the internet shakeout. *Strategic Management Journal*, 32: 1025–1045.

Drover, W., Busenitz, L., Matusik, S., Townsend, D., Anglin, A., & Dushnitsky, G. 2017. A Review and Road Map of Entrepreneurial Equity Financing Research: Venture Capital, Corporate Venture Capital, Angel Investment, Crowdfunding, and Accelerators. *Journal of Management*, 1-34.

Duncan, R. B. 1976. The ambidextrous organization: Designing dual structures for innovation. *The management of organization*, *1*, 167-188.

Durand, T. 1992. The Dynamics of Cognitive Technological Maps. In P. Lorange, J. Roos, B. Chakravarty, & A. Van de Ven (Eds.), *Strategic Processes*. Blackwell Business.

Dushnitsky, G. & Shapira, Z. 2010. Entrepreneurial finance meets organizational reality: Comparing investment practices and performance of corporate and independent venture capitalists. *Strategic Management Journal*, 31(9): 990-1017.

Dushnitsky, G. 2006. Corporate venture capital: Past evidence and future directions. In M. Casson, B. Yeung, A. Basu, & N. Wadeson (Eds.), *The Oxford Handbook of Entrepreneurship:* 387-431. Oxford University Press: Oxford, UK.

Dushnitsky, G., & Lavie, D. 2010. How alliance formation shapes corporate venture capital investment in the software industry: a resource-based perspective. *Strategic Entrepreneurship Journal*, *4*(1): 22-48.

Dushnitsky, G., & Lenox, M. J. 2005a. When do incumbents learn from entrepreneurial ventures?: Corporate venture capital and investing firm innovation rates. *Research Policy*, 34(5): 615-639.

Dushnitsky, G., & Lenox, M. J. 2005b. When do firms undertake R&D by investing in new ventures? *Strategic Management Journal*, 26(10): 947-965.

Dushnitsky, G., & Lenox, M. J. 2006. When does corporate venture capital investment create firm value? *Journal of Business Venturing*, 21(6): 753-772.

Dushnitsky, G., & Shaver, J. M. 2009. Limitations to interorganizational knowledge acquisition: the paradox of corporate venture capital. *Strategic Management Journal*, *30*(10): 1045-1064.

Dussauge, P., Garrette, B., & Mitchell, W. 2000. Learning from competing partners: outcomes and durations of scale and link alliances in Europe, North America and Asia. *Strategic Management Journal*, 99-126.

Dyck, A., & Zingales, L. 2004. Private benefits of control: An international comparison. *The Journal of Finance*, *59*(2): 537-600.

Dyer, J. H., & Singh, H. 1998. The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of management review*, 23(4): 660-679.

Eisenhardt, K. M. 1985. Control: Organizational and Economic Approaches. *Management*

Science, *31*(2): 134-149.
Eisenhardt, K. M. 1989. Agency theory: An assessment and review. *Academy of Management Review*, 14(1): 57-74.
Eisenhardt, K. M., & Tabrizi, B. N. 1995. Accelerating adaptive processes: Product innovation in the global computer industry. *Administrative Science Quarterly*, 40(1): 84-110.
Engelberg, J., Gao, P., & Parsons, C. A. 2013. The Price of a CEO's Rolodex. *Review of Financial Studies*, 26(1): 79-114.
Ernst & Young, 2008. *Global Corporate Venture Capital Survey 2008-09: Benchmarking Programs and Practices*. Ernst & Young.
Ernst, H., Witt, P., & Brachtendorf, G. 2005. Corporate venture capital as a strategy for external innovation: an exploratory empirical study. *R&D Management*, *35*(3): 233-242.
Evans, C. R., & Dion, K. L. 1991. Group cohesion and performance a meta-analysis. *Small group research*, *22*(2): 175-186.
Faleye, O., Hoitash, R., & Hoitash, U. 2011. The costs of intense board monitoring. *Journal of Financial Economics*, 101(1): 160-181.
Fang, V. W., Tian, X., & Tice, S. 2014. Does stock liquidity enhance or impede firm innovation? *The Journal of Finance*, 69(5): 2085-2125.
Ferreira, D., Manso, G., & Silva, A. C. 2014. Incentives to innovate and the decision to go public or private. *Review of Financial Studies*, 27(1): 256-300.
Fich, E. M., Harford, J., & Tran, A. L. 2015. Motivated monitors: The importance of institutional investors′ portfolio weights. *Journal of Financial Economics*, 118(1): 21-48.
Finkelstein, S., & Haleblian, J. 2002. Understanding acquisition performance: The role of transfer effects. *Organization Science*, *13*(1): 36-47.
Finkelstein, S., Hambrick, D. C., & Cannella, A. A. 2009. *Strategic leadership: Theory and research on executives, top management teams, and boards*. Oxford University Press, USA.
Froot, K. A., Scharfstein, D. S., & Stein, J. C. 1992. Herd on the street: Informational inefficiencies in a market with short-term speculation. *The Journal of Finance*, *47*(4): 1461-1484.
Fulghieri, P., & Sevilir, M. 2009. Organization and financing of innovation, and the choice between corporate and independent venture capital. *Journal of Financial and Quantitative Analysis*, *44*(06): 1291-1321.
Gaba, V., & Bhattacharya, S. 2012. Aspirations, innovation, and corporate venture capital: A behavioral perspective. *Strategic Entrepreneurship Journal*, *6*(2): 178-199.
Gaba, V., & Dokko, G. 2016. Learning to let go: Social influence, learning, and the abandonment of corporate venture capital practices. *Strategic Management Journal,* 37:1558-1577.
Gaba, V., & Joseph, J. 2013. Corporate structure and performance feedback: Aspirations and adaptation in M-form firms. *Organization Science*, 24(4): 1102-1119.
Gaba, V., & Meyer, A. D. 2008. Crossing the organizational species barrier: How venture capital practices infiltrated the information technology sector. *Academy of Management Journal*, *51*(5): 976-998.
Galloway, T. L., Miller, D. R., Sahaym, A., & Arthurs, J. D. 2017. Exploring the innovation strategies of young firms: Corporate venture capital and venture capital impact on alliance innovation strategy. *Journal of Business Research*, *71*: 55-65.
Galunic, D. C., & Eisenhardt, K. M. 1996. The evolution of intracorporate domains: Divisional charter losses in high-technology, multidivisional corporations. *Organization Science*, *7*(3): 255-282.

Garcia, R., Calantone, R., & Levine, R. 2003. The role of knowledge in resource allocation to exploration versus exploitation in technologically oriented organizations. *Decision Sciences*, 34(2): 323-349.

Garcia, R. 2002. *Infusion effects of innovations on the technologically oriented new product development process*. Doctoral dissertation, Michigan State University.

Gavetti, G., Greve, H.R., Levinthal, D.A. & Ocasio, W. 2012. The behavioral theory of the firm: Assessment and prospects. *The Academy of Management Annals*, 6: 1-40.

Gersick, C. J. 1994. Pacing strategic change: The case of a new venture. *Academy of Management Journal*, *37*(1): 9-45.

Gibson, C. B., & Birkinshaw, J. 2004. The antecedents, consequences, and mediating role of organizational ambidexterity. *Academy of Management Journal*, 47(2): 209-226.

Gilsing, V., & Nooteboom, B. 2006. Exploration and exploitation in innovation systems: The case of pharmaceutical biotechnology. *Research Policy*, 35(1): 1-23.

Ginsberg, A., Hasan, I., & Tucci, C. L. 2011. Unpacking the effects of corporate venture capital investor ties on the reduction of price discounting among IPO firms. *Entrepreneurship Research Journal*, 1(2).

Global Corporate Venturing. 2015. *Global Corporate Venturing Annual Survey 2015.*

Global Corporate Venturing. 2016. *Global Corporate Venturing Annual Survey 2016.*

Gompers, P. A. 2002. Corporations and the financing of innovation: the corporate venturing experience. *Economic Review-Federal Reserve Bank of Atlanta*, *87*(4): 1.

Gompers, P. A. 1996. Grandstanding in the venture capital industry. *Journal of Financial Economics*, 42: 133–156.

Gompers, P., & Lerner, J. 2000. The determinants of corporate venture capital success: Organizational structure, incentives, and complementarities. In *Concentrated corporate ownership* (pp. 17-54). University of Chicago Press.

Goodstein, J., Gautam, K., & Boeker, W. 1994. The effects of board size and diversity on strategic change. *Strategic Management Journal*, *15*(3): 241-250.

Goossen, M. C., Bazazzian, N., & Phelps, C. 2012. *Consistently Capricious: Simultaneous and Sequential Exploration and Exploitation.* Academy of Management Annual Meeting.

Graves, S. B., & Waddock, S. A. 1990. Institutional ownership and control: Implications for long-term corporate strategy. *The Executive*, 4(1): 75-83.

Greene, W. H. 2003. *Econometric analysis*. Pearson Education.

Greve, H. R. & Zhang, C.M. 2016. *Myopic reactions to performance feedback: Different decision makers, different decisions*. Working paper.

Greve, H. R. 1998. Performance, aspirations, and risky organizational change. *Administrative Science Quarterly*, 43(1): 58-86.

Greve, H. R. 2003a. A behavioral theory of R&D expenditures and innovations: Evidence from shipbuilding. *Academy of Management Journal*, 46(6): 685-702.

Greve, H. R. 2003b. *Organizational learning from performance feedback: A behavioral perspective on innovation and change*. Cambridge: Cambridge University Press.

Greve, H. R. 2007. Exploration and exploitation in product innovation. *Industrial and Corporate Change*, 16(5): 945-975.

Gujarati, D. N. 1995. *Basic Econometrics*. Tata McGraw-Hill Education.

Gupta, A. K. 1987. SBU strategies, corporate-SBU relations, and SBU effectiveness in strategy implementation. *Academy of Management Journal*, 30(3): 477-500.

Gupta, A. K., Smith, K. G., & Shalley, C. E. 2006. The interplay between exploration and exploitation. *Academy of Management Journal*, 49(4): 693-706.

Haanaes, K. 2015. *To perfect or to explore? Strategy traps for businesses*. BCG Perspectives.

Hagedoorn, J., & Duysters, G. 2002. Learning in dynamic inter-firm networks: the efficacy of multiple contacts. *Organization Studies*, 23(4): 525-548.

Hallen, B. L., Katila, R., & Rosenberger, J. D. 2014. How do social defenses work? A resource-dependence lens on technology ventures, venture capital investors, and corporate relationships. *Academy of Management Journal*, *57*(4): 1078-1101.

Hannan, M. T., & Freeman, J. 1984. Structural inertia and organizational change. *American Sociological Review*, 49(2): 149-164.

Haunschild, P. R. 1993. Interorganizational imitation: The impact of interlocks on corporate acquisition activity. *Administrative Science Quarterly*, 564-592.

Hausman, J. A. 1978. Specification tests in econometrics. *Econometrica*, 46(6): 1251-1271.

He, Z. L., & Wong, P. K. 2004. Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis. *Organization science*, *15*(4): 481-494.

Hellmann, T., & Puri, M. 2000. The interaction between product market and financing strategy: The role of venture capital. *Review of Financial studies*, *13*(4): 959-984.

Henderson, J., & Leleux, B. 2005. Corporate venture capital: realizing resource combinations and transfers. In *Corporate Entrepreneurship and Venturing* (pp. 73-100). Springer US.

Hennart, J. F., & Reddy, S. 1997. The choice between mergers/acquisitions and joint ventures: The case of Japanese investors in the United States. *Strategic Management Journal*, 1-12.

Hermalin, B. E., & Weisbach, M. S. 1988. The determinants of board composition. *The RAND Journal of Economics*, 589-606.

Hill, C. W., & Snell, S. A. 1988. External control, corporate strategy, and firm performance in research-intensive industries. *Strategic Management Journal*, 9(6): 577-590.

Hill, S. A., & Birkinshaw, J. 2008. Strategy–organization configurations in corporate venture units: Impact on performance and survival. *Journal of Business Venturing*, 23(4): 423-444.

Hill, S. A., & Birkinshaw, J. 2014. Ambidexterity and survival in corporate venture units. *Journal of Management*, 40(7): 1899-1931.

Hill, S. A., Maula, M. V., Birkinshaw, J. M., & Murray, G. C. 2009. Transferability of the venture capital model to the corporate context: Implications for the performance of corporate venture units. *Strategic Entrepreneurship Journal*, 3(1): 3-27.

Hillman, A. J., & Dalziel, T. 2003. Boards of directors and firm performance: Integrating agency and resource dependence perspectives. *Academy of Management Review*, 28(3): 383-396.

Holman, M.H., Feinstein, M., & Bünger, M. 2014. The Future of Corporate Venturing: Survey Results. Lux Research.

Holmström, B. 1999. Managerial incentive problems: A dynamic perspective. *Review of Economic Studies*, 66(1): 169-182.

Hope, O. K., Thomas, W., & Vyas, D. 2011. Financial credibility, ownership, and financing constraints in private firms. *Journal of International Business Studies*, 42(7): 935–957.

Hoskisson, R. E., & Hitt, M. A. 1988. Strategic control systems and relative R&D investment in large multiproduct firms. *Strategic Management Journal*, 9(6): 605-621.

Hoskisson, R. E., Hitt, M. A., Johnson, R. A., & Grossman, W. 2002. Conflicting voices: The effects of institutional ownership heterogeneity and internal governance on corporate innovation strategies. *Academy of Management Journal*, 45(4): 697-716.

Huber, G. P. 1991. Organizational learning: The contributing processes and the literatures. *Organization science*, *2*(1): 88-115.

Ivanov, V. I., & Xie, F. 2010. Do corporate venture capitalists add value to start-up firms? Evidence from IPOs and acquisitions of VC-backed companies. *Financial Management*, *39*(1): 129-152.

Iyer, D. N., & Miller, K. D. 2008. Performance feedback, slack, and the timing of acquisitions. *Academy of Management Journal*, 51(4): 808-822.

Jansen, J. J., Tempelaar, M. P., Van den Bosch, F. A., & Volberda, H. W. 2009. Structural differentiation and ambidexterity: The mediating role of integration mechanisms. *Organization Science*, *20*(4): 797-811.

Jensen, M. C., & Meckling, W. H. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4): 305-360.

Jensen, M. C. 1986. Agency Costs Of Free Cash Flow, Corporate Finance, and Takeovers. *American Economic Review*, 76(2): 323-329.

Jensen, M. C. 1993. The modern industrial revolution, exit, and the failure of internal control systems. *the Journal of Finance*, *48*(3): 831-880.

Jeon, E.J., Dussauge, P., & Phelps, C. 2017 (forthcoming). *Performance Feedback, Shareholder Influence and the Direction of Organizational Change: Evidence From Corporate Venture Capital Investing*. Academy of Management Annual Meeting, Atlanta.

Johnson, J. L., Daily, C. M., & Ellstrand, A. E. 1996. Boards of directors: A review and research agenda. *Journal of Management*, *22*(3): 409-438.

Johnson, R. A., Hoskisson, R. E., & Hitt, M. A. 1993. Board of director involvement in restructuring: The effects of board versus managerial controls and characteristics. *Strategic Management Journal*, 14(S1): 33-50.

Judge, W. Q., & Zeithaml, C. P. 1992. Institutional and strategic choice perspectives on board involvement in the strategic decision process. *Academy of Management Journal*, *35*(4): 766-794.

Junni, P., Sarala, R. M., Taras, V., & Tarba, S. Y. 2013. Organizational ambidexterity and performance: A meta-analysis. *The Academy of Management Perspectives*, 27(4): 299-312.

Kacperczyk, A., Beckman, C. M., & Moliterno, T. P. 2015. Disentangling risk and change: Internal and external social comparison in the mutual fund industry. *Administrative Science Quarterly*, 60(2): 228-262.

Kahneman, D., & Tversky, A. 1979. Prospect theory: An analysis of decision under risk. *Econometrica*, 263-291.

Kale, P., Dyer, J. H., & Singh, H. 2002. Alliance capability, stock market response, and long-term alliance success: the role of the alliance function. *Strategic Management Journal*, 23(8): 747-767.

Kammerlander, N., Burger, D., Fust, A., & Fueglistaller, U. 2015. Exploration and exploitation in established small and medium-sized enterprises: The effect of CEOs' regulatory focus. *Journal of Business Venturing*, 30(4), 582–602.

Kann, A. 2000. *Strategic venture capital investing by corporations: A framework for structuring and valuing corporate venture capital programs*. Unpublished Doctoral Dissertation. Stanford university.

Kanter, R. 1985. Supporting innovation and venture development in established companies. *Journal of Business Venturing*, *1*(1): 47-60.

Karim, S., & Mitchell, W. 2000. Path-dependent and path-breaking change: Reconfiguring business resources following acquisitions in the US medical sector, 1978-1995. *Strategic Management Journal*, 1061-1081.

Kasznik, R., & McNichols, M. F. 2002. Does meeting earnings expectations matter? Evidence from analyst forecast revisions and share prices. *Journal of Accounting Research*, 40(3): 727-759.

Katila, R., Rosenberger, J. D., & Eisenhardt, K. M. 2008. Swimming with sharks: Technology ventures, defense mechanisms and corporate relationships. *Administrative Science Quarterly*, *53*(2): 295-332.

Keil, T. 2000. *External Corporate Venturing: Cognition, speed, and capability development*. Unpublished Doctoral Dissertation. Helsinki University of Technology.

Keil, T. 2004. Building external corporate venturing capability. *Journal of Management Studies*, *41*(5): 799-825.

Keil, T., Autio, E., & George, G. 2008. Corporate venture capital, disembodied experimentation and capability development. *Journal of Management Studies*, *45*(8): 1475-1505.

Keil, T., Maula, M. V., & Wilson, C. 2010. Unique resources of corporate venture capitalists as a key to entry into rigid venture capital syndication networks. *Entrepreneurship Theory and Practice*, *34*(1): 83-103.

Kelly, M. J., Schaan, J. L., & Joncas, H. 2000. Collaboration Between Technology Entrepreneurs and Large Corporations: Key Design and Management Issue. *Journal of Small Business Strategy*, 11(2): 60-76.

Kidwell, R. E., & Bennett, N. 1993. Employee propensity to withhold effort: A conceptual model to intersect three avenues of research. *Academy of Management Review*, *18*(3): 429-456.

Kim, C. 2014. Smart Investors or Myopic Traders? Governance Role of Institutional Investors at a M&A Wave. *Academy of Management Proceedings*, 2014(1).

Kim, H., Kim, H., & Lee, P. M. 2008. Ownership structure and the relationship between financial slack and R&D investments: Evidence from Korean firms. *Organization Science*, 19(3): 404-418.

Kim, K., Gopal, A., & Hoberg, G. 2016. Does Product Market Competition Drive CVC Investment? Evidence from the US IT Industry. *Information Systems Research*, *27*(2): 259-281.

Kim, Y., Kim, Y., & Lee, J. D. (2011). Corporate Venture Capital and Its Contribution to Intermediate Goods Firms in South Korea. *Asian Economic Journal*, *25*(3), 309-329.

King, D. R., Dalton, D. R., Daily, C. M., & Covin, J. G. 2004. Meta-analyses of post-acquisition performance: Indications of unidentified moderators. *Strategic Management Journal*, 25(2): 187-200.

Klarner, P., & Raisch, S. 2013. Move to the beat—Rhythms of change and firm performance. *Academy of Management Journal*, *56*(1): 160-184.

Klein, A., & Zur, E. 2009. Entrepreneurial shareholder activism: Hedge funds and other private investors. *The Journal of Finance*, *64*(1): 187-229.

Kochhar, R., & David, P. 1996. Institutional investors and firm innovation: A test of competing hypotheses. *Strategic Management Journal*, 17(1): 73-84.

Koh, P. S. 2007. Institutional investor type, earnings management and benchmark beaters. *Journal of Accounting and Public Policy*, 26(3): 267-299.

Kotter, J.P. 1995. Leading Change: Why Transformation Efforts Fail. *Harvard Business Review*, 85(1):59-67.

KPMG. 2017. *Venture Pulse: Q4'16 Global analysis of venture funding*.

Krishnan, C. N. V., Ivanov, V. I., Masulis, R. W., & Singh, A. K. 2011. Venture capital reputation, post-IPO performance, and corporate governance. *Journal of Financial and Quantitative Analysis*, 46(05): 1295-1333.

Kuusela, P., Keil, T., & Maula, M. 2016. Driven by aspirations, but in what direction? Performance shortfalls, slack resources and resource-consuming vs. resource-freeing organizational change. *Strategic Management Journal*.

Laamanen, T. 1999. Option nature of company acquisitions motivated by competence acquisition. *Small Business Economics*, 12(2): 149-168.

Lavie, D., Stettner, U., & Tushman, M. L. 2010. Exploration and exploitation within and across organizations. *Academy of Management annals*, 4(1): 109-155.

Lee, J., Lee, J., & Lee, H. 2003. Exploration and exploitation in the presence of network externalities. *Management Science*, 49(4): 553-570.

Lee, S. M., Kim, T., & Jang, S. H. 2015. Inter-organizational knowledge transfer through corporate venture capital investment. *Management Decision*, 53(7): 1601-1618.

Lee, S. U., & Kang, J. 2015. Technological diversification through corporate venture capital investments: creating various options to strengthen dynamic capabilities. *Industry and Innovation*, 22(5): 349-374.

Leibenstein, H. 1976. Beyond Economic Man. Cambridge, MA: Harvard University Press

Lennox, C. S., & Pittman, J. A. 2011. Voluntary audits versus mandatory audits. *The Accounting Review*, *86*(5): 1655-1678.

Leonard-Barton, D. 1995. *Wellsprings of knowledge: Building and sustaining the sources of innovation*.Boston, MA: Harvard Business School Press.

Levinthal, D. A., & March, J. G. 1993. The myopia of learning. *Strategic Management Journal*, *14*(S2): 95-112.

Levinthal, D., & March, J. G. 1981. A model of adaptive organizational search. *Journal of Economic Behavior & Organization*, 2(4): 307-333.

Levitt, B., & March, J. G. 1988. Organizational learning. *Annual review of sociology*, *14*(1): 319-338.

Lin, S. J., & Lee, J. R. 2011. Configuring a corporate venturing portfolio to create growth value: Within-portfolio diversity and strategic linkage. *Journal of Business Venturing*, *26*(4): 489-503.

Linck, J. S., Netter, J. M., & Yang, T. 2008. The determinants of board structure. *Journal of Financial Economics*, *87*(2): 308-328.

Lindenberg, E. B., & Ross, S. A. 1981. Tobin's q ratio and industrial organization. *Journal of Business*, 1-32.

Lipton, M., & Lorsch, J. W. 1992. A modest proposal for improved corporate governance. *The business lawyer*, 59-77.

LiPuma, J.A. 2007. *Corporate venture capital and the international intensity of portfolio companies*. SBA Office of Advocacy.

Lorsch, J. W., & Maclver, E. 1989. *Pawns and potentates: The reality of America's corporate boards.* Boston: Harvard University Press.

Luger, J. 2014. *A longitudinal perspective on organizational ambidexterity*. Unpublished Doctoral dissertation. University of St. Gallen.

Ma, S. 2016. *The Lifecycle of Corporate Venture Capital*. Working Paper.

Macmillan, I., Roberts, E., Livada, V., & Wang, A. 2008. *Corporate venture capital (CVC): Seeking innovation and strategic growth*. National Institute of Standards and Technology, US Department of Commerce.

Madsen, P. M., & Desai, V. 2010. Failing to learn? The effects of failure and success on organizational learning in the global orbital launch vehicle industry. *Academy of Management Journal*, *53*(3): 451-476.

Manso, G. 2011. Motivating innovation. *The Journal of Finance*, *66*(5): 1823-1860.

March, J. G. 1991. Exploration and exploitation in organizational learning. *Organization Science*, 2(1): 71-87.

March, J. G. 2003. Understanding organisational adaptation. *Society and Economy*, *25*(1): 1-10.

Masulis, R. W., & Nahata, R. 2009. Financial contracting with strategic investors: Evidence from corporate venture capital backed IPOs. *Journal of Financial Intermediation*, *18*(4): 599-631.

Masulis, R. W., & Nahata, R. 2011. Venture capital conflicts of interest: Evidence from acquisitions of venture-backed firms. *Journal of Financial and Quantitative Analysis*, *46*(02): 395-430.

Maula, M. V. 2001. *Corporate venture capital and the value-added for technology-based new firms*. Helsinki University of Technology.

Maula, M. V. 2007. 15 Corporate venture capital as a strategic tool for corporations. *Handbook of research on venture capital*, *1*, 371.

Maula, M. V., Autio, E., & Murray, G. C. 2009. Corporate venture capital and the balance of risks and rewards for portfolio companies. *Journal of Business Venturing*, *24*(3): 274-286.

Maula, M. V., Keil, T., & Zahra, S. A. 2013. Top management's attention to discontinuous technological change: Corporate venture capital as an alert mechanism. *Organization Science*, *24*(3): 926-947.

Maula, M., & Murray, G. 2000. Corporate venture capital and the exercise of the options to acquire. *R&D Management*.

Maula, M., Keil, T., & Salmenkaita, J. P. 2006. Open innovation in systemic innovation contexts. *Open innovation: researching a new paradigm*, 241-257.

McCahery, J. A., Sautner, Z., & Starks, L. T. 2016. Behind the scenes: The corporate governance preferences of institutional investors. *Journal of Finance*.

Meyer, B. 2016. *UPS invests in same-day delivery startup*. American Shipper: Feb, 26, 2016.

Miller, D., & Chen, M. J. 1994. Sources and consequences of competitive inertia: A study of the US airline industry. *Administrative Science Quarterly*, 39(1): 1-23.

Miller, D., & Shamsie, J. 2001. Learning across the life cycle: Experimentation and performance among the Hollywood studio heads. *Strategic Management Journal*, *22*(8): 725-745.

Mitchell, W., Dussauge, P., & Garrette, B. 2002. Alliances with competitors: how to combine and protect key resources? *Creativity and Innovation Management*, 11(3): 203-223.

Mom, T. J., Van Den Bosch, F. A., & Volberda, H. W. 2009. Understanding variation in managers' ambidexterity: Investigating direct and interaction effects of formal structural and personal coordination mechanisms. *Organization Science*, 20(4): 812-828.

Monks, R.A.G. & Minow, N. 2008. *Corporate governance, 4th edition*. John Wiley & Sons.

Mudambi, R., & Swift, T. 2014. Knowing when to leap: Transitioning between exploitative and explorative R&D. *Strategic Management Journal*, *35*(1): 126-145.

Munari, F., & Toschi, L. 2015. Do patents affect VC financing? Empirical evidence from the nanotechnology sector. *International Entrepreneurship and Management Journal*, *11*(3): 623-644.

Narayanan, V. K., Yang, Y., & Zahra, S. A. 2009. Corporate venturing and value creation: A review and proposed framework. *Research Policy*, 38(1): 58-76.

Nelson, R. R., & Winter, S. G. 1982. The Schumpeterian tradeoff revisited. *The American Economic Review*, 72(1): 114-132

Nickerson, J. A., & Zenger, T. R. 2002. Being efficiently fickle: A dynamic theory of organizational choice. *Organization Science*, 13(5): 547-566.

Noyes, E., Brush, C., Hatten, K., & Smith-Doerr, L. 2014. Firm network position and corporate venture capital investment. *Journal of small business management*, *52*(4): 713-731.

O'Reilly, C. A., & Tushman, M. L. 2013. Organizational ambidexterity: Past, present, and future. *Academy of Management Perspectives*, 27(4): 324-338.

Pahnke, E. C., Katila, R., & Eisenhardt, K. M. 2015. Who takes you to the dance? How partners' institutional logics influence innovation in young firms. *Administrative Science Quarterly*, 60(4): 596-633.

Palmer, D. A., Jennings, P. D., & Zhou, X. 1993. Late adoption of the multidivisional form by large US corporations: Institutional, political, and economic accounts. *Administrative Science Quarterly*, 100-131.

Papke, L. E., & Wooldridge, J. M. 2008. Panel data methods for fractional response variables with an application to test pass rates. *Journal of Econometrics*, 145(1): 121-133.

Park, H. D., & Steensma, H. K. 2012. When does corporate venture capital add value for new ventures?. *Strategic Management Journal*, 33(1): 1-22.

Park, H. D., & Steensma, H. K. 2013. The selection and nurturing effects of corporate investors on new venture innovativeness. *Strategic Entrepreneurship Journal*, 7(4): 311-330.

Penrose, E. T. 1959. *The Theory of the Growth of the Firm*. New York: Sharpe.

Pfeffer, J., & Salancik, G. R. 1978. *The External Control of Organizations: A Resource Dependence Perspective.* Standford University Press.

Phelps, C. 2010. A longitudinal study of the influence of alliance network structure and composition on firm exploratory innovation. *Academy of Management Journal*, 53(4): 890-913.

Phelps, C., Heidl, R., & Wadhwa, A. 2012. Knowledge, networks, and knowledge networks: A review and research agenda. *Journal of Management*, 38(4): 1115-1166.

Philippidis, A. 2014. *Top 17 Corporate Venture Funds.* Genetic Engineering and Biotechnology News: July 30, 2014.

Piao, M. 2010. Thriving in the new: Implication of exploration on organizational longevity. *Journal of Management*, 36(6): 1529-1554.

Porter, M.E. 1992. Capital choices: Changing the way America invests in industry. Journal *of Applied Corporate Finance*, 5(2): 4-16.

Prager, R.A. 1992.The effects of horizontal mergers on competition: The case of the Northern Securities Company. *Rand Journal of Economics*, 23: 123-133.

Raisch, S., & Birkinshaw, J. 2008. Organizational ambidexterity: Antecedents, outcomes, and moderators. *Journal of Management*, 34(3): 375-409.

Ramalingegowda, S. M. 2006. *Do Institutional Investors who hold Large Stakes over Long Horizons have Private Information about Future Performance?* Unpublished Doctoral Dissertation. Pennsylvania State University.

Riyanto, Y. E., & Schwienbacher, A. 2006. The strategic use of corporate venture financing for securing demand. *Journal of Banking & Finance*, *30*(10): 2809-2833.

Romanelli, E., & Tushman, M. L. 1994. Organizational transformation as punctuated equilibrium: An empirical test. *Academy of Management Journal*, *37*(5): 1141-1166.

Rosenkopf, L., & Nerkar, A. 2001. Beyond local search: boundary-spanning, exploration, and impact in the optical disk industry. *Strategic Management Journal*, *22*(4): 287-306.

Sahaym, A., Cho, S. Y., Kim, S. K., & Mousa, F. T. 2016. Mixed blessings: How top management team heterogeneity and governance structure influence the use of corporate venture capital by post-IPO firms. *Journal of Business Research*, *69*(3): 1208-1218.

Sahaym, A., Steensma, H. K., & Barden, J. Q. 2010. The influence of R&D investment on the use of corporate venture capital: An industry-level analysis. *Journal of Business Venturing*, *25*(4): 376-388.

Salancik, G. R., & Pfeffer, J. 1978. A social information processing approach to job attitudes and task design. *Administrative science quarterly*, 224-253.

Sasson, A., & Minoja, M. 2010. Banking on ambidexterity: a longitudinal study of ambidexterity, volatility and performance. In (Eds.), P. Mazzola, & F.W. Kellermanns. *Handbook of Research on Strategy Process*: 240-263. MA: Edward Elgar Publishing.

Schildt, H. A., Maula, M. V., & Keil, T. 2005. Explorative and exploitative learning from external corporate ventures. *Entrepreneurship Theory and Practice*, 29(4): 493-515.

Schmidt, C. 2008. What Neuroeconomics Does Really Mean? *Revue D'économie Politique*, 118(1): 7-34.

Schmidt, C. 2013. Contributions récentes des neurosciences à l'analyse des risques financiers. IAE lyon Seminar.

Schnatterly, K., Shaw, K. W., & Jennings, W.W. 2008. Information advantages of large institutional owners. *Strategic Management Journal*, 29(2): 219-227.

Schneider, S. L. 1992. Framing and conflict: Aspiration level contingency, the status quo, and current theories of risky choice. *Journal of Experimental Psychology*: Learning, Memory, and Cognition, 18: 1040-1057.

Schneper, W. D., & Guillén, M. F. 2004. Stakeholder rights and corporate governance: A cross-national study of hostile takeovers. *Administrative Science Quarterly*, 49(2): 263-295.

Shimizu, K. 2007. Prospect theory, behavioral theory, and the threat-rigidity thesis: combinative effects on organizational decisions to divest formerly acquired units. *Academy of Management Journal,* 50(6): 1495–1516.

Shinkle, G.A. 2012. Organizational aspirations, reference points and goals. *Journal of Management*, 38: 415-455.

Siegel, R., Siegel, E., & MacMillan, I. C. 1988. Corporate venture capitalists: Autonomy, obstacles, and performance. *Journal of Business Venturing*, *3*(3): 233-247.

Simon, H. A. 1982. *Models of Bounded Rationality: Empirically Grounded Economic Reason*. MIT press.

Simsek, Z. 2007. CEO tenure and organizational performance: An intervening model. *Strategic Management Journal*, *28*(6): 653-662.

Simsek, Z., Heavey, C., Veiga, J. F., & Souder, D. 2009. A typology for aligning organizational ambidexterity's conceptualizations, antecedents, and outcomes. *Journal of Management Studies*, *46*(5): 864-894.

Singh, J. V. 1986. Performance, slack, and risk taking in organizational decision making. *Academy of management Journal*, 29(3): 562-585.

Sirén, C. A., Kohtamäki, M., & Kuckertz, A. 2012. Exploration and exploitation strategies, profit performance, and the mediating role of strategic learning: Escaping the exploitation trap. *Strategic Entrepreneurship Journal*, *6*(1): 18-41.

Sitkin, S. B. 1992. Learning through failure: the strategy of small losses. *Research in Organizational Behavior*, 14: 231-266.

Smith, S. W., & Shah, S. K. 2013. Do innovative users generate more useful insights? An analysis of corporate venture capital investments in the medical device industry. *Strategic Entrepreneurship Journal*, *7*(2): 151-167.

Sørensen, J. B., & Stuart, T. E. (2000). Aging, obsolescence, and organizational innovation. *Administrative Science Quarterly*, *45*(1), 81-112.

Souitaris, V., & Zerbinati, S. 2014. How do corporate venture capitalists do deals? An exploration of corporate investment practices. *Strategic Entrepreneurship Journal*, *8*(4): 321-348.

Souitaris, V., Zerbinati, S., & Liu, G. 2012. Which iron cage? Endo-and exoisomorphism in corporate venture capital programs. *Academy of Management Journal*, *55*(2): 477-505.

Stettner, U., & Lavie, D. 2014. Ambidexterity under scrutiny: Exploration and exploitation via internal organization, alliances, and acquisitions. *Strategic Management Journal*, 35(13): 1903-1929.

Stinchcombe, A. L., & March, J. G. 1965. Social structure and organizations. *Handbook of organizations*, 142-193.

Stuart, T. E. 2000. Interorganizational alliances and the performance of firms: A study of growth and innovation rates in a high-technology industry. *Strategic management journal*, 791-811.

Swift, T. 2015. The perilous leap between exploration and exploitation. *Strategic Management Journal*, 37(8): 1688-1698.

Sykes, H. B. 1990. Corporate venture capital: Strategies for success. *Journal of Business Venturing*, *5*(1): 37-47.

Teppo, T., & Wustenhagen, R. 2009. Why corporate venture capital funds fail–evidence from the European energy industry. *World Review of Entrepreneurship, Management and Sustainable Development*, *5*(4): 353-375.

Tetlock, P.E. & Boettger, R. 1994. Accountability amplifies the status quo effect when change creates victims. *Journal of Behavioral Decision Making*, 7: 1-23.

Thelander, J. 2016. Thelander-CVI² 2015 CVC Bonus & Compensation Report.

Thornhill, S., & Amit, R. 2003. Learning about failure: Bankruptcy, firm age, and the resource-based view. *Organization science*, *14*(5): 497-509.

Tian, X., & Wang, T. Y. 2014. Tolerance for failure and corporate innovation. *Review of Financial Studies*, 27(1): 211-255.

Titus Jr, V., House, J. M., & Covin, J. G. 2014. The influence of exploration on external corporate venturing activity. *Journal of Management*, 0149206314562426.

Titus, V. K., & Anderson, B. S. 2016. Firm Structure and Environment as Contingencies to the Corporate Venture Capital–Parent Firm Value Relationship. *Entrepreneurship Theory and Practice*.

Tong, T. W., & Li, Y. 2011. Real options and investment mode: Evidence from corporate venture capital and acquisition. *Organization Science*, *22*(3): 659-674.

Tsai, W., & Ghoshal, S. 1998. Social capital and value creation: The role of intrafirm networks. *Academy of management Journal*, *41*(4): 464-476.

Tuggle, C. S., Sirmon, D. G., Reutzel, C. R., & Bierman, L. 2010. Commanding board of director attention: investigating how organizational performance and CEO duality affect board members' attention to monitoring. *Strategic Management Journal*, 31(9): 946-968.

Tushman, M. L., & O'Reilly, C. A. 1996. The ambidextrous organizations: Managing evolutionary and revolutionary change. *California Management Review*, 38(4): 8-30.

Tushman, M., & Romanelli, E. 1985. *Organizational evolution: Interaction between external and emergent processes and strategic choice*. In Cummings, L.L., & Staw, B.M. (eds.), Research in Organizational Behavior, 7: 171–222. Greenwich, CT: JAI Press.

Uotila, J., Maula, M., Keil, T., & Zahra, S. A. 2009. Exploration, exploitation, and financial performance: analysis of S&P 500 corporations. *Strategic Management Journal*, *30*(2): 221-231.

Van de Vrande, V., & Vanhaverbeke, W. 2013. How prior corporate venture capital investments shape technological alliances: A real options approach. *Entrepreneurship Theory and Practice*, *37*(5): 1019-1043.

Van de Vrande, V., Vanhaverbeke, W., & Duysters, G. 2011a. Additivity and complementarity in external technology sourcing: The added value of corporate venture capital investments. *IEEE Transactions on Engineering Management*, *58*(3): 483-496.

Van de Vrande, V., Vanhaverbeke, W., & Duysters, G. 2011b. Technology in-sourcing and the creation of pioneering technologies. *Journal of Product Innovation Management*, *28*(6): 974-987.

Van de Vrande, V., Vanhaverbeke, W., & Duyster, G. 2009. External technology sourcing: The effect of uncertainty on governance mode choice. *Journal of business venturing,* 24(1): 62-80.

Vanhaverbeke, W., Beerkens, B., Gilsing, V., & Duysters, G. 2006. *Explorative and Exploitative Learning Strategies in Technology-Based Alliance Networks.* Academy of Management Proceedings, 2006(1): 11-16.

Venkatraman, N., Lee, C. H., & Iyer, B. 2007. *Strategic ambidexterity and sales growth: A longitudinal test in the software sector.* Working Paper (earlier version presented at the Academy of Management Meetings, 2005).

Vermeulen, F., & Barkema, H. 2001. Learning through acquisitions. *Academy of Management journal*, *44*(3), 457-476.

Voss, G. B., Sirdeshmukh, D., & Voss, Z. G. 2008. The effects of slack resources and environmental threat on product exploration and exploitation. *Academy of Management Journal*, *51*(1): 147-164.

Wadhwa, A., & Basu, S. 2013. Exploration and resource commitments in unequal partnerships: An examination of corporate venture capital investments. *Journal of Product Innovation Management*, 30(5): 916-936.

Wadhwa, A., & Kotha, S. 2006. Knowledge creation through external venturing: Evidence from the telecommunications equipment manufacturing industry. *Academy of Management Journal*, 49(4): 819-835.

Wadhwa, A., & Phelps, C. 2011. *Take a chance on me: An examination of the interdependence of start-up tie formation across venture capital and alliance networks*. DRUID.

Wadhwa, A., Phelps, C., & Kotha, S. 2016. Corporate venture capital portfolios and firm innovation. *Journal of Business Venturing*, 31(1): 95-112.

Wang, X. A., & Wan, W. P. 2013. Explaining the Variance in Underpricing among Venture Capital-Backed IPOs: A Comparison Between Private and Corporate VC Firms. *Strategic Entrepreneurship Journal*, 7(4): 331-342.

Weber, B., & Weber, C. 2007. Corporate venture capital as a means of radical innovation: Relational fit, social capital, and knowledge transfer. *Journal of Engineering and technology management*, 24(1): 11-35.

Weber, C., & Weber, B. 2011. Exploring the antecedents of social liabilities in CVC triads—A dynamic social network perspective. *Journal of Business Venturing*, *26*(2): 255-272.

Weber, C., Bauke, B., & Raibulet, V. 2016. An Empirical Test of the Relational View in the Context of Corporate Venture Capital. *Strategic Entrepreneurship Journal*, *10*(3): 274-299.

Weick, K. E., & Quinn, R. E. 1999. Organizational change and development. *Annual Review of Psychology*, 50(1): 361-386.

Weisbach, M. S. 1988. Outside directors and CEO turnover. *Journal of financial Economics*, 20: 431-460.

Wernerfelt, B., & Montgomery, C. A. 1988. Tobin's q and the importance of focus in firm performance. *The American Economic Review*, 246-250.

Wiersema, M. F., & Zhang, Y. 2011. CEO dismissal: The role of investment analysts. *Strategic Management Journal*, *32*(11): 1161-1182.

Yang, Y., Narayanan, V. K., & De Carolis, D. M. 2014. The relationship between portfolio diversification and firm value: The evidence from corporate venture capital activity. *Strategic Management Journal*, *35*(13): 1993-2011.

Yang, Y., Narayanan, V. K., & Zahra, S. 2009. Developing the selection and valuation capabilities through learning: The case of corporate venture capital. *Journal of Business Venturing*, *24*(3): 261-273.

Zahra, S.A. 1996. Governance, ownership, and corporate entrepreneurship : The moderating impact of industry technological opportunities. *Academy of Management Journal*, 39(6): 1713-1735.

Zhang, Y., & Gimeno, J. 2016. Earnings Pressure and Long-Term Corporate Governance: Can Long-Term-Oriented Investors and Managers Reduce the Quarterly Earnings Obsession? *Organization Science*, 27(2): 354-372.

Zhou, K. Z., & Wu, F. 2010. Technological capability, strategic flexibility, and product innovation. *Strategic Management Journal*, *31*(5): 547-561.

APPENDIX

APPENDIX A. BUSHEE CLASSIFICATION

Classification of Dedicated and Transient Ownership used in Essays 2 and 3

Bushee (1998) used factor and cluster analysis to classify institutional shareholders into three types: dedicated, transient, and quasi-indexer. Classification of institutional shareholders is based on nine variables that represent their past investment behaviors. Nine of these variables are summarized into three factors: portfolio diversification, portfolio turnover, and trading sensitivity. First, there are four variables that measure the diversification level of the institutional shareholder's portfolio: concentration, average holding, large block holding, and Herfindahl concentration. Concentration is measured by the average percentage of the institutional shareholder's total equity holdings in its portfolio firms. Average percentage holding is measured by the average percentage of the institutional shareholder's equity share in its portfolio firms. Large block percentage holding is measured by the percentage of the institutional shareholder's equity share for the portfolio firms held with greater than 5 percent ownership. Herfindahl measure of concentration is measured by the sum of the squared percentage of ownership share in each firm of the portfolio.

Secondly, there are two variables that measure the degree of institutional shareholder's portfolio turnover: portfolio turnover and portfolio stability. Portfolio turnover is measured by the average absolute change in the institution's quarterly equity share divided by the change in total equity held. Relative stability of the institution's holdings in its portfolio firms is measured by the percentage of the institution's total equity that is continuously held for the past two years.

Thirdly, there are three variables that measure institutional shareholder's trading sensitivity with regards to current earnings: earnings sensitivity 1, 2, and 3. Earnings sensitivity 1 is the ratio of change in the institution's equity share in a given portfolio firm in each quarter over the portfolio firm's change in quarterly earnings. Earnings sensitivity 2 is measured by the difference between the average change in the earnings of the portfolio firms in which the institution increased and decreased its share. Earnings sensitivity 3 is the difference between the institution's change in its equity share of portfolio firms with positive earnings change and portfolio firms with negative earnings change.

K-means cluster analysis on the previous three factors – portfolio diversification, portfolio turnover, and trading sensitivity – results in three classifications of institutional shareholders based on Porter's (1992) descriptions. *Transient institutional shareholders* have highly diversified portfolios, high portfolio turnover, and high trading sensitivity. *Dedicated institutional shareholders* have highly concentrated portfolios, low turnover, and near zero trading sensitivity. Lastly, *quasi-indexers* have diversified portfolios, moderate turnover, and low trading sensitivity. We drop the quasi-indexers from our discussion of the theory and analysis as they are less homogeneous and do not actively participate in influencing the managerial decision-making (Bushee, 1998; Connelly et al., 2010).

APPENDIX B. SAMPLE FIRMS

Table 16. Sample Firms for Essays 2 and 3

Firm No.	Parent Firm	CVC Program	Observation Period
1	Agilent Technologies	Agilent Ventures	2000-2008
2	Apple Computer	Apple Computer Strategic Investment Group	1995-2010
3	ABB	ABB Technology Ventures	2010-2013
4	Abbott Laboratories	Abbott Biotech Ventures	1996-2012
5	Adobe Systems		1995-2013
6	ADC Telecommunications		1996-2001
7	Analog Devices Enterprises	Analog Devices Enterprises	1998-2004
8	Advanced Digital Information Corp		2000
9	Steel Excel		2000-2007
10	Advanced Fibre Communications		1999-2001
11	Affymetrix Inc		1999-2008
12	Ameritech Development Corp		1993-1999
13	Alcatel-Lucent USA	Alcatel Ventures, Alcatel-Lucent Ventures, Lucent Venture Partners I/II/III	2000-2011
14	Altera Corporation		1997-2001
15	Applied Materials	Applied Ventures LLC	2000-2013
16	AMD	AMD Ventures LLC	2012-2013
17	Amgen	Amgen Ventures	2003-2013
18	Amazon.com		1998-2012
19	Angiotech Pharmaceuticals Inc	Angiotech Drug Device Venture and Capital Enterprises	2005-2007
20	AOL	AOL Ventures Fund	2002-2013
21	Air Products and Chemicals Inc		2000-2009
22	Alexandria Real Estate Equities		2002-2013
23	Adp Inc		1998
24	American Express Ltd	American Express Company Investment Fund	1996-2013
25	Boeing Co & Consolidated Subsidiaries	Boeing Ventures	2003-2008
26	Baxter International Inc	Baxter Ventures	1993-2013
27	Best Buy Co	Best Buy Capital LP	2008-2013
28	Bell Canada Enterprises (BCE) Inc	BCE Capital	2004-2012
29	Becton, Dickinson & Co	BD Ventures	1997-2008
30	BEA Systems Inc		2000-2005
31	Smithkline Beecham Corp		1999
32	Franklin Resources Inc		2000
33	Biogen Idec Inc	Biogen Idec New Ventures Inc	2005-2013
34	Bellsouth Corp	Bell South Ventures Corp.	2000-2001

Firm No.	Parent Firm	CVC Program	Observation Period
35	BMC Software Inc		2002
36	Bristol-Myers Squibb Co		1994-2009
37	BP PLC		2000
38	Brocade Communications Systems Inc		2005-2013
39	Boston Scientific Corp		1995-2013
40	British Telecom		1999
41	BroadVision Inc		1999-2000
42	Caterpillar Inc	Caterpillar Venture Capital Inc	2000-2013
43	CBS Worldwide Inc		1999
44	Capital Cities	Capital Cities Capital Inc	1993-1995
45	Avis Budget Group Inc		1999-2000
46	Comdisco	Comdisco Ventures	2000
47	Cadence Design Systems Inc		1995-2009
48	Cell Genesys Inc		2004-2007
49	Celgene Corp		2007-2013
50	Collagen Corp		1994-1998
51	Chevron	Chevron Technology Ventures, CTTV Investments Fund I/II/III/IV, CTTV Investments Power & Energy I	1999-2013
52	Cinergy Corp	Cinergy Ventures LLC	1997-2005
53	CIT Group Inc	CIT Group Venture Capital	2002-2012
54	Mack-Cali Realty Corp		2013
55	Comerica Capital	Comerica Venture Capital Group	1997-2009
56	CMGI	@Ventures	1999-2010
57	Comverse Technology Inc	Comverse Investments, Ltd.	1997-2004
58	ZDNet Group		2000
59	Concur Technologies Inc	Concur Perfect Trip Fund	2013
60	Centocor Corp		1994-1998
61	Lakestar Semi Inc		1999-2003
62	3COM	3COM Ventures	1996-2003
63	ConocoPhillips	ConocoPhillips Technology Ventures	2012-2013
64	Cox Enterprises Inc		2003
65	Critical Path Inc		2000
66	Compuware Corp	Compuware Ventures LLC	2011-2012
67	Cirrus Logic Inc		2006-2008
68	Cisco Systems Inc	Cisco Investments	1994-2013
69	Citrix Systems Inc	Citrix Startup Accelerator	2009-2013
70	Cablevision Systems Corp		2000-2001
71	Cenovus Energy Inc	Cenovus Environmental Opportunity Fund	2011-2013

Firm No.	Parent Firm	CVC Program	Observation Period
72	Cypress Semiconductor Corp		1999-2008
73	Frontier Communications Inc	Frontier Internet Ventures	1999
74	E.I. duPont de Nemours & Co	DuPont Ventures	1999-2013
75	Dell Inc	Dell Ventures LP	1999-2011
76	Walt Disney Co	Steamboat Ventures, LLC	1995-2013
77	Dun & Bradstreet Corp		2000
78	RR Donnelley & Sons Co		1994-2013
79	Dow Chemical Co	Dow Venture Capital	1998-2012
80	Duquesne Light Holdings Inc		1998-2000
81	Deutsche Telekom	T-Venture Holding GmbH, T-Mobile Venture Fund	
82	DTE Energy Co	DTE Energy Ventures Inc	2004-2009
83	Dura Pharmaceuticals Inc		1999
84	eBay Inc		1999-2013
85	Central Newspapers Inc	CNI Ventures Inc	1999-2000
86	Electronics For Imaging Inc	Electronics For Imaging Fund I (AKA: EFI Fund I)	2008
87	EG&G	EG&G Venture Partners	1993-1994
88	Eastman Kodak Co		1997-2010
89	Elan Corporation Ltd		1997-2004
90	Eastman Chemical Company	Eastman Ventures	1999-2006
91	Enron Corp	Enron Broadband Ventures, Enron Principal Investments, Enron Investment Parners	2000-2001
92	Electro Scientific Industries Inc		2006-2013
93	Entercom Communications Corp		2002
94	Enterasys Networks (FKA: Cabletron Systems, Inc.)		2005
95	Edwards Lifesciences Corp		2001-2010
96	Exelon Corp	Exelon Capital Partners	2001-2011
97	Anderson Enterprises	Spring Creek Partners	1998
98	Exodus Communication		2001
99	Ford Motor Co		1998-2006
100	First Commerce Corporation	First Commerce Capital Inc	1997-1998
101	First Data Corp		1999-2007
102	FedEx Corp		1999-2000
103	Flextronics International Ltd	Flextronics International Direct Investment Fund	2000-2008
104	H.B. Fuller	H.B. Fuller Ventures	2006-2008
105	Global Crossing Ltd	Global Crossing Ventures Inc	1999-2001
106	Tegna Inc		1996-2013
107	Guidant Corporation		1997-2005

Firm No.	Parent Firm	CVC Program	Observation Period
108	General Electric Co	GE Capital, General Electric Venture Capital Corp (Gevenco), GE Investments Private Placement Partners, GE Healthymagination Fund, GE Equity	1994-2013
109	Gibson Greetings Inc		1997-1999
110	General Instrument Corp		1995-1999
111	General Mills Inc		1999-2008
112	Corning Inc		2004
113	S.R. One Limited		1996-2013
114	General Motors Corporation	General Motors Ventures LLC, GM Capital Partners	1994-2013
115	Google	Google Ventures	2007-2013
116	Goldman Sachs	Goldman Sachs Capital LP	2004-2012
117	GTE Corp		1998
118	W.W. Grainger Inc	Grainger Technology Partners LLC	2000
119	Quantum Corp	Quantum Technology Ventures	1996-1999
120	Hartford Financial Services Group Inc		2004-2007
121	Highwoods Properties Inc		2013
122	Honda Motor Corp	Honda Strategic Venturing	2004-2006
123	HNC Software Inc		1999-2000
124	Move Inc		2000
125	Hewlett-Packard Co		1993-2001
126	HealthSouth Corp		2001-2002
127	Harris Corp		1994-2005
128	Houghton Mifflin Harcourt Publishing Co		1998-2000
129	Humana Inc.	Humana Ventures	1996-2011
130	International Business Machines Corp		2000-2011
131	Actua Corp		2005-2010
132	ICOS Corp		2006
133	Insignia Financial Group Inc		1999
134	iXL Enterprise	iXL Ventures	2000
135	Incyte Pharmaceuticals		2001-2009
136	Infosys Ltd	Infosys Technologies Ltd - Direct Investment Fund	2000-2002
137	Inktomi Corp		2000
138	Blucora Inc		2000-2001
139	Intel Corp	Intel Capital Corp, Intel 64 Fund, Intel Communications Fund, Intel Capital China Technology Fund, Intel Capital India Technology Fund, Intel Capital Middle East and Turkey Fund	1995-2013
140	MecklerMedia Corp	internet.com Venture Fund	2000-2001
141	Intuit Inc		1998-2013

Firm No.	Parent Firm	CVC Program	Observation Period
142	Interpublic Group of Companies Inc		2006
143	i2 Technologies Inc	i2 Ventures	1999-2000
144	Invacare Corp		1997
145	Johnson & Johnson	Johnson & Johnson Innovation-JJDC Inc	1993-2013
146	Juniper Networks Inc		2000-2013
147	Nordstrom Inc		2000-2013
148	Mondelez International Inc		2007
149	Korea Telecom	KT Venture Group LLC	2001-2011
150	Kimberly-Clark Corp	Kimberly-Clark Ventures LLC	2001-2009
151	Knight Ridder Inc		1995-2006
152	Keyspan Corp		1999-2000
153	Lycos	Terra Lycos Ventures, L.P. (FKA: Lycos Ventures)	1999
154	Eli Lilly & Co		1995-2012
155	LSI Logic Corporation	LSI Logic Venture Fund	1996-2010
156	Loews Corp		2000
157	MasterCard Inc		2012
158	Macromedia Inc	Macromedia Ventures	2000-2001
159	McKesson Corp	McKesson Technology Investments	1995-2007
160	Medtronic Inc		1994-2013
161	AstraZeneca Group	MedImmune Ventures LLC	1997-2006
162	MercadoLibre Inc	MercadoLibre Commerce Fund	2013
163	Mcgraw-Hill	Mcgraw-Hill Ventures Inc	1996-2011
164	Mirant Corp	Mirant Capital Management LLC	2002
165	3M Corporation	3M New Ventures	2002-2013
166	Altria Group	Altria Ventures Inc	2012
167	Molex Inc		2000-2001
168	Monsanto Co		1998-2012
169	Motorola Solutions Inc	Motorola Solutions Venture Capital	1999-2009
170	Merck & Co Inc	Merck Capital Ventures LLC	1993-2009
171	Microsoft Corp	Microsoft Ventures	1993-2013
172	ArcelorMittal SA	ArcelorMittal Clean Technology Venture Capital Fund	2008-2009
173	NCR Corp		2007-2011
174	The9 Ltd	Fund9	2011
175	Networks Associates, Inc.	New World Infrastructure Limited	1999-2000
176	Norsk Hydro ASA	Norsk Hydro Technology Venture Fund	2003-2007
177	Northrop Grumman Space & Mission Systems Corp		1996-2000
178	Nest Management Oy		2002-2011

Firm No.	Parent Firm	CVC Program	Observation Period
179	Novell Inc	Novell Ventures Inc	1993-2007
180	National Semiconductor Corp		1994-2002
181	Nortel Networks Corp		2000-2007
182	Novartis	Novartis Venture Funds, Novartis Korea Venture Fund, Novartis BioVenture Fund	2002-2013
183	News Corporation	epartners Venture Group	1999-2001
184	Nextel Communications	Nextel Ventures	2001-2003
185	Nynex Co	Nynex Technology Investments	1995-1997
186	New York Times Co		1999-2013
187	Office Depot Inc		1999-2000
188	Omnicom Group Inc		2000-2011
189	Orbotech Ltd	Orbotech Technology Venture	2001-2002
190	Oracle America Inc	Oracle Venture Fund	1999-2010
191	VeriFone		2009
192	PG&E	Pacific Venture Capital LLC	2000-2003
193	Priceline Group Inc		2000
194	Petco Animal Supplies Inc		1999
195	PetSmart Inc		1999
196	Pfizer Inc	Pfizer Venture Capital, Pfizer Venture Investments	1995-2012
197	Procter & Gamble Co		2000-2010
198	Koninklijke Philips Electronics NV	Philips Venture Capital Fund BV	1998-1999
199	Pioneer Capital Corp		1997
200	Platinum Technology International Inc		1997-1998
201	Polycom Inc		2003-2007
202	PMC-Sierra Inc		2000-2010
203	Venturebank@PNC		1999-2000
204	PNC Financial Services Group	PNC RiverArch Capital	2011-2013
205	Pro After Inc		2000
206	Peregrine Systems Inc		2000-2001
207	Portal Software Inc		2000
208	PSINet Inc	PSINet Ventures	2000
209	Providian Financial Corp		2001
210	Qualcomm Inc	Qualcomm Ventures	2000-2013
211	Quintiles Transnational Corp		2001
212	Redback Networks Inc		2000-2001
213	Rogers Communications Inc	Rogers Ventures Ltd	2006-2013
214	RCN Corp		2000
215	Reader's Digest Association Inc		1999-2000

Firm No.	Parent Firm	CVC Program	Observation Period
216	Reliant Energy Inc	Reliant Energy Ventures Inc	2000-2001
217	Red Hat Inc	Red Hat Ventures	2005-2013
218	Rambus Inc		2000
219	Rhone Poulenc		1996-1999
220	Raytheon Co	Raytheon Ventures	1993-2007
221	Raychem Corp		1993-1996
222	Sears Holdings Corp		2000
223	Science Applications International Corporation (SAIC)	SAIC Venture Capital Corporation	2008-2011
224	SAP SE	Sapphire Ventures LLC	2000-2013
225	Sapient Corp		1999-2001
226	AT&T Inc		1997-2003
227	Starbucks Corp		1999-2008
228	SCANA Corp		2000-2002
229	Seagate Technology PLC	Seagate Venture Fund	1993-2013
230	Scientific-Atlanta Inc		2000-2003
231	Safeguard Scientifics Inc		1995-2013
232	Graphics Properties Holdings Inc		1993-2002
233	Schering-Plough Corporation		1994-2007
234	Siemens AG	Siemens Venture Capital GmbH	2012-2013
235	SINA Corp		2011-2012
236	D.E Shaw Group	Shaw Ventures Ltd	2013
237	Schlumberger NV		1998-2007
238	Sylvan Learning Systems	Sylvan Ventures	1999-2001
239	Shanda Interactive Entertainment Ltd		2010
240	SanDisk Corp	SanDisk Ventures	2000-2013
241	Sony Corp		2006
242	Synopsys Inc		1998-2009
243	Sanofi S.A.	Sanofi-Genzyme BioVentures	2006-2013
244	Staples Inc		1999-2001
245	Sempra Ventures		2001-2004
246	E.W. Scripps Co	Scripps Ventures LLC	1996-2005
247	STMicroelectronics NV		2000-2008
248	Statoil Venture AS		2007-2012
249	Stanley Black & Decker Inc		2000-2008
250	Sybase Inc	Sybase Innovation Fund	2000
251	Symantec Corp		2000-2013
252	AT&T Corp	AT&T Ventures, AT&T Venture Fund II	1993-2011
253	Transamerica Corp		1997-1999

Firm No.	Parent Firm	CVC Program	Observation Period
254	Trammell Crow Co		1999-2001
255	Tele-Communications Inc		1995-1996
256	Tandem Computers Inc		1996
257	Teradyne Inc		1999-2005
258	Tenet Healthcare Corp		1999-2007
259	Tellabs Inc		2000-2008
260	Times Mirror Co		1995-1999
261	TriQuint Semiconductor Inc		2001-2007
262	Tribune Co	Tribune Ventures	1996-2001
263	TELUS	TELUS Ventures	2010-2013
264	Tvi Corp		2007
265	Time Warner Inc	Time Warner Investments	1999-2013
266	Texas Instruments, Inc.	TI Ventures	1995-2012
267	Tyco International Ltd	Tyco Ventures	2000-2004
268	Unilever	Unilever Ventures Ltd, Unilever Technology Ventures Fund BV (AKA: UTV)	2003-2007
269	United Microelectronics Co (UMC)	UMC Capital Corp	2002-2013
270	Comcast MO Group Inc		1998-1999
271	UPS	UPS Strategic Enterprise Fund	2000-2013
272	Visa Inc	Visa International Fund	2008-2012
273	VerticalNet		2000
274	Vignette Inc	Vignette Partnership LP	2000
275	Verisign Inc		2000-2002
276	Veritas Software Corp		2000-2004
277	MCI Worldcom	MCI WorldCom Fund, Worldcom Ventures	1996-2001
278	Kratos Defense and Security Solutions Inc		2000-2002
279	Weatherford International Ltd		2000-2008
280	Warner Music Group		2007
281	Graham Holdings Co		2003-2010
282	Excite@Home		1998-1999
283	Xilinx Inc		2000-2013
284	Exxon Enterprises Inc		1998
285	Xerox Corporation	Xerox Venture Capital	1993-2001
286	Yahoo! Inc		1997-2008

APPENDIX C. VARIABLES DEFINITION

Table 17. Variable Operationalization and Data Source

Variable	Operationalization	Data Source
Essay 2 Dependent Variables		
Exploration Share	Four digit SIC code relatedness between the corporate investor and the startup, weighted by the quarterly amount of CVC investment (USD)	VentureXpert, Corporate Affiliations
CVC Intensity	Ratio of quarterly firm level CVC investments (USD) to quarterly sales (USD)	VentureXpert, Compustat
Essay 2 Independent Variables		
Earnings Gap (below aspiration)	Actual EPS (earnings per share) subtracted from expected EPS when it has a positive value, otherwise 0	I/B/E/S
Dedicated Ownership	Ratio of equity shares held by dedicated shareholders to total outstanding shares of the firm	13F, Bushee Classification
Transient Ownership	Ratio of equity shares held by transient shareholders to total outstanding shares of the firm	13F, Bushee Classification
Essay 3 Dependent Variable		
Firm Performance	Tobin's Q (i.e. ratio of market value to book value)	Compustat
Essay 3 Independent Variables		
Simultaneous Ambidexterity	$\text{Exploration Share}_{t-1} \times \text{Exploitation Share}_{t-1}$ [8]	VentureXpert, Corp Affiliations
Sequential Ambidexterity	$\frac{\text{Exploration Share}_t \times \text{Exploitation Share}_{t-1} + \text{Exploitation Share}_t \times \text{Exploration Share}_{t-1}}{2}$	VentureXpert, Corp Affiliations
Change Duration	Number of quarters in which the firm continuously changed its exploration share	VentureXpert, Corp Affiliations
Change Amplitude	Total amplitude of continuously changed Exploration Share	VentureXpert, Corp Affiliations
Control Variables		
Earnings Gap (above aspiration)	Expected EPS subtracted from actual EPS when it has a positive value, otherwise 0	I/B/E/S
Technological Dynamism	Industry R&D expenditure over industry net sales	Compustat, Corp Affiliations
Firm Size	Total number of employees for each firm	Corporate Affiliations
Firm Age	Founding year subtracted from current year	Compustat

[8] Exploitation share is measured by subtracting Exploration share from value of one

Variable	Operationalization	Data Source
External CVC Structure	Dummy for CVC program that is governed by a separate, wholly-owned subsidiary	Corporate Affiliations, SEC 10-K, Factiva
Unabsorbed Slack	Ratio of quarterly current assets to quarterly current liabilities	Compustat
Absorbed Slack	Ratio of quarterly selling, general, and administration expenses to quarterly sales	Compustat
Potential Slack	Ratio of quarterly debt to quarterly equity	Compustat
R&D Intensity	Ratio of quarterly R&D expenditures to quarterly sales	Compustat
Diversification	Number of four-digit SIC codes in which the firm operates in	Corporate Affiliations
Firm Profitability	Ratio of quarterly operating income after depreciation to quarterly net sales	Compustat
Firm Growth	Growth in ratio of quarterly operating income after depreciation to quarterly net sales	Compustat
CEO Age	CEO birth year subtracted from current year	Compustat EXECUCOMP
Year Fixed Effects	Dummies for years 1993-2013	VentureXpert
Industry Fixed Effects	Dummies for two-digit level SIC codes	Compustat
Region Fixed Effects	Dummies for the United States, non-U.S. developed countries, and Emerging Economies	Dow Jones/S&P Classification

APPENDIX D. INTERVIEW RESPONDENT BACKGROUND

Table 18. Corporate Venture Capital Program Managers Respondent Background

	Position	Industry	Country
1	Senior Vice President of Corporate Development	Software Company	Canada
2	Director of CVC program	Financial Market Company	United States
3	Investment Principal of CVC program	Energy and Services Company	United Kingdom
4	Venture Capitalist of CVC program	Glass Manufacturer	Japan
5	Investment Principal of CVC program	Automobile Manufacturer	Germany
6	Vice President of Investment of CVC program	Insurance Company	United States
7	Vice President of CVC program	Insurance Company	United States
8	Investment Director of CVC program	Telecommunications Company	Switzerland
9	Chief Innovation Officer	Electric Utility Company	France
10	Managing Director of CVC program	Shipping Company	United States
11	Director of Corporate Development & Integration	IT Company	United States
12	Director of CVC program	Semiconductor Manufacturer	United States
13	Director of Corporate Development	IT Company	United States
14	Director of Corporate Development	Software Company	United States

Table 19. Institutional Shareholders Respondent Background

	Position	Industry	Country
1	Security Analyst	Investment Management Firm	United Kingdom
2	Head of Investment Policy Division	Pension Fund	South Korea
3	Head of Fund Evaluation Team	Pension Fund	South Korea

Table 20. Investor Relations Managers Respondent Background

	Position	Industry	Country
1	Vice President of IR	Hard Drive Manufacturer	United States
2	IR Manager	Chemical Company	Germany
3	IR Manager	Software Company	United States
4	IR Manager	Oil and Gas Company	France
5	IR Manager	Networking Equipment Manufacturer	United Kingdom
6	IR Manager	IT Consulting Firm	United States
7	Senior IR Manager	Manufacturing and Electronics Conglomerate	Germany
8	IR Manager	Advertising and Public Relations Company	Japan

APPENDIX E. PROPOSITIONS & HYPOTHESES

Table 21. Propositions of Essay 1

	Proposition	Note
P1	When performance relative to aspiration level decreases, likelihood of organizational change increases.	Tested as H1 in Essay 2
P2	When performance relative to internal social aspiration level increases and when performance relative to external social aspiration level decreases, the proportion of exploitation increases (and the proportion of exploration decreases).	Tested as H2 in Essay 2
P3	When performance relative to internal and external social aspiration level decreases, the proportion of exploration increases (and the proportion of exploitation decreases).	
P4	As the level of dedicated ownership increases, declining performance (below the aspiration level) results in a lower proportion of exploitation and a concomitant increase in the proportion of exploration.	Tested as H3 in Essay 2
P5	As the level of transient ownership increases, declining performance (below the aspiration level) results in a greater proportion of exploitation and a concomitant decrease in the proportion of exploration.	Tested as H4 in Essay 2
P6	As the level of the board's monitoring intensity increases, declining performance (below the aspiration level) results in a greater proportion of exploitation and a concomitant decrease in the proportion of exploration.	
P7	As the level of the board's advising intensity increases, declining performance (below the aspiration level) results in a greater proportion of exploration and a concomitant decrease in the proportion of exploitation.	

Table 22. Hypotheses of Essay 2

	Hypothesis	Result
H1	When performance relative to aspiration level decreases, CVC investment intensity will increase.	Supported
H2	When performance relative to aspiration level decreases, the proportion of exploitative CVC investments increases (and the proportion of explorative investments decreases).	Supported
H3	As the level of dedicated ownership increases, declining performance (below the aspiration level) results in a lower proportion of exploitative CVC investments and a concomitant increase in the proportion of explorative investments.	Supported
H4	As the level of transient ownership increases, declining performance (below the aspiration level) results in a greater proportion of exploitative CVC investments and a concomitant decrease in the proportion of explorative investments.	Not Supported

Table 23. Hypotheses of Essay 3

	Hypothesis	Result
H1	Simultaneous ambidexterity in CVC investing increases firm performance.	Supported
H2	Sequential ambidexterity in CVC investing increases firm performance.	Partially Supported
H3	Increased duration of the change in exploitation and exploration in CVC investing has an inverted-U relationship with firm performance.	Supported
H4	When the amplitude of the change in exploitation and exploration in CVC investing increases, firm performance decreases.	Not Supported

APPENDIX F. ARTICLES IN THE CVC LITERATURE REVIEW

Table 24. Summary of CVC Articles

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Allen & Hevert (2007)	90 U.S. IT firms during 1990-2002	Financial performance (IRR, cash flow metrics)	Timing of initiation within the VC cycle, CVC program scale, annual investment, write-down, harvest behavior	IRRs and cash flow metrics of the CVC programs are dispersed and bimodally distributed. Top 30% of the CVC programs achieved IRRs greater than +40% and the bottom 30% of the CVC programs achieved IRRs lesser than -20%. 39% of the CVC programs had IRRs that met or exceeded the parent firm's cost of capital. Low performers invested at the late stage of the VC cycle, had significant variations on annual investment activities, and did not harvest actively during the late stage of the VC cycle.	N.A.
Alvarez-Garrido & Dushnitsky (2016)	545 U.S. biotechnology startups founded between 1990 and 2003	Startup innovation outcome (i.e. patent/publication counts)	CVC vs. IVC backing, geographical proximity between corporate investor and startup, startup subject to regulatory approval	CVC-backed startups produce greater publications and patent outputs compared to IVC-backed startups. The relationship between CVC-backing and startup's innovation performance is stronger when the corporate investor is geographically proximate and regulatory demand is high (i.e. subject to FDA approval).	N.A.
Anokhin, Peck, & Wincent (2016)	153 firms during 1998-2001	Number of CVC investments	Multiple board mandates, outside director ratio, board equity ownership, institutional ownership, CEO duality, CEO tenure, risky investments	While the board with multiple mandates increases CVC investing, CEO duality and greater institutional ownership decrease CVC investing. Furthermore, risk tolerance strengthens the positive relationship between board equity ownership and level of CVC investing.	Corporate Governance Research
Anokhin, Wincent, Oghazi (2016)	163 firms during 1998-2001	Innovative opportunity pool, scale efficiency gain	Driving (technology/market fits are high), enabling (high market fit, low technology fit), emerging (high technology fit, low market fit), passive (technology/market fits are low)	When both technology fit and market fit are high or when market fit is high but technology fit is low, it leads to corporate investors obtaining greater pools of innovation opportunities and improved scale efficiency yields. When both technology fit and market fit are low or when technology fit is high but market fit is low, it leads to corporate investors obtaining lesser pools of innovative opportunities and diminished scale efficiency yields.	Chesbrough (2002)

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Baierl, Anokhin, & Grichnik (2016)	162 firms during 1998-2003	Corporate innovativeness (annual report content analysis), financial performance (annual shareholder return)	Centrality, belonging to a restricted subgroup, proximity to structural hole	While the corporate investor's greater centrality leads to increased innovation performance, corporate investors belonging to a restricted subgroup leads to lesser innovation performance. Innovation increases the corporate investor's subsequent financial performance.	Social Network Theory
Baldi, Baglieri, & Corea (2015)	Qualitative study of 26 global top biopharmaceutical firms during 2003-2013 (260 CVC deals)	Learning propensity	CVC portfolio diversification	There is a U-shaped relationship between portfolio diversification and the corporate investor's learning propensity.	Inductive study
Basu & Wadhwa (2013)	477 firms in the Fortune 500 list during 1990-2000	Discontinuous strategic renewal	CVC activity, industry technological intensity, industry competitive intensity, firm technological/marketing capabilities	CVC investing is negatively related to the firm's likelihood of pursuing discontinuous renewal, and this relationship is stronger when the firm is operating in a dynamic industry and has strong internal capabilities	Real Options Theory
Basu, Phelps, & Kotha (2011)	477 firms in the Fortune 500 list during 1990-2000	Number of CVC deals	Rapid tech change, high competition, weak appropriability regime, tech/marketing resource, experience	Firms operating in industries with high competition, rapid technological change, and weak IPP regime lead to greater CVC investing. Firms with greater technological and marketing resources and diverse CVC investing experience leads to increased number of new CVC relationships.	Resource Based View

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Basu, Phelps, & Kotha (2016)	Interviews with 17 CVC units in the U.S. during 2006-2012	External knowledge search and internal integration	Investment practices	Corporate investors who are adept at searching for external knowledge carried out investment practices such as (1) reducing the deal complexity, (2) protecting the startups' interests, which increases the corporate investors' attractiveness as potential partners to the startup and the VC community, and (3) evaluating and investing in early-stage startups, which provides windows on useful but uncertain technologies to the parent firm. Corporate investors who are skillful at integrating the startup's external knowledge to the parent firm's internal units adopted investment practices such as (1) establishing explicit collaborative blueprints between the business units and the portfolio startups, and (2) avoiding competitive posture of the CVC units with the parent firm's business units and framing the CVC unit's role as complementary	Inductive Study
Benson & Ziedonis (2009)	34 U.S. IT firms acquiring 242 technology startups during 1987-2003	Acquisition performance (CAR)	CVC intensity, CVC stability	Greater CVC investment intensity leads to increased acquisition performance (i.e. abnormal returns) at a diminishing rate, and stable CVC investing results in greater acquisition performance than sporadic CVC investing	Absorptive Capacity Literature
Benson & Ziedonis (2010)	61 top U.S. firms during 1987-2003	Acquisition performance (CAR)	Original/third-party corporate investor, dedicated CVC unit	While the overall performance of third-party corporate investors' acquiring startups is positive with the average CAR of 0.67%, the performance of original corporate investors' acquiring their portfolio startups is negative with the average CAR of -0.97%. Third-party corporate investors' performance of acquiring startups is stronger for those that have dedicated CVC units.	N.A.
Bertoni, Colombo, & Croce (2010)	379 Italian startups during 1994-2003	Startup's investment sensitivity	CVC-, IVC-backing	While CVC-backing does not change the sensitivity of the startups' level of investment relative to their current cash flow, IVC-backing makes them less sensitive to investing.	Investment cash flow sensitivity research
Bertoni, Colombo, & Grilli (2013)	531 Italian startups in multiple industries during 1994-2003	Employment/sales growth	CVC/IVC-backing	While both CVC- and IVC-backed startups show increased employment growth, IVC-backed startups show greater short-term sales growth than CVC-backed startups.	Grandstanding hypothesis (Gompers, 1996)

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Birkinshaw & Hill (2005)	Interviews with 50 European and U.S. CV unit managers, survey of 95 CV units during 2001-2004 in 8 countries	CV unit performance	CV unit's autonomy, tie with VC community, compensation system	Greater autonomy of the CV unit, closer tie with the VC community, and compensation system that rewards strategic benefits drive CV unit success.	N.A.
Bottazzi, Da Rin, & Hellmann (2008)	Survey of 119 European VCs in 17 countries during 1998-2001	Likelihood of startup exit by acquisition or IPO	CVC-, IVC-backing	Captive VCs (i.e. CVC, bank-backed VC, government-backed VC) are less active in getting involved in managerial decision-making of the startup firms than the IVCs. CVCs' lukewarm activism decreases the likelihood of the portfolio startups being acquired or going public compared to that of the IVCs.	N.A.
Ceccagnoli, Higgins, & Kang (2015)	58 U.S. pharmaceutical firms during 1985-2007	Likelihood of CVC, licensing, or acquisition after the CVC deal	Investor's scientific capability, investor-partner technological distance, investor's early-stage technology, value of partner's technology, volatility of technical subfield	Firms with weaker scientific capabilities, that access distant technologies, and possess smaller proportion of early-stage technologies prefer to choose CVC over licensing or acquisition. Resolution of exogenous uncertainty related to the startups' technologies increases the likelihood that the CVC relationship is stepped up to technology-licensing or acquisition events.	Real Options Theory
Champenois, Engel, & Heneric (2006)	378 German biotech startups during 1995-1999	CVC vs. IVC investment likelihood	Startups developing new healthcare applications and new technology platforms, young high-tech startups	Compared to IVCs, corporate investors avoid investing in risky startups characterized with above average patents and high standard deviation of employment growth.	N.A.
Chemmanur, Loutskina, & Tian (2014)	462 CVC-backed IPO firms and 1,667 IVC-backed IPO firms during 1980-2004	Innovation (number of patents, patent citations)	IVC vs. CVC-backing	CVC-backed IPO firms have greater patents and those with higher quality, although they are younger, riskier, and less profitable than IVC-backed IPO firms. CVC-backed IPO firm's greater innovation performance arises from the corporate investor's technological fit with the startups and its tolerance for failure.	N.A.
Colombo & Shafi (2016)	47,708 dyads (91 corporate investors, 658 startups) during 1994-2009 in Belgium, Finland, France, Germany, Italy, Spain, U.K. (multiple high-tech manufacturing and service industries)	CVC relationship formation	Industry overlap, IPP regime	Weak IPP regime and industry overlap increase CVC relationship formation. Strong IPP regime and a greater industry overlap increase the formation of CVC relationships, which effect is much stronger than that under weak IPP regimes. Furthermore, timing defense is ineffective, whereas social defenses (e.g. affiliation with prominent VCs) complement the legal defenses.	Replication of Dushnitsky & Shaver (2009)

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Dokko & Gaba (2012)	70 CVC units of IT firms during 1992-2008	CVC goal orientation (financial/strategic), CVC operational strategy modification	Practice-specific experience, fit-specific experience (organizational fit, technical fit)	A higher proportion of CVC managers with IVC experience leads the CVC unit to be oriented towards financial goals and modify less of its operational strategies. A higher proportion of internal hires in the CVC unit leads to decreasing the financial goal orientation and raising the strategic goal orientation. A greater proportion of CVC managers with engineering experience leads to greater strategic goal orientation.	Organizational Learning Theory
Dushnitsky & Lavie (2010)	372 U.S. software firms during 1990-1999	Number of CVC deals	Number of alliances, firm's age, resource, CVC experience	Alliance formation has an inverted U-shaped relationship with CVC activity, and this relationship is negatively moderated by the firms' internal resource stocks, age, and CVC experience.	Resource Based View
Dushnitsky & Lenox (2005a)	2,289 U.S. firms during 1969-1999	Innovation performance (future citation-weighted patenting rate)	CVC investment, absorptive capacity, IPP regime	CVC investing leads to greater future citation-weighted patenting rates, and this relationship is strengthened when the corporate investor has greater absorptive capacity or when the intellectual property protection (IPP) regime is weak.	Organizational Learning, Appropriability Regime Research
Dushnitsky & Lenox (2005b)	1,171 U.S. firms during 1990-1999 (115 firms are corporate investors)	Firm sector CVC investment	Technological opportunity, IPP regime, complementary asset importance	Industries with rich technological opportunities, weak intellectual property protection (IPP) regime (i.e. patent protection), and where complementary assets are valuable motivate greater CVC investing	Organizational Learning, Appropriability Regime Research
Dushnitsky & Lenox (2006)	171 U.S. firms during 1990-1999 (1,102 non-corporate-investors as control group)	Firm value (Tobin's Q)	CVC investment, financial/strategic aim	Corporate investors who explicitly pursue strategic purposes of harnessing novel technologies through CVC investing obtain greater firm valuations regarding Tobin's Q than those purely focusing on financial returns.	N.A.
Dushnitsky & Shapira (2010)	U.S. VC investing practices during 1990-1999 (300 corporate investors, 2,530 IVCs)	Investment stage, syndicate size, performance	CVC-backing, IVC only investments, low vs. high-powered incentives	Corporate investors prefer later stage investments and a greater number of syndication partners. When corporate investors are paid with carried interests, they invest in earlier stage startups and participate in smaller syndicates. Corporate investors paid with carried interests will show greater performance.	Agency Theory

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Dushnitsky & Shaver (2009)	1646 U.S. startups during 1990-1999 (87 corporate investors)	CVC relationship formation	IPP regime, industry overlap	A CVC relationship is likely to form when industry overlaps under strong IPP regime, whereas a CVC relationship is unlikely to form when industry overlaps under weak IPP regime.	Appropriability Regime Research
Ernst, Witt, & Brachtendorf (2005)	Interviews with 21 German CVC unit in 2001			Frequent communication facilitates resource transfer between the parent firm via CVC program and the startup.	N.A.
Fulghieri & Sevilir (2009)	N.A. (Formal Modeling Paper)			Increase in competition leads the firms to adopt external technology sourcing, particularly through CVC. Firms can increase the success rate of R&D by increasing the allocation of resources to CVC.	Patent Race Model
Gaba & Dokko (2016)	70 CVC units of IT firms during 1992-2008 in the U.S.	CVC unit abandonment	VC practice utilization, internal/practice hire, abandonment by industry/practice referents	Hiring former IVCs in the CVC unit leads to a lesser abandonment likelihood of the CVC unit, whereas greater internal hire leads to a greater abandonment likelihood. While CVC units filled with former IVCs follow exit decisions of the VCs, CVC units consisting of internal hires follow decisions of their peer corporate investors.	Diffusion Theory
Gaba & Meyer (2008)	VCs and IT firms during 1992-2001	Likelihood of adopting CVC programs	Geographical proximity to IVCs, IVCs showing good record, popularity of adopting CVC by peers corporate investors, prominence of prior adopter, corporate investor's success experience, proximity to prior adopter	IT firms are more likely to adopt CVC programs when they are geographically closer to the VC population and when VC population have good IPO records of their portfolio startups. IT firms are more likely to adopt CVC programs when the CVC programs are popularly adopted by peer firms, when CVC programs are adopted by prominent prior adopters, when they observe prior adopters' success experience, and when prior adopters are proximate.	Diffusion Theory
Gaba & Bhattacharya (2012)	204 U.S. IT firms in Forbes 500 list during 1992-2003	Adoption/ termination of CVC units	Innovation performance relative to aspiration levels	When the innovation performance is closer to the aspiration levels (i.e. expected performance), either when the performance is above or below the aspirations, firms are more likely to adopt and less likely to terminate their CVC units.	Behavioral Theory of the Firm

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Galloway, Miller, Sahaym, & Arthurs (2017)	122 adolescent firms that underwent IPO during 1997-2007 in the U.S.	Exploratory Alliance	CVC ownership, VC ownership, Founder ownership, Founder technology background	Both founder's ownership and technology-related knowledge strengthen the positive relationship between the corporate investor ownership and the likelihood of the startup firm forming an explorative alliance.	Real Options Theory, Multiple Agency Perspective
Ginsberg, Hasan, & Tucci (2011)	315 U.S. IPO firms backed by corporate investors during 1990-1999	Underpricing at IPO	Corporate investor affiliated with banks, corporate investor in the S&P 100 list, IPO market temperature	Underpricing is lower for IPO firms backed by corporate investors affiliated with commercial banks than those backed by non-banks. Underpricing is lower for IPO firms backed by corporate investors that are members of the prominent stock market index (i.e. S&P 100) than those backed by non-members, and this relationship is strengthened when the stock market is hot.	Signaling Theory
Gompers & Lerner (2000)	32,364 investments made by VCs in the U.S. during 1983-1994 (2,032 investments made by corporate investors)	Likelihood of IPO, bankruptcy, favorable acquisition	CVC-backing, strategic fit	Corporate investors are as successful as the IVCs with respect to the IPO likelihood of their portfolio startups, and this relationship is strengthened by the business overlap between the corporate investor and the startup.	N.A.
Gompers (2002)	2,032 investments made by U.S. corporate investors during 1983-1994	Portfolio startup valuation at IPO or acquisition events	CVC-backing	CVC-backed portfolio startup's valuation at the time of IPO or acquisition was at least three times of the original investment.	N.A.
Guo, Lou, & Perez-Castrillo (2015)	4,311 U.S. startups during 1980-2004	Investment amount, investment duration, exit likelihood (IPO/M&A)	IVC/CVC backing	CVC-backed startups receive longer and larger investments than IVC-backed startups. Longer investment duration leads to increased likelihood of acquisition, whereas larger investment leads to greater likelihood of IPO.	N.A.
Hallen, Katila, & Rosenberger (2014)	700 U.S. startups in five technology-intensive industries during 1979-2003	Number of corporate investors that participated in a given round of a young firm's funding	Startups with more central IVCs, startups with IVC proximity, secrecy/timing defenses	Centrally positioned IVCs are effective means of social defense and facilitate tie formation between corporate investors and startups. Such third-party social defense becomes more effective when legal or timing defenses are unavailable.	Resource Dependence Theory, Social Networks Theory

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Hill & Birkinshaw (2008)	Survey of 95 global CV units during 2001-2003	CV unit performance (financial performance, technological development, entrepreneurial capability), CV unit survival	Alignment between strategic objectives and organizational profile (e.g. relationship with senior managers and VC community, relative focus on building, developing, selecting, exiting ventures, incentive system), exploration orientation	Better alignment between strategic objectives and organizational profiles lead to better CV unit performance. Exploitation-oriented CV units survive longer than the exploration-oriented CV units.	Configuration Theory
Hill & Birkinshaw (2014)	Survey of 95 global CV units during 2001-2003	Likelihood of CV unit survival	CV unit ambidexterity, CV unit's relationship with senior executive, business unit, VC community	A higher level of ambidexterity (i.e. interaction between exploitation and exploration) leads to a greater likelihood of CV unit survival. Stronger the relationship between the CV unit and (1) senior managers, (2) other business units, and (3) VC community leads to achieving higher levels of ambidexterity.	Exploitation, Exploration, Ambidexterity
Hill, Maula, Birkinshaw, & Murray (2009)	Survey of 95 global CV units during 2001-2003	CV unit's strategic/financial performance, survival	Incentive, autonomy, syndication, staging, specialization practices	By adopting VC practices such as incentive, autonomy, syndication, staging, and specialization, CV units obtain greater strategic and financial performance and increased survival.	Financial Economics Research
Ivanov & Masulis (2011)	138 IVC- and 138 CVC-backed U.S. IPO firms during 1992-1999	IPO firm corporate governance, exit likelihood	IVC-backing, CVC-backing	Compared to IVC-backing, CVC-backing results in IPO firms to adopt a greater number of independent board of directors, an increased level of anti-takeover provisions, and smaller primary shares to preserve their voting rights. CVC-backed IPO firms survive longer and have a lower likelihood of being acquired.	N.A.
Ivanov & Xie (2010)	219 CVC-backed startups, 1,291 IVC-backed startups during 1981-2000	IPO valuation, acquisition premium	CVC-backing, IVC-backing, non-CVC-backing	CVC-backing leads to a greater valuation of the portfolio startups at the IPO than IVC-backing, and this relationship is stronger when there is a strategic fit (i.e. strategic alliance or business relationship) between the corporate investor and the startup. CVC-backing leads to a greater acquisition premium of the portfolio startup when there is a strategic fit.	N.A.

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Katila, Rosenberger, & Eisenhardt (2008)	701 U.S. startups in medical, biotechnology, communications, electronics, and software industries during 1979-2003 (4,077 funding rounds)	CVC relationship formation	Financial resource need, complementary resource need, patent defense, secrecy defense, timing defense	Startups with dire needs for complementary resources and those that use trade secrets and late-stage funding rounds are more likely to enter CVC relationships.	Resource Dependence Theory
Keil (2004)	Case studies of 2 European ICT firms during 1996-2000	External corporate venturing capability	Learning process (experiential, acquisitive learning), knowledge management (knowledge codification, knowledge exchange network)	Through acquisitive and experiential learning, firms develop external corporate venturing capabilities. While acquisitive learning occurs when firms acquire external knowledge and internalize it, experiential learning occurs inside organizations and create knowledge that is adapted to the organization. External corporate venturing capabilities consist of organizational structures, resources, processes, skills, knowledge, education and reward systems that enable the firm to utilize external ventures to develop new capabilities and reconfigure existing ones to build new businesses.	Organizational Learning, Capability Development
Keil, Autio, & George (2008)	Case studies of 5 largest global ICT firms (85 interviews with 62 senior managers and CVC program managers) during 1998-2002	Capability internalization	CVC unit's knowledge brokering role, internalization impediment	CVC unit managers facilitate the knowledge sourcing from the startup to the parent firm when the CVC managers (1) are deeply embedded in the social networks of the parent firm and the startup, (2) have prior backgrounds as entrepreneurs, VCs, acquisition managers, which can complement CVC investing with technical business experience, and (3) have external network endorsements. When the CVC unit is positioned too close to either the parent firm (and thus the business units) or the VC community it can hamper the process of knowledge sourcing. CVC unit's structural misalignment with its strategic mandate can be hindering the process of knowledge sourcing. Conflicting goals between the parent firm's business units and CVC units can inhibit the process of knowledge sourcing.	Capability Development, Organizational Learning
Keil, Maula, & Wilson (2010)	358 U.S. firms during 1996-2005	Centrality in VC syndication network	Corporate investor's prior centrality, corporate investor's resource endowment	Prior corporate investor's network centrality influences its future centrality and the corporate investor's resource endowments influence its future centrality. Corporate investor's prior centrality and resource endowments substitute each other with respect to leading to future central positions.	Social Networks Theory, Relational View

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Keil, Maula, Schildt, & Zahra (2008)	110 largest U.S. firms in ICT industries during 1993-2000	Innovation performance (number of patent applications)	Number of CVC, alliance, JV, acquisition, relatedness between the parent firm and startup	Relatedness between the corporate investor and the startup have an inverted-U shape moderation effect on the relationship between CVC investing and innovation performance.	Organizational Learning
Kim, Gopal, & Hoberg (2016)	145 U.S. IT firms during 1997-2007	Amount of CVC, patent output	Competition level, technology leader, CVC investment	Increased level of product market competition increases the level of CVC spending and this is a result of firms shifting their resources from internal R&D to CVC investing. The relationship between competition and CVC investing is strengthened for technology leaders with deep patent stocks. Increased CVC investing leads to greater patent applications for the technology leaders with deep patent stocks but not for the technology followers.	Escape competition hypothesis (Aghion et al. 2005), exploration/ exploitation, flexibility/ commitment
Kim, Kim, & Lee (2011)	934 VC-backed startups during 1999-2001 in South Korea	Startup firm performance (employment growth, sales growth, ROA, R&D intensity)	CVC stand alone, CVC syndication	No syndication effect of the corporate investors on startup performance. Stand alone CVC-backing increases the startup firms' employment growth, sales growth, ROA, and R&D intensity.	N.A.
Lee & Kang (2015)	U.S. firms during 1990-2010	Corporate investor's technological diversity	Amount of CVC investment, portfolio diversity, absorptive capacity	A greater level of CVC investing has an inverted U-shaped relationship with the corporate investor's technological diversification. Greater portfolio diversity of the corporate investor has an inverted-U shaped relationship with technological diversification, and this relationship is strengthened by the corporate investor's absorptive capacity.	Dynamic Capabilities, Ambidexterity Theory, Real Options Theory
Lee, Kim, & Jang (2015)	29 U.S. ICT firms industry during 1995-2005 (178 firm-year observation)	Knowledge transfer from startup to corporate investor	Number of CVC investment, tie strength between corporate investor and startup, corporate investor's knowledge diversity	The level of CVC investing has an inverted U-shaped relationship with the level of knowledge transferred from the startup to the corporate investor (i.e. number of the startup's patents cited by the corporate investor), and this relationship is strengthened by the corporate investor's knowledge diversity.	Search, social relations, absorptive capacity

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Lin & Lee (2011)	111 Taiwanese firms in IT and electronics industries during 2000-2003 (779 startups)	Future growth opportunity (Tobin's Q, growth option value)	CVC portfolio growth potential, portfolio uncertainty, within-portfolio diversity, corporate investor-startup linkage	Increasing the portfolio diversity and the product relatedness between the corporate investor and the startup leads to greater future growth opportunity (i.e. Tobin's Q and growth option value) for the corporate investor	Real Options Theory
LiPuma (2007)	268 U.S. startups during 1997-2003	International intensity	CVC-backing, corporate investor with international investing experience	Greater CVC-backing leads to increased proportion of the startup's revenue being generated from foreign markets.	Resource Based View
Masulis & Nahata (2009)	177 CVC-backed IPO firms in the U.S. during 1996-2001	Board seat allocation, insider board power	Strategic corporate investor, lead corporate investor	When there is a greater overlap of product classification between the corporate investor and the portfolio startup, the startup limits the number of board seats that corporate investors can take and increases the insiders' board representation. Startups limit the board representation by lead corporate investors that invest in the early stages.	N.A.
Masulis & Nahata (2011)	60 CVC-backed startups, 185 IVC-backed startups during 1991-2006	Acquisition performance	CVC-backing, strategic fit between corporate investor and startup	CVC investing leads to greater cumulative abnormal return (CAR) than that of IVC, and this relationship arises from corporate investor's pursuit of strategic benefit.	Agency Theory
Maula & Murray (2000)	206 startup acquisitions made by corporate investors during 1990-1999	Acquisition of startups previously in CVC relationship	Original corporate investor, third-party investor	Among the 206 startup acquisitions during 1990-1999, only 12 acquisitions (i.e. 5.8%) were conducted by the original corporate investor, whereas 194 events (i.e. 94.2%) were made by third-party firms.	Real Options Theory, Agency Theory
Maula, Autio, & Murray (2009)	Surveys of 91 U.S. startups during 2000-2001	Realized risk, realized learning benefit	Complementarities, safeguards, social interaction	Adopting safeguards (i.e. limiting the corporate investor's ownership stake, restricting the number of board seats that can be taken by the corporate investors, and accepting corporate investors only in the later stages of the startup's development) are effective means of decreasing the risks arising from the CVC relationship, including those from misappropriation, lower autonomy, and slower decision-making.	Organizational Learning, Agency Theory
Maula, Keil, & Zahra (2013)	Largest U.S. corporate investors in the ICT industry during 1989-2000	Timing of the senior executive's formal attention to major discontinuities	Homophilous interorganizational ties (i.e. number of alliances or JVs with peer firms), heterophilous ties (i.e. number of co-investment ties with IVCs), IVC status	Corporate investor's syndication with VCs, in particular, those with high-statuses, enable the managers to attend to technological discontinuities earlier.	Attention Based View

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Munari & Toschi (2015)	332 VC-backed companies in the nanotechnology sector during 1985–2006	CVC financing amount	Number of core technology patent held by startup	Increased number of core technology patents held by startups attracts greater CVC investing.	N.A.
Noyes, Brush, Hatten, & Smith-Doerr (2014)	679 U.S. firms in S&P 500 during 1996-2006	CVC investment likelihood (total number of years for CVC investment during 1996-2006)	Direct/second-degree/third-degree network ties with firms making CVC investment, network centrality	Firms that have direct ties with CVC practicing firms and greater network centrality are likely to sustain their CVC practices.	Social Networks Theory, Resource Dependence Theory, Embeddedness Perspective
Pahnke, Katila, & Eisenhardt (2015)	198 U.S. medical device firms that develop products for minimally invasive surgery (MIS) during 1986-2007	Technical/commercial innovation (counts of patented technologies and product approval)	IVC/CVC/GVC (government venture capital) backing	CVC-backing decreases the portfolio startups' technical innovation (i.e. counts of patented technologies), and this negative effect is stronger when there is industry overlap between the corporate investor and the startup.	Institutional logics literature
Park & Steensma (2012)	508 U.S. startups in the computer, semiconductor, and wireless industries during 1990-2003	IPO/bankruptcy of the startup	CVC funding, specialized complementary asset, environmental uncertainty	CVC-backing increases the likelihood of the startups going public when the startups require specialized complementary assets than generic complementary assets. They also found that CVC-backing decreases the likelihood of the startups going bankrupt when the startups require specialized complementary assets than generic complementary assets and when startups are operating in an uncertain environment than a stable environment.	Transaction Cost Economics
Park & Steensma (2013)	508 U.S. startups operating in computer hardware, semiconductor, and wireless service industries during 1990-2003	Pre-funding innovative capability, post-funding innovation rate (number of patent applications)	CVC funding, corporate investor reputation	Corporate investors are more likely to select start-up firms with a greater number of patent applications compared to the IVCs. CVC-backed startups generate a greater number of patents during the post-funding period compared to IVC-backed startups, and this relationship is strengthened when the corporate investors have stronger reputations.	Multiple Agency Perspective
Riyanto & Schwienbacher (2006)	Formal Modeling			CVC investing allows the corporate investor to influence the degree of complementarity between the products of the corporate investor and that of the startups. Such complementarity allows the corporate investor to steal demand from its competitors that have substitute products.	N.A.

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Sahaym, Cho, Kim, & Mousa (2016)	172 IPO firms in multiple industries during 2001-2005	Number of CVC investments	TMT functional heterogeneity, TMT ownership, CEO non-duality	TMT with various functional backgrounds has an inverted U-shaped relationship with the number of CVC deals that the IPO firms entered when the firm has non-duality and TMT ownership.	Behavioral Agency Theory, Upper Echelon Theory
Sahaym, Steensma, & Barden (2010)	400 U.S. manufacturing industry during 1997-1999	Industry-level CVC deals	Industry-level R&D intensity, technological change, environmental munificence	Greater levels of industry R&D investments increase the number of industry-level CVC deals, and this relationship is enhanced when the technology is rapidly evolving and the industry is rapidly growing.	Absorptive Capacity, Real Options Theory
Schildt, Maula, & Keil (2005)	110 largest U.S. ICT firms during 1992-2000	Explorative learning	Governance modes for external corporate venturing (i.e. CVC, alliance, JV, acquisition), industry relatedness, vertical relatedness, technological relatedness	Lower integrated modes (e.g. CVC, alliance, joint venture) lead to greater explorative learning (i.e. generating patents that do not cite their own prior patents) than higher integrated modes (e.g. acquisition). Greater overlap between the patent portfolios of the parent firm and the startup leads to lower exploration.	Organizational Learning
Smith & Shah (2013)	4 main corporate investors in the medical device industries during 1978-2007 (i.e. Boston Scientific, Medtronic, Guidant, and Johnson & Johnson) (128 corporate investor-startup dyads)	Knowledge incorporated into new products/technologies	Physician-founded startup	Corporate investors' relationships with the portfolio startups that are founded by practicing physicians lead to a greater number of startups' patents being cited by the corporate investor's patents and products.	User Innovation Research
Souitaris & Zerbinati (2014)	Interviews with 23 CVC executives of 13 CVC programs during 2002, 2011-2012	Investment logic (integrated vs. arms-length)	Investment practices	When the CVC unit follows the norms of the parent firm (i.e. endo-isomorphism), it leads to following the integrated investment logic, which is characterized by greater involvement of the business units and senior executives in the CVC decision-making process. When the CVC unit follows the norms of the VC community (i.e. exo-isomorphism), it leads to following the arms-length investment logic, which implies that the business units and the senior executives are much less involved in the CVC decision-making process.	Inductive study

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Souitaris, Zerbinati, & Liu (2012)	Interviews with 12 CVC executives from 6 global CVC programs in 2002	Adoption of mechanistic/organic structure	endo- vs. exo-isomorphism, legitimacy seeking from the parent firm vs. VC community, CVC manager background (corporate/private equity)	While endo-isomorphism leads the CVC unit to adopt a mechanistic structure, exo-isomorphism leads it to adopt an organic structure. When the CVC unit seeks legitimacy with the parent firm, it pursues endo-isomorphism, and when the CVC unit seeks legitimacy with the entrepreneurs or other IVCs, it pursues exo-isomorphism. When the CVC unit managers have corporate backgrounds, they pursue endo-isomorphism, whereas when they have private equity backgrounds, they pursue exo-isomorphism.	Inductive study leading to Institutional Theory
Sykes (1986)	37 CV investments by Exxon	CV success	market and technical risk, managerial experience, procedural factors (control, selection of CV managers, incentive compensation, financing), structural factors (technology, market, organization, people)	Intrinsic factors such as risk and experience are more important in explaining CV success. CV manager's prior experience in the target market area and general managerial experience showed strong correlation with financial success. Market and technical risk showed a negative correlation with financial success.	N.A.
Sykes (1990)	Interviews and surveys of 31 corporate investors	Strategic objective achievement	Business relationship, conflicting interests, communication type, direct vs. indirect CVC investment	Mutually supportive relationship (e.g. business relationship) between the corporate investor and startup leads to success. Conflicting interests such as startup acquisition can lead to failure of the CVC relationship. Direct and frequent contact between the corporate investor and startup enhances strategic value. Direct and indirect investing can be complementary to the corporate investor - direct investment can provide an opportunity to develop business relationships with the startups, whereas indirect investment gives access to deal flow.	N.A.
Teppo & Wustenhagen (2009)	27 in-depth interviews with U.S. and European CVC/IVC program managers during 2003-2005	CVC fund survival	Organizational culture, risk and decision-making, managing and measuring success	An organizational culture that does not view innovation as a key component for competitive advantage, that supports industry stability and neglects the speed of technological change, and that lacks entrepreneurial spirit negatively influences the survival of CVC funds. Corporate investors without any appropriate evaluation system of financial and strategic benefits result in a lower likelihood of CVC fund survival.	Inductive study

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Titus & Anderson (2016)	95 U.S. firms during 2000-2008 in ICT, chemicals, and medical and laboratory equipment industries	Parent firm value	CVC investment, operational concentration, environmental munificence	Greater operational concentration - the extent that the firm is concentrated with regards to reporting structure of the business segments - leads to drawing more attention of the senior managers and better aligning CVC investing decisions with the corporate strategic initiatives, which leads to greater performance.	Attention Based View, Contingency Theory
Titus, House, & Covin (2014)	607 U.S. firms in the ICT, chemicals, medical and laboratory equipment industries during 1996-2008	Relative usage of acquisitions over CVCs and JVs in the portfolio of equity-based external CV investments	Degree of exploration, industry R&D intensity	Firms that pursue a greater degree of exploration engage in more acquisitions and fewer CVCs and JVs. The relationship between exploration and relative usage of acquisition over JV and CVC is negatively moderated by technological dynamism (i.e. industries with greater R&D intensity).	Organizational Learning
Tong & Li (2011)	99 firms in multiple industries during 2003-2005 (546 CVC deals, 2229 acquisition deals)	Choice between CVC and acquisition	Market uncertainty, investment irreversibility, growth opportunity, competition	When an investment is surrounded by high levels of market uncertainty, corporate investors attach greater value to the real options embedded in CVC investments opposed to those in acquisitions. Preference of choosing CVC over acquisition in face of higher uncertainty will be strengthened with greater irreversibility of the investment and weakened with greater growth opportunities of the investment.	Real Options Theory
Van de Vrande & Vanhaverbeke (2013)	78 top global pharmaceutical firms during 1985-2000	Likelihood of alliance formation from CVC relationship	Prior CVC, partner uncertainty, technological uncertainty, market uncertainty	Greater levels of prior CVC investments, the technological proximity between the corporate investor and the startup, and the maturity of the startup increase the likelihood of forming subsequent alliances from CVC relationships. The resolution of partner uncertainty decreases the likelihood of subsequent alliance formation.	Real Options Theory
Van de Vrande, Vanhaverbeke, & Duysters, (2009)	153 largest pharmaceutical firms during 1990-2000	Choice among non-equity alliance, CVC, minority holding, JV, acquisition	Environmental turbulence, technological newness, technological distance, prior cooperation	Greater technological distance between the corporate investor and the startup facilitates CVC investing over non-equity alliance, joint ventures, or acquisitions. Under greater environmental turbulence, non-equity alliance is the most preferred mode, whereas CVC is preferred over joint ventures. Technological newness of the startup increases the likelihood that the established firm will employ CVC over alternative technology sourcing modes.	Real Options Theory, Transaction Cost Economics

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Van de Vrande, Vanhaverbeke, & Duysters (2011a)	200 largest pharmaceutical and biotech firms during 1990-1997 (4,302 technology sourcing deals)	Corporate investor's innovation performance (weighted patent count)	Numbers of CVC, non-equity alliance, alliance, M&A deals	CVC investing is complementary with strategic alliance and acquisition with respect to raising the corporate investor's innovation performance (i.e. weighted patent count).	N.A.
Van de Vrande, Vanhaverbeke, & Duysters (2011b)	153 largest pharmaceutical firms during 1990-2000	Number of pioneering technologies	CVC investing, strategic alliance, acquisition, technological distance, technology newness	Greater number of CVC investing leads to increased number of pioneering technologies, and this relationship is weakened when the corporate investor invests in newer technologies.	Technology sourcing literature
Wadhwa & Kotha (2006)	36 U.S. telecommunication equipment manufacturing (TEM) firms during 1989-1999	Knowledge creation rate (number of patent applications)	Number of CVC investment, corporate investor's involvement with startup, technological knowledge diversity	The number of CVC investment has an inverted U-shaped relationship with the number of patent applications, and this relationship is reversed and becomes a U-shaped relationship when the corporate investor is actively involved with the startup by establishing strategic alliance relationships and taking board seats.	Search, Exploration Research
Wadhwa & Phelps (2011)	302 dyads between large global telecommunication equipment manufacturers and startups during 1989-1999 (34 firms, 273 startups)	Likelihood and rate of CVC relationships leading to subsequent alliances	Resolution of uncertainty arising from the startups, startups' technologies, and risk of competitors' preemptive exercise, corporate investor's technological resource	Resolution of various types of uncertainties increases the likelihood and rate of alliance formation. The corporate investor's technological resources strengthen the positive relationship between the risk of competitors' preemptive exercise and alliance formation.	Real Options Theory
Wadhwa & Basu (2013)	43 corporate investors operating in telecommunications, semiconductor, and computer industries during 1996-2000 (248 distinct corporate investor-startup dyads)	Amount of CVC investing	Degree of exploration, CVC experience diversity, startup's affiliation to prominent VCs	The degree of exploration pursued by corporate investors has an inverted U-shaped relationship with the amount of CVC investing. The main relationship between exploration and CVC investing is positively moderated by the corporate investor's prominence. CVC experience diversity decreases the amount of CVC investing.	Real Options Theory, Inter-organizational Learning Theory
Wadhwa, Phelps, & Kotha (2010)	40 large telecommunications equipment manufacturers	Exploratory knowledge creation	Portfolio consisting of startups with moderately diverse, mature, and have codified technological knowledge	Corporate investors investing in portfolio startups with moderately diverse, mature, and codified technological knowledge leads to greater explorative knowledge creation.	Recombinatory Search, Organizational Learning

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Wadhwa, Phelps, & Kotha (2016)	40 largest global telecommunication manufacturers during 1989-2000 in 11 countries	Innovation performance (forward citation-weighted patent counts)	Portfolio diversity, portfolio depth, portfolio partners	Portfolio diversity has an inverted U-shaped relationship with the corporate investor's innovation performance (i.e. forward citation-weighted patent counts), and this relationship is strengthened when the portfolio startups' stocks of patented technologies and number of alliance partners increase	Recombinatory Search Literature
Wang & Wang (2013)	200 U.S. CVC- and IVC-backed IPO firms during 2000-2007	Underpricing at IPO	IVC ownership, CVC ownership	While IVC ownership is related to positive underpricing of the IPO firms, CVC ownership is related to negative underpricing.	Signaling Theory
Weber & Weber (2005)	20 corporate investors in Germany	CVC goal attainment	Corporate investor's strategic, financial goals	Corporate investors focusing primarily on either strategic or financial goals show greater goal attainment compared to those aiming for a mixture of strategic and financial goals.	Organizational Learning
Weber & weber (2007)	Interviews with 32 CVC managers and startup CEOs in Germany	Knowledge transfer and creation, Startup performance	Relational fit between corporate investor and startup	Greater relational fit (i.e. knowledge sharing routines, willingness to cooperate, emotional fit, trust) enhances knowledge transfer and creation, which ultimately increases the startup's sales, sales growth, return, and growth in market share.	Social Capital Theory, Knowledge Based View
Weber & Weber (2011)	Qualitative study of 12 CVC triads (i.e. CVC unit, corporate business unit, and portfolio startups) in 2002 in Germany	Knowledge transfer and creation within the CVC triad	Social capital, social liability	Social capital initially facilitates knowledge transfer and creation. Structural and personal lock-ins may eventually turn such social capital into social liability.	Social Networks Theory

Author	Sample	Dependent Variable	Independent Variable	Finding	Theoretical Background
Weber, Bauke, & Raibulet (2016)	Survey of 47 corporate investor-startup dyad and interviews with 28 investment managers of 23 CVC units in Austria, Germany, Switzerland during 2010-2012	Relational rent	Relation-specific asset, knowledge-sharing routine, informal self-enforcing governance mechanism, complementary resources and capabilities	Greater relation-specific assets, knowledge-sharing routines, and complementary resources and capabilities generate greater relational rent. Relation-specific asset and knowledge-sharing routines mediate the relationship between complementary resources/capabilities and relational rent.	Dyer and Singh's (1998) Relational View
Yang, Chen, & Zhang (2016)	152 U.S. firms during 1990-2004	Portfolio diversification	structural autonomy of the CVC program	greater autonomy leads to greater CVC portfolio diversification.	Attention Based View
Yang, Narayanan, & Zahra (2009)	2110 CVC deals made by 166 U.S. corporate investors and 1,626 portfolio startups during 1990-2001	Selection capability, valuation capability	Experience intensity, experience diversity, acquisitive experience, project uncertainty	Intense, diverse, and syndicated CVC investing experience leads the corporate investors to select portfolio startups with greater strategic potential (i.e. IPO likelihood, patent counts), and this relationship will be stronger when project uncertainty is lower. Diverse experience enhances the corporate investor's valuation capability (i.e. post-money valuation), and this relationship will be stronger when project uncertainty is lower.	Organizational Learning
Yang, Narayanan, & De Carolis (2014)	189 U.S. firms during 1990-2004 (1,233 firm-year observation)	Corporate investor's value (Tobin's Q)	CVC portfolio diversification, financial constraint	They found that the diversification of the corporate investor's portfolio of startups has a U-shaped relationship with the firm's value creation (i.e. Tobin's Q), and this relationship is stronger under greater financial constraints.	Real Options Theory, Diversification Research

Titre : Antécédents et Conséquences des Activités d'Exploration et d'Exploitation : Une Analyse Empirique dans le domaine du *Corporate Venture Capital*

Mots clés : d'Exploration, d'Exploitation, la théorie comportementale de l'entreprise, la structure du capital et l'actionnariat, l'ambidextrie organisationnelle, Corporate Venture Capital

Résumé : Cette thèse étudie la façon dont l'atteinte ou non des objectifs et la gouvernance influencent la direction du changement organisationnel – en termes d'exploration et d'exploitation - et analyse l'impact de ces effets sur la performance de l'entreprise au fil du temps. Dans un premier temps, je procède à une analyse détaillée de la littérature sur le *Corporate Venture Capital* afin de positionner mon propre travail de recherche dans le champs considéré et confirmer l'originalité de mes contributions. Ensuite, dans la première étude, j'examine comment la non-atteinte des objectifs fixés influe sur la direction du changement organisationnel mis en œuvre dans l'entreprise, et étudie la façon dont ces changements sont influencés par la place qu'occupent les actionnaires stables ou passagers dans le capital de l'entreprise. Dans la seconde étude, je vérifie empiriquement la validité des propositions formulées en examinant les investissements de *corporate venture capital* (CVC) réalisés par un échantillon d'entreprises ayant une forte activité CVC. Enfin, l'équilibre entre exploration et exploitation au fil du temps, ainsi que les caractéristiques des oscillations entre ces deux types d'activités sont examinés dans la troisième étude constituant cette thèse. Les analyses empiriques portent sur les investissements de CVC effectués par 286 entreprises des États-Unis sur la période 1993-2013. Cette thèse contribue à la théorie comportementale de l'entreprise (*Behavioral Theory of the Firm*) en examinant la façon dont la structure du capital et l'actionnariat influe sur la prise de décisions en matière d'innovation et de changement. En étudiant la façon dont l'inertie organisationnelle et les phases de changement affectent les activités d'exploitation et d'exploration, cette thèse contribue aussi à la recherche sur l'ambidextrie organisationnelle. Pour finir, ce travail participe à la recherche sur le *corporate venture capital* au travers de l'étude des antécédents et des conséquences des activités d'exploration et d'exploitation dans le cadre de l'investissement CVC.

Title: Antecedents and Consequences of Exploration and Exploitation Decisions: Evidence from Corporate Venture Capital Investing

Keywords: Exploration, Exploitation, Behavioral Theory of the Firm, Corporate Governance, Ambidexterity, Corporate Venture Capital.

Abstract : This dissertation addresses unexplored issues on the antecedents, management, and outcomes of corporate venture capital (CVC). More specifically, I examine how negative performance feedback and corporate governance influence the direction of organizational change - in terms of exploration and exploitation - and how balancing such change over time influences firm performance in the CVC context. I first review the extant literature on CVC and lay out the unique contributions of my research. Then, in the first essay, I theorize on how poor firm performance influences the resource allocation decisions on exploration and exploitation and how such decisions are affected by the concentration of dedicated and transient shareholders and by the board of directors' monitoring and advising intensities. In the second essay, I empirically examine how the resource allocation decisions on exploration and exploitation are influenced by dedicated and transient shareholders in the context of CVC investing. In the third essay, I examine how balancing exploration and exploitation over time and the characteristics of oscillation impact firm performance. The empirical analysis in the latter two essays is based on CVC investments made by 286 U.S. companies during 1993-2013. This dissertation contributes to the Behavioral Theory of the Firm and Corporate Governance research by introducing how shareholders and boards influence managerial decision-making in search and change, Ambidexterity research by studying how continuous change and organizational inertia impact temporal spillover between exploration and exploitation, and CVC research by examining the antecedents and consequences of explorative and exploitative initiatives in CVC investing.