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Conor M. O'Toole a,b,c
Carol Newman a

a Department of Economics, Trinity College Dublin, College Green, Dublin 2, Ireland
b Department of Agricultural Economics and Farm Surveys, Teagasc, Athenry, Co. Galway, Ireland
c Economic Analysis Division, Economic and Social Research Institute, Whitaker Square, Sir John Rogerson's Quay, Dublin 2, Ireland

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Conor M. O'Toole[a,b,c,*], Carol Newman[a]

[a]*Department of Economics, Trinity College Dublin, College Green, Dublin 2, Ireland*
[b]*Department of Agricultural Economics and Farm Surveys, Teagasc, Athenry, Co. Galway, Ireland*
[c]*Economic Analysis Division, Economic and Social Research Institute, Whitaker Square, Sir John Rogerson's Quay, Dublin 2, Ireland*

Abstract

We explore whether financial development reduces external investment financing constraints for firms. Within-country provincial measures of financial development are linked to investment using data from the Vietnamese enterprise survey (VES). We focus on three main aspects of financial development: financial sector depth, state interventionism in finance, and the degree of market driven financing in the economy. We find that financial development reduces investment financing constraints. Constraints are decreasing in credit to the private sector, increasing in the use of finance by state-owned enterprises and decreasing in the degree to which finance is allocated on commercial market terms.

Keywords: Financial development, Financing constraints, Investment

JEL codes: G31; G32; O16

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*Corresponding author: conor.otoole@esri.ie, Economic and Social Research Institute, Whitaker Square, Sir John Rodgerson's Quay, Dublin 2, Ireland. Tel: 00 353 1 8632135

1. Introduction

This paper evaluates the effect of financial development on firms access to external finance. Using firm-level data from the Vietnamese Enterprise Survey (VES) over the period 2002-2008, we test whether financial development at the provincial level in Vietnam reduces financing constraints for firms and alters their dependence on internal resources to fund investment. In measuring financial development, we focus on both financial depth and financial resource allocation. Our research is novel as it is the first time that within-country financial development indicators are linked to investment financing constraints in a developing country context.

There is an extensive body of research that investigates the role of finance in the economic growth process. Many authors argue in support of a first-order causal effect (Levine, 1997, 2003, 2005). Theoretical models suggest that financial development should lead to increased and more efficient investment, better monitoring and corporate governance, improved risk management and help facilitate trade (Levine, 2005). On the basis of this research, many emerging market economies and developing countries have been advised to liberalise financial markets and reduce government control in the banking sector. It is argued that liberalisation leads in turn to increased financial development bringing the associated growth effects. However, due to the onset of the recent global financial crisis and the Latin American and East Asian financial crises in the 1980's and 1990's, a somewhat more sceptical view of financial liberalisation, and the role of finance in the development process, challenges the consensus on this issue (Andersen and Tarp, 2003; Andersen et al.,

2012). In addition, the exceptionally strong performance of the Chinese economy, which has a malfunctioning financial system (Guariglia and Poncet, 2008; Guariglia et al., 2011) presents a puzzle in understanding the role of formal financial markets in driving growth and the specific channels through which it operates.

One of the more established channels through which financial development is understood to influence firm behaviour relates to access to investment finance (Rajan and Zingales, 1998; Love, 2003; Levine et al., 2000; Beck et al., 2006). Testing this channel, our specific contributions to the existing research are as follows: first, we use within-country cross-provincial data from Vietnam to estimate financial development along three dimensions: financial sector depth and intermediary development, state interventionism in finance and the degree of market financing in the economy. This builds on the indicators of financial development outlined in Guariglia and Poncet (2008). Financial depth is measured as the volume of credit extended to the private sector as a percent of output. State intervention is measured by the share of total loans held by state-owned enterprises (SOEs) as well as the ratio of SOE loans to SOE output. Market financing is measured using the ratio of investment financed through loans from commercial banks relative to the share of investment financed by government banks. These three indicators enable a broad definition of financial development to be analysed.

Second, linking financial development to investment financing, our research builds on Rajan and Zingales (1998), Love (2003) and Love and Zicchino (2006) by extending the analysis to a development context and using a broader sample than existing research. Our data include listed and non-listed firms across all size classes (small, medium and

large) and legal ownership (state, foreign and private) for both manufacturing and non-manufacturing firms from Vietnam. The inclusion of non-listed SMEs is important as current research suggests that SMEs are most at risk of being constrained (Beck et al., 2008,a,b). Many SMEs face particular challenges in accessing external credit, mainly due to asymmetric information, a lack of collateral and a dependence on capital markets in their direct geographic location.

Third, we test for financing constraints using a direct measure of the firms' dependence on internal finance or their financial composition *mix*. We define *mix* as the share of investment financed by internal funds. This measure, following Kashyap et al. (1993), Huang (2003), Bougheas et al. (2006) and Guariglia and Mateut (2010) exploits the imperfect substitutability of differing sources of finance. If financial markets are perfect (internal and external finance carry an equivalent cost of capital), this measure will have no effect on investment. In the face of capital market imperfections, where firms are locked out of external finance, *mix* will have a positive relationship with investment. Using information on the firms' financial composition mix to identify financing constraints circumvents the criticism that direct measures of internal funds (such as cash flow) may contain profitability indicating properties that are correlated with fundamentals in neoclassical investment models.[1] When included in a regression, a significant relationship could be identified be-

[1]Many studies use a measure of the value of internal funds to identify credit constraints (Fazzari et al., 1988b; Haramillo et al., 1996; Koo and Shin, 2004; Barajas et al., 2000; Gelos and Werner, 2002). This method is criticised by Kaplan and Zingales (1997, 2000).

tween investment and measures of internal funds for this reason alone leading to a spurious conclusion. Financial composition mix also takes into account the differing financing options available to firms and allows for differentiated financing strategies. Our research is the first time this approach is used in a development context.

Our empirical strategy uses the fundamental Q approach (Gilchrist and Himmelberg, 1995) to model investment with the measure of financial composition *mix* appended to the empirical model to identify credit constraints. We control for endogeneity and firm heterogeneity using a GMM estimation strategy. We test the robustness of our results by re-estimating the model using both cash flow-investment sensitivities and a distributed lag accelerator model.

A number of conclusions emerge. First, we find that the neoclassical Q model and the distributed lag accelerator approach adequately capture the fundamentals explaining firms' investment decisions. The Q statistic is positive and significant in all regressions as is the sales growth term in the accelerator model. These results suggests that firms' investment strategies are determined based on underlying business fundamentals.

Testing for financing constraints, we find a positive and significant relationship between investment and firms' financial composition *mix*, indicating a wedge between the internal and external costs of financing. This result suggests that firms face imperfections in capital markets in Vietnam and is in line with previous country specific research (Rand, 2007). Interacting financing constraints with the indicators of financial development, we find that constraints are decreasing in credit provided to the private sector, increasing in the use of financing by state-owned enterprises and decreasing in the degree to which finance is allo-

cated on market-based terms. If fact, when the interactions between financing constraints and financial development are included in the regression, the financing constraints own coefficient is insignificant. It appears that the degree to which firms face credit constraints is completely determined by the level of financial development. As financial development increases, either through an expansion of credit or through improved financial allocation, firms reliance on internal finance decreases. In line with previous research (Rajan and Zingales, 1998; Love, 2003) our findings support the finance-for-growth literature. We provide direct evidence of an improvement in investment credit access as a result of financial development in a fast growing developing economy.

Considering the distributional impact of financial development on financing constraints across firms, the results are strongest for private domestic firms, especially small- and medium-sized enterprises. There does not appear to be any effect on foreign firm investment financing of an increase in financial depth or increased allocation of credit on market-based terms in the host economy. The results also suggest that foreign firms do not compete with state firms for credit as their investment financing is insensitive to the share of credit allocated to state firms. We find service firms face lower financing constraints than manufacturing and industrial firms and benefit more from increases in credit provided to the private sector. Service firms are also the main beneficiaries of reallocating credit away from state firms and increasing the degree of market-based allocation of lending in the economy.

These results provide evidence that financial development alters the investment behaviour of firms by improving access to external capital. As financial development in-

creases, the differential cost of capital between internal and external finance is eliminated through both an increase in the quantity of credit as well as an improvement in allocation. This is an important finding from a development perspective as continued financial development can provide firms with the credit required to invest and grow. As SMEs and private domestic firms are the main beneficiaries, this is further evidence that financial development can be managed to provide real economic benefits to firms.

This paper is structured as follows: Section 2 presents an overview of previous research as well as financial sector development in Vietnam. Section 3 presents the empirical approach. Section 4 outlines the data and econometric methodology. Section 5 outlines the results and Section 6 concludes.

2. Background and context

2.1. Financial development and economic outcomes

In the past three decades, there has been considerable international integration and globalisation in financial markets (Lane and Milesi-Ferretti, 2008). Many countries, especially in the developing world have undertaken extensive reforms to open domestic financial sectors to international capital flows (Abiad et al., 2010). Feeding into this policy action is an extensive literature, both theoretical and applied, that focuses on the causal role of finance in driving economic growth.[2] Identifying the specific mechanisms by which finance influences growth, endogenous finance-growth models present clear theoretical channels

[2]See Levine (1997) and Levine (2005) for an extensive overview of the empirical and theoretical views on finance and economic growth.

through which finance can influence long-term growth patterns (Greenwood and Jovanovic, 1990; Greenwood and Smith, 1997; Diamond and Rajan, 2001; Diamond, 1984, 1991). These are summarised by Levine (2005) as: producing information about investments and allocated capital, monitoring investments and exerting corporate governance, facilitating trading, diversification and management of risk, mobilizing and pooling saving and easing the exchange of goods and services.

On this topic, empirical research is extensive and covers a range of issues relating to financial development and growth (Levine, 2003; Beck et al., 2003; Demirguc-Kunt and Levine, 1996; Levine and Zervos, 1996; Levine, 1997; Levine and Zervos, 1998; Levine, 1998, 1999; Huang, 2010, 2011). The focus of this paper is to investigate how finance can facilitate investment activity. In this area, the current research can be split into two categories: first, research on the issue of financial development, investment and economic growth in a single or cross-country context and second, research into the effect of financial reform on investment credit constraints (proxying for the level of financial development).

In the former category, a number of papers are of particular relevance. Rajan and Zingales (1998) investigate whether sectors which are more highly dependent on external financing grow proportionately more quickly in countries with better developed financial systems. They use cross-country industry data to investigate whether financial development affects growth through this channel. By constructing the industry's technological demand for external finance, they find that financially dependent sectors grow disproportionately quickly if the financial system is better developed. Love (2003) considers the effect of financial development on investment credit constraints using pooled cross-country

firm-level data. The methodology follows an Euler equation approach, introducing financing constraints by parameterising the shadow cost of external funds as a function of the firms' cash stock. The findings indicate that financial development decreases financing constraints which in turn leads to higher investment activity. Love and Zicchino (2006) use a firm-level panel vector autoregression (VAR) to evaluate the relationship between investment and the firms' financing position. They find that the impact of financing constraints on investment is larger in countries with less developed financial systems.

While providing valuable contributions, there are a number of areas in which this research could be extended to provide additional insight. In Rajan and Zingales (1998), the data are not firm level so therefore do not specifically link the demand for finance to firm level outcomes. Additional concerns about this paper are also raised by Fisman and Love (2007) who note that Rajan and Zingales (1998) may not actually be testing whether sectors with a greater inherent dependence on external finance grow quicker in countries with better financial intermediation. Instead, they may actually be testing the ability of financial markets to smooth global shocks. The research by Love (2003) and Love and Zicchino (2006) further this debate by using firm-level data, allowing a more direct link of financing constraints to firm-level outcomes and firm behaviour. However, their data cover many of the most developed financing systems and include only large, listed firms. This presents two challenges. First, large listed firms are most likely the least financially constrained with better access to both domestic and international capital markets. A deeper analysis of the effect of financial development on credit constraints would include small- and medium-sized firms and other non-listed enterprises, who in

many cases rely exclusively on bank credit as a source of external finance. This point is highlighted by Guariglia (2008). Second, from a development perspective, the data used in these papers excludes many of the least developed countries where financial systems are the most underdeveloped and where firms face acute access to finance difficulties. Extending this analysis to a development context could provide important insight.[3]

In addition to the cross-country studies, one particular single-country study is similar to our analysis. Guariglia and Poncet (2008) use data from 30 Chinese provinces for 1989-2003 to evaluate the relationship between financial development, capital expenditure, GDP growth and total factor productivity. They measure financial development along three dimensions: financial sector depth and intermediary development, state interventionism in finance and the degree of market-driven financing in the economy. Their use of cross-provincial within-country data addresses the concern of measurement error across different countries (noted by Guariglia and Poncet (2008) and Levine and Zervos (1996)) and controls for institutional differences in financial intermediation that are often immeasurable by the econometrician. However, as they do not use micro data, Guariglia and Poncet (2008) are unable to link financial development and firm growth, a step that we take in this paper.

The second related literature focuses on the effect of financial liberalisation on access

[3]Demirguc-Kunt and Maksimovic (1996) and Demirguc-Kunt and Maksimovic (2002) consider the differential effects on firms of the development of bank-based or stock market-based financial development. These studies do not directly deal with the issues of investment financial constraints but focus on funding growth and credit facility usage.

to finance and investment activity (see for example Kabango and Paloni (2011), Haramillo et al. (1996), Koo and Shin (2004), Koo and Maeng (2005), Barajas et al. (2000) and Gelos and Werner (2002) as well as cross-country studies such as Abiad et al. (2008) and Galindo et al. (2007)). Typically, firm-level credit constraints are used to proxy for the level of financial development and tests are undertaken as to whether or not financial reform leads to improvement in credit access. Clarke et al. (2006) and Beck et al. (2004) focus on specific aspects of banking market reform and access to finance. They find a positive effect of financial liberalisation on financing constraints, indicating that financial development leads to economic growth through improvements in the allocation of finance.

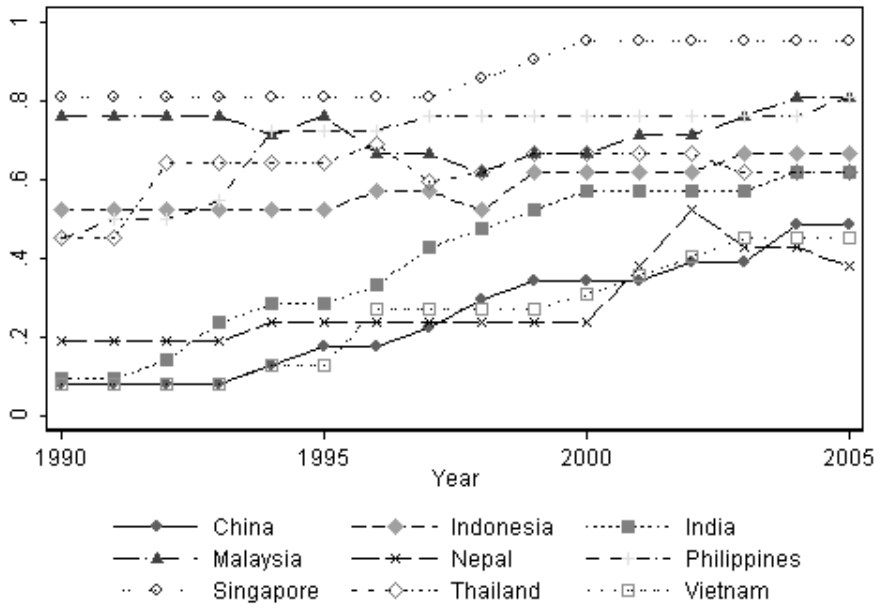
2.2. Financial sector development in Vietnam

Vietnam provides an interesting case study for evaluating the impact of financial development on the performance and activity of firms. Over the past 20 years, the country has moved from central planning to a more open, market-oriented economy. This transition has included a process of liberalisation in both capital and product markets which culminated in membership of the WTO in 2007. According to Abbott and Tarp (2011), since the original "Doi Moi" reforms, economic growth in Vietnam has been impressive. It exceeded 9 percent per annum prior to the East Asian financial crisis and has been 8 percent per annum up to the recent international financial and economic crisis. Its subsequent recovery has been extremely robust with growth of 5.3 percent in 2009 and over 6 percent in 2010. Since the late 1990's, the country has also experienced a surge in trade activity and reformed investment legislation by extending operating conditions for foreign

companies and joint ventures between foreign and domestic companies.

While many Asian economies embraced financial liberalisation pre the East Asian crisis, Vietnam did not do so. This may have insulated it against the worst effects of the crisis, when many other nations faced sharp reversals in capital flows and severe exchange rate pressures. However, in the post crisis period, Vietnam has been more embracing of financial reform. This is shown by data from Abiad et al. (2010) (presented in figure 1) which devises a financial reform index across seven dimensions of financial and capital market policy. In comparison to other Asian economies, Vietnam began from a low base but has increasingly reformed its financial markets. While in 2005, it remained one of the least liberalised financial systems, in recent years, additional reforms have been undertaken.

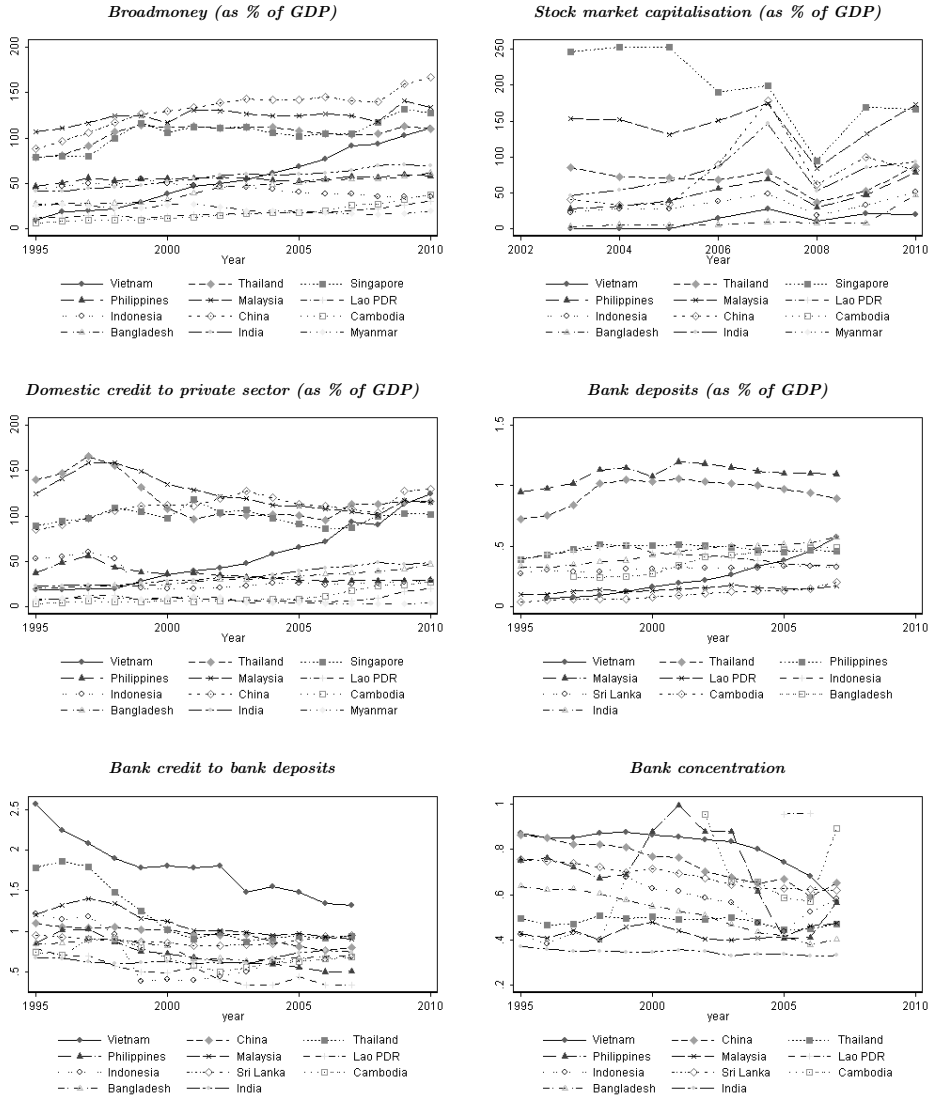
Figure 1: Financial reform index, 1990-2005



Source: Author's calculations based on Adiad et al. (2010).

To understand the evolution of the macro-credit environment in Vietnam, figure 2 presents key indicators of financial development in comparison to selected Asian economies. The indicators are: broadmoney as a percent of GDP, domestic credit and domestic private credit as a percent of GDP and stock market capitalisation as a percent of GDP. What is evident from the mid-90's for Vietnam is that there has been a significant expansion in the monetary base and the supply of formal credit available in the economy. Domestic credit to the private sector and broad money as a percentage of GDP have expanded significantly. The increase in private sector credit as a percent of GDP is also in line with the transformation of the economy away from central planning to a more market oriented system.

Figure 2: Indicators of financial development and banking market structure



Source: Author's calculations based on publicly available World Bank data.

Having reviewed overall financial reform and indicators of financial development, it is pertinent to delve deeper into specific aspects of the banking sector in Vietnam. Measures of bank market activity are taken from Beck et al. (2010) and also outlined in figure 2. It is evident that bank deposits increased significantly over time, indicating better mobilisation of domestic funds and a formalisation of the financial sector. Bank concentration, while

not a direct measure of competition, fell significantly over the period 2000-2007. This is indicative of the changing banking landscape which has seen increased foreign entry as well as privatisation of state financial institutions.

These country-level data paint a picture of a rapidly changing, dynamic banking sector which is channeling increasing amounts of credit to the private sector. This provides the perfect setting to evaluate the impact of financial development on firm level investment and financing constraints.

3. Modelling investment, financing constraints and financial development

In this section we present the empirical model used to estimate the firm-level investment equation and outline our method for testing the relationship between financing constraints and financial development.

3.1. Modelling investment

To estimate firm-level investment, we use the fundamental Q model of finance as outlined in Gilchrist and Himmelberg (1995). There are a number of reasons why we have chosen this method as opposed to alternative neoclassical investment models such as the investment Euler equation or error-correction specification. Regarding the error-correction framework, while the model does not require the explicit selection of a functional form for adjustment costs which is the case in the Q and Euler equation models, it does require a symmetric capital-output relationship for all firms in the data. Our sample includes mining, industrial and market services firms which may have very different relationships

between capital and output. Firms in different sectors may have differing error-correction patterns relative to the long-run sales and capital stocks. This could make it difficult to identify the correct parameter estimates on the correction term and to empirically observe error-correction behaviour. The Q model, by relating investment to the firms' individual investment opportunities (Q), is a more flexible model for such a diverse sample.

Concerning the Euler equation, the poor empirical performance of the model is well documented (Whited, 1998). As an intertemporal structural approach, it is more sensitive to the selection of the functional form for adjustment costs and requires that firms smooth investment over time. In a dynamic, fast-growing economy like Vietnam, this smooth investment behaviour may not be a characteristic of firm behaviour. Newman et al. (2011) highlight the dynamic nature of firms in the Vietnamese economy, strengthening this concern. Further difficulties arise in the Euler equation when attempting to incorporate financing constraints (Whited, 1998; Whited and Wu, 2006). The Q model should be more flexible as it solely tests the relationship between investment and Q. An empirical proxy for financing conditions can simply be appended to the model to test for financing constraints.

To estimate Q, we follow a methodology outlined by Gilchrist and Himmelberg (1995). In the absence of financial market data, which is the case in our empirical analysis, Gilchrist and Himmelberg (1995) propose an approach whereby an estimate of Q based on fundamentals (referred to from here as fundamental Q) can be substituted for marginal Q. This is estimated by specifying a linear AR(1) VAR of firm profitability indicators (a proxy for the marginal value product of capital and the cash flow to capital ratio), $\mathbf{x_{it}}$. An estimate

of the Q statistic is developed using the coefficients from the VAR and the underlying data in the VAR variables.[4] The estimate of Q, in essence, captures the average return per unit capital for the firm, i.e. the benefit to profitability of a one unit increase in the capital stock. The model is estimated using panel GMM as outlined by Holtz-Eakin et al. (1988) and applied empirically by Love and Zicchino (2006). The VAR process is given by:

$$\mathbf{x_{it}} = \mathbf{A}\mathbf{x_{it-1}} + \zeta_{\mathbf{i}} + \theta_{\mathbf{t}} + \varepsilon_{\mathbf{it}} \quad (1)$$

$$Q_{it} = \left(\mathbf{c}'[\mathbf{I} - \chi\mathbf{A}]\right)\mathbf{x_{it}} \quad (2)$$

where the vector $\mathbf{x_{it}}$ includes a proxy for the firms' marginal value product of capital as well as the cash sales to capital ratio.[5] Time- and firm-specific effects are denoted by θ_t and ζ_i, respectively. The VAR is used to estimate the coefficient matrix A which is then included in equation (2). The vector c identifies the marginal value product of capital ratio and χ is the combined discount and depreciation rate.[6] The estimated value of fundamental Q can be substituted into the empirical investment equation as follows:

[4]For a more detailed explanation of the approach see Gilchrist and Himmelberg (1995).

[5]For this research, the marginal value product of capital has been proxied using the sales to capital ratio. This is valid under a Cobb-Douglas production structure with constant returns to scale. For more details see Galindo et al. (2007).

[6]As in Gilchrist and Himmelberg (1995), we set $\chi = 0.8$ and is calculated as $\frac{1-\delta}{1+r}$, where depreciation $\delta = 0.15$ and the discount rate, r = 0.06. We have conducted sensitivities which range the values from 0.6 to 0.95 and the mains results hold in all cases.

$$\left(\frac{I}{K}\right)_{it} = \alpha + \beta_Q Q_{it} + c_i + \eta_t + \epsilon_{it} \quad (3)$$

A positive relationship between Q and investment indicates that firms' fundamentals are driving their investment strategies.

To ensure that our results are not dependent on the use of the Q model, we also estimate a distributed lag accelerator model as a robustness check. It is given as follows:

$$\frac{I_{it}}{K_{it-1}} = \beta_0 + \beta_2 \Delta s_{it} + \beta_3 \Delta s_{it-1} + c_i + \lambda_t + \theta_{jt} + \varepsilon_{it} \quad (4)$$

This model is the simplest of the neoclassical models of finance and links the growth in the capital stock (investment to capital ratio) to the growth in output, Δs_{it}. A more detailed outline of this model is presented in Chirinko (1993).

3.2. Measuring credit constraints

An extensively researched but highly contentious question is how to measure whether or not firms face binding financing constraints. Most studies use one of the following methodologies: 1) the sensitivity of investment to measures of internal funds (cash flow or cash stock), 2) the sensitivity of investment to the firms' financing mix and 3) direct survey questions on access to finance. Using direct survey information is not of relevance to this research as we do not have these questions available. Our discussion therefore focuses on the first two approaches.

The first strand of research uses a measure of the internal resources available to the firm such as cash flow or cash stock and identifies an excess sensitivity of investment to internal

funds as a measure of credit constraints (Fazzari et al., 1988a; Hubbard and Kashyap, 1992).[7] This approach has been criticised, most notably by Kaplan and Zingales (1997, 2000). Ranking firms on the basis of their demand for funds, managements' discussion of liquidity and availability of internal funds, Kaplan and Zingales (1997) argue that "firms classified as less financially constrained, exhibit a significantly greater investment-cash flow sensitivity than those firms classified as more financially constrained". They present a general rebuttal of previous work in this area (such as Fazzari et al. (1988a)) using the cash flow-investment sensitivity to infer conclusions about credit constraints.

This critique led to analysis which takes a more composite view of firms' financing decisions and the degree to which credit constraints affect investment. This includes studies that incorporate firms' access to external debt into a theoretical framework such as an investment Euler equation (Whited, 1992; Bond et al., 2003; Bond and Meghir, 1994) or Q framework (Hennessy et al., 2007; Hennessy, 2004) as well as studies that focus on the financial composition of firms and their real activities (Guariglia and Mateut, 2010; Kashyap et al., 1993; Huang, 2003; Bougheas et al., 2006). As we are focusing on empirically testing the effect of financial development on firms investment financing, we follow the latter studies and focus on financial composition.

To assess the degree to which financial composition affects firm investment, we follow

[7]While these are among the best known, the number of studies using this approach is voluminous. See Chirinko (1993) and Hubbard (1998) for a review of early work and Guariglia (2008) for a more recent discussion.

the argumentation of Kashyap et al. (1993) who evaluate how the imperfect substitutability of differing sources of finance affect investment in inventories and fixed assets. They argue that firms can finance their investment using one of two sources: commercial paper or bank loans. However, as these are imperfect substitutes with a differing cost of capital, the choice of the financing *mix* (the ratio of bank loans to bank loans and commercial paper) affects the investment level. The imperfect substitutability may come about due to asymmetric information and adverse selection, as well as the transactions costs associated with issuing commercial paper.

Guariglia and Mateut (2010) also investigate the effect of a firm's financing *mix* on investment behaviour. They redefine *mix* as the ratio of short term loans to short term loans plus trade credit. They state that as trade credit and bank loans are imperfect substitutes, for firms that face financing constraints, the proportion of bank loans they receive should affect their investment in inventories. They note that a positive association between their *mix* measure and investment indicates that having cheaper bank finance facilitates inventory investment.

In this paper, we define the firms' financial composition *mix* by exploiting the differential cost of capital relating to the financing options available to firms. Our measure, denoted IF_{it}, is the share of investment financed using internal resources relative to total investment finance:

$$IF_{it} = \frac{Investment\ funded\ using\ internal\ funds}{Total\ investment\ finance} \tag{5}$$

This measure captures firms' relative use of internal and external finance and should measure the degree to which they are able to interact with formal financial markets. Our expectation is that if firms are financially constrained and face imperfections in capital markets, the financial mix variable (IF_{it}) will have a positive and statistically significant relationship with investment. The relationship should be more pronounced the greater the level of information asymmetries between borrowers and lenders. If no capital market imperfections exist and internal and external finance are perfect substitutes, then no statistical relationship between IF_{it} and investment should exist.

There are a number of motivating factors for using this definition. First, for many firms in developing countries and in Vietnam, the commercial paper market is not well developed or is non-existent. The most frequently used sources of investment finance are internal resources, lending from commercial or government institutions or informal finance. This is especially the case for small- and medium-sized non-listed firms, who account for the majority of firms in our data. These firms are also the most likely to face financing constraints (Beck et al., 2006). Second, if capital markets are imperfect and borrowers face asymmetric information, the cost of internally generated funds will be lower than all external sources. Our measure captures the degree of market imperfections and gives a very direct measure of the firms interaction with financial markets. As we do not use a measure of internal funds such as cash flow, we also mitigate the risk that the financing constraint measure is either capturing some information pertaining to profitability or reflecting the firms' strategy on using internal finance.

Including IF in our benchmark Q model gives:

$$\left(\frac{I}{K}\right)_{it} = \alpha + \beta_Q Q_{it} + \beta_{IF} IF_{it-1} + c_i + \eta_t + \lambda_j + \epsilon_{it} \quad (6)$$

The lagged value of IF_{it-1} is used to prevent any reverse causation between the financing structure and investment within the period. Our a priori expectations are: $\beta_Q > 0$ if firms are using fundamentals to determine their investment strategy and $\beta_{IF} > 0$ if firms are financially constrained.

As a robustness check, we also re-run all regressions using cash flow-investment sensitivities as our measure of constraints. A positive and statistically significant relationship between investment and cash flow is indicative of a credit constraint.

3.3. Measuring financial development

Measures of financial development should in general attempt to capture the ease with which capital is intermediated between savers and borrowers. Rajan and Zingales (1998, p.569) provide a broad definition of the parameters of financial development stating that:

"financial development should be related to the variety of intermediaries and markets available, the efficiency with which they perform the evaluation, monitoring, certification, communication and distribution functions and the legal and regulatory framework assuring performance".

The majority of studies measuring financial development focus on two specific aspects of this wider concept, financial depth and intermediation and capital market development (Demirguc-Kunt and Levine, 1996; Love, 2003; Love and Zicchino, 2006; Chinn and Ito, 2006; Baltagi et al., 2009). The former, financial depth and intermediary development,

is usually measured as total credit or credit to the private sector as a percent of GDP or liquid liabilities (M3) as a percent of GDP. It attempts to assess the degree to which entrepreneurs with positive NPV projects can access finance for investment (Baltagi et al., 2009). Measures of the latter, capital market development, include total stock market capitalisation to GDP, stock market value traded to GDP or total value traded to market capitalisation.

In this paper, we draw from these traditional measures but deviate quite deliberately on other aspects. As our data cover mainly unlisted firms and the stock market is very underdeveloped in Vietnam, we do not focus on securities market development but instead on financial depth and financial resource allocation. We closely follow Guariglia and Poncet (2008) whose evaluation of the effects of financial distortions on economic growth in China breaks down financial development into three different elements: 1) financial depth and intermediary development, 2) state interventionism in finance and 3) the degree of market financing in the economy. Their motivation for categorising financial development in this manner is to separately account for capital market intermediary development and resource mis-allocation in the context of financial distortions in China.

There are two mains reasons why using this framework is very applicable to our work. Vietnam, like China, is a communist country with a very high, but declining, degree of state involvement in both capital and product markets. Historically, the state-owned financial sector channeled funds to SOEs or to households and firms to maximise certain policy objectives (Kovsted et al., 2003). Capital has not been allocated on the basis of the highest risk-weighted return. However, in recent years, as part of the transition to a market-

oriented economy, state involvement in finance and production is declining and more market driven financial allocation is taking place. However, a legacy of state involvement continues and on this basis provides an interesting case study to evaluate both financial depth as well as resource allocation. Moreover, focusing on the allocation and efficiency of capital usage as well as the depth of financial markets brings our measurement of financial development closer to the holistic definition as presented by Rajan and Zingales (1998).

The measures that we focus on are as follows:

1. **Financial depth**
    - Credit to private sector as a percent of industrial output, $FinDepth$
2. **State interventionism**
    - SOE share of total loans, (L_S)
    - SOE share of loans to SOE share of output, $\left(\frac{L_S}{GDP_S}\right)$
3. **Market financing of investment**
    - % of investment lending by commercial banks to % of investment lending by state, $\left(\frac{CL}{GL}\right)$

Our data facilitate the measurement of these indicators at a cross-provincial level in Vietnam. $FinDepth$ is our proxy for general financial sector depth and intermediary development and is equivalent to the private sector credit to GDP measures used by Demirguc-Kunt and Levine (1996), Love (2003), Love and Zicchino (2006), Chinn and Ito (2006) and Baltagi et al. (2009). $FinDepth$ is increasing in financial development. State interventionism in finance includes two measures, both following Guariglia and Poncet (2008). The

first measure, (L_S), captures the degree to which lending is allocated to SOEs. The second measure, $\left(\frac{L_S}{GDP_S}\right)$, is potentially more informative. SOEs may play an important role in specific sectors and therefore are entitled to credit to undertake this activity. However, if they are receiving a greater share of credit relative to their share of output, this may indicate a potential mis-allocation of resources. If state firms are large inefficient entities, channeling credit to these firms may not reflect the best use of capital in the economy. Additionally, due to the long established relationships between Vietnamese state banks and SOEs or implicit/explicit government guarantees, the state banks may be more likely to allocate credit to these firms. If there are investment opportunities in the wider economy that are forgone due to this lending activity, the overall efficiency of capital allocation is lessened. Reducing the SOE use of credit therefore may lead to an improvement in capital efficiency. Both of these indicators should be decreasing in the degree of financial development.

The final measure is the share of total annual investment that is financed using loan facilities provided by commercial banks relative to the share of investment lending from government banks, $\left(\frac{CL}{GL}\right)$. If commercial lenders have more market-oriented selection and credit allocation criteria, as well as more intrusive and well developed monitoring capabilities, the efficiency of capital should be higher if allocated by these institutions relative to government banks. The latter may not provide credit based on the market cost of capital or the returns of the investment project. This measure, in line with Guariglia and Poncet (2008), captures the degree of market financing of investment and is expected to be increasing in financial development. To test the effects of financial development on firm

financing constraints, we interact the measure of constraints with the indicators of financial development in the empirical model:

$$\begin{aligned}\left(\frac{I}{K}\right)_{it} &= \alpha + \beta_Q Q_{it} + \beta_{IF} IF_{it-1} + \beta_{FD} FD_{pt-1} + \beta_{SI} SI_{pt-1} + \beta_{MF} MF_{pt-1} \\ &+ \beta_{IFFD} \left(IF \cdot FD\right)_{pt-1} + \beta_{IFSI} \left(IF \cdot SI\right)_{pt-1} + \beta_{IFMF} \left(IF \cdot MF\right)_{pt-1} \\ &+ c_i + \eta_t + \epsilon_{it}\end{aligned} \tag{7}$$

All measures of financial development are lagged so as to ensure no contemporaneous correlation between investment and financial market developments. The a priori expectations differ depending on the financial development indicator. If financing constraints are decreasing with financial depth, $FinDepth$, we expect to find $\beta_{IFFD} < 0$. If state interventionism in financial markets reduces the credit available for private firms to undertake investment opportunities, we expect $\beta_{IFSI} > 0$. If constraints are decreasing in the degree of market financing of lending activities, we expect $\beta_{IFMF} < 0$.

4. Econometric considerations and data description

4.1. Econometric considerations

Two main econometric issues must be treated when estimating firm-level investment equations. These are endogeneity and individual heterogeneity. First, as the Q statistic is measured in the same period as investment, it may reflect the changes to fundamentals that come about following within-period investment (e.g. a firm invests and capital becomes immediately productive thus increasing profits and cash flow within the period, influencing

the value of Q). In this case, there could be reverse causation between Q and investment. Additionally, as cash flow is used to develop the measure for Q due to its properties as an indicator of profitability, Q is also highly correlated with measures of internal resources. This is a potential additional source of endogeneity. Both of these concerns can be dealt with using an instrumental variables strategy. We use the GMM method of Arellano and Bond (1991) and Arellano and Bover (1995) with internal instruments to treat endogeneity. The exogeneity condition required for valid instruments is given by:

$$E(u_{it}x_{i,t-s}) = 0 \; \forall \; s > 0 \tag{8}$$

Second, the composite error includes firm-level heterogeneity which is most likely correlated with the independent regressors. This requires a fixed-effects transformation that does not invalidate our exogeneity condition but yet factors out time invariant firm heterogeneity.[8] We use a Helmert transformation which takes deviations from forward means (Harrison and Mcmillan, 2003; Love, 2003; Harrison et al., 2004).

Using panel data, we must consider the issue of serial correlation even in the transformed errors. If the transformed errors are AR(n), this alters the exogeneity condition for the instrument set to a lag deeper than n as follows:

$$E(u_{it}x_{i,t-s}) = 0 \forall s > n \tag{9}$$

[8]Using standard fixed effects rules out the use of lags as instruments due to the correlation with the variables' intertemporal within-group averages.

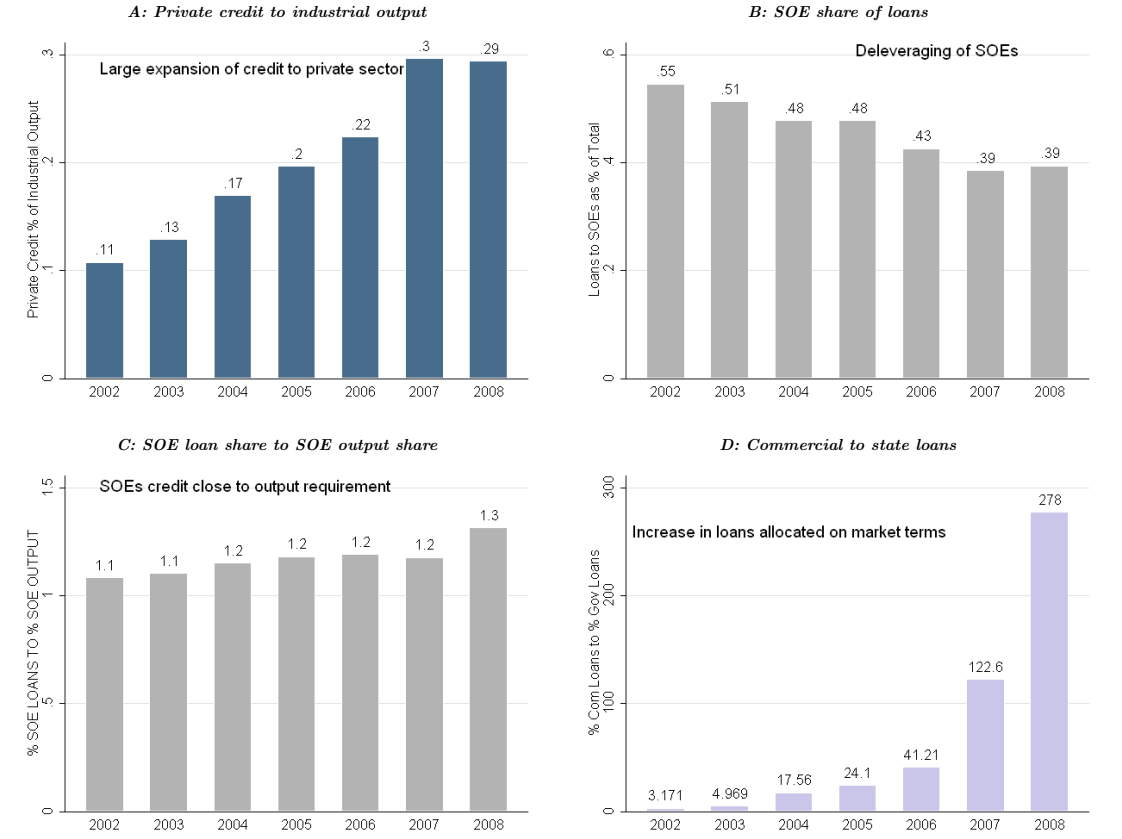
As in other studies using micro data to estimate investment equations using GMM (Guariglia, 2008; Guariglia and Mateut, 2010; Guariglia et al., 2011), we expect that serial correlation of order one in the transformed errors will be present. This would indicate the use of levels of the endogenous variables from time t-3 or earlier as valid instruments. We test for serial correlation in the empirical section.

4.2. Data and summary statistics

Our data are taken from the VES for the period 2002-2008. The survey captures balance sheet information on the population of firms in Vietnam with 30 or more employees and a representative sample of firms with less that 30 employees. It is collated annually across all 64 provinces and covers all sectors of the economy, including agriculture, manufacturing and services as well as domestically non-traded and internationally-traded sectors. The dataset contains information on firm performance, investment, employment, legal status, ownership (foreign owned, state owned, private domestic or a joint venture with domestic state or private firms) and a range of other variables.

The VES is an unbalanced panel, which for the period 2002 - 2008 contains over 450,000 observations across 98,644 firms. To create the financial development indicators, data on all firms are aggregated up to the provincial level. These measures therefore vary by province and year. As the VES captures the population of firms in Vietnam with over 30 employees and a representative sample of firms for under 30 employees, we believe that our measures are representative of the capital market structure of each province. The annual average for each measure across all 64 provinces is presented in figure 3.

Figure 3: Mean of provincial financial development indicators



Source: Author's calculation using VES data.

The indicator of financial depth increases from 11 percent in 2002 to 30 percent in 2008 and the trend mirrors the national chart in figure 2. Loans to state-owned enterprises as a percent of total loans decrease from 2002 to 2008 in line with the equitisation and privatisation programmes undertaken by the Vietnamese government. Figure 3 C shows that despite the fact that state firms are being privatised, the share of SOE credit to the share of SOE output is relatively constant and greater than unity. SOEs are using more credit than their share of output which may suggest a continued mis-allocation of financial resources. The final measure, the ratio of new investment loans allocated by

commercial lenders relative to loans by government lenders increases dramatically from just 3 to 1 in 2002 to over 300 to 1 in 2008. This highlights the significance of the flow of new finance allocated by commercial lenders. If commercial lenders allocate credit using more market-oriented allocation and monitoring procedures, it is expected that the efficiency of overall capital allocations in the Vietnamese economy has improved. Overall, our provincial measures mirror the developments in capital markets identified by national statistical sources. They show an increase in credit to the private sector, a reduction in the stock of loans held by SOEs and an increase in the proportion of lending allocated on market-based terms. These measures provide an interesting setting to evaluate the effect of financing constraints on firm level investment across provinces in Vietnam.

For the firm-level estimations, a number of data restrictions are required. To satisfy the underlying behavioural assumptions of the investment models, firms must be profit oriented. Therefore we omit firms from sectors relating to education provision, social work and healthcare. We also drop firms in financial intermediation as well as agricultural enterprises. Our final sample thus covers firms from manufacturing and industry as well as market services. The panel has a high degree of attrition with significant firm entry and exit, a function of the very dynamic, early growth phase of the Vietnamese economy. A number of outliers are evident and these have been removed. Our selection criteria for the exclusion of outliers are outlined in Appendix A. Our estimation strategy, using internal instruments and a heterogeneity transformation, requires that firms are in the sample for at least three consecutive years. This limits our estimation sample to approximately 44,000 observations.

Table 1: Summary statistics for main variables

Variable	N	Mean	St Dev
$\frac{I}{K}$	43,138	.927	1.489
IF	44,153	.691	.404
$\left(\frac{CF}{K}\right)$	37,867	.116	.312
$\left(\frac{S}{K}\right)$	44,153	4.716	4.651
$\left(\frac{P}{K}\right)$	44,153	.076	.405
FinDepth	44,153	.269	.136
$\left(\frac{L_S}{L_T}\right)$	44,153	.416	.188
$\left(\frac{L_S}{GDP_S}\right)$	44,153	1.245	.447
$\left(\frac{CL}{GL}\right)$	42,817	134.8	228.2
Private	44,153	.784	.411
State	44,153	.128	.334
Joint venture	44,153	.023	.150
Solely foreign	44,153	.065	.247
Services	44,153	.388	.487
SME	44,153	.872	.334

Source: Author's calculation using VES data.

Table 1 presents summary statistics for the key variables. The definitions are presented in table A.9 in Appendix A. Investment rates are particularly high in the sample with an average investment to capital ratio of 0.9. This is indicative of the fast growing, capital intensive nature of the Vietnamese economy. The measure of financing constraints, IF, has a sample average of 0.69, this indicates that nearly 70 percent of firm investment is financed using internal resources. On the composition of the sample, nearly 78 percent of firms are

private domestic, with 12 percent state firms, 7 percent solely foreign owned and 2 percent joint ventures between domestic firms and foreign firms. Services firms account for nearly 40 percent of the sample while over 87 percent of the firms are small- and medium-sized enterprises.

5. Results

In this section we present our main empirical results. Tests for first and second order serial correlation in the transformed residuals indicate the presence of first order serial correlation in the transformed residuals. Therefore the instruments are selected from lagged levels dated t-3 and deeper. The Sargan and Hansen tests for overidentifying restrictions on the instrument matrix are used to check instrument validity and the p-values are presented in each table. Additionally, in all regressions, we remove time means, prior to estimation to control for any common business cycle and macroeconomic influences. Province means, sector means and sector-province means are also removed to capture province and sector fixed effects as well as factors that are specific to the industrial structure in each province but differ from the national picture. In all cases, standard errors are clustered at the firm level.[9]

5.1. Main estimation results

Table 2 presents the main results of the GMM estimates for the Q model with financing constraints and interactions with financial development. The sample includes all firms

[9]Additional analysis clustering at the province level is presented as a robustness check.

(private domestic, state and foreign) across all size categories (small, medium and large). The total number of observations included is 39,000 reflecting missing values for some variables. In all regressions, the Sargan and Hansen tests fail to reject the null of instrument validity at the 1 percent level suggesting that the instrument matrix is valid. Column 1 includes the estimates for Q and financing constraints while columns 2 - 3 introduce the financial depth measure and its interaction with financing constraints. Columns 4 - 7 contain the results for the state interventionism measures while columns 8 and 9 introduce the measure of market financing. Column 10 includes all three effects simultaneously. We include only one of the two interactions for state interventionism as they are highly collinear and capture the same aspect of financial allocation. We have chosen $\left(\frac{L_S}{GDP_S}\right)_{t-1}$ as we believe it to better approximate the degree to which finance is over-allocated to the state-owned enterprises.

Table 2: GMM estimates for all firms using Q model

$\left(\frac{I}{K}\right)_t$	**Constraint**	**Financial Depth**		**State Interventionism**				**Market Financing**		**Overall**
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10
Q_t	0.219***	0.219***	0.217***	0.217***	0.218***	0.218***	0.219***	0.224***	0.224***	0.212***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.031)	(0 .031)	(0.021)
IF_{t-1}	0.058***	0.060***	0.005	0.056***	0.029	0.057***	0.065***	0.079***	0.049**	0.025
	(0.018)	(0.018)	(0.021)	(0.018)	(0.019)	(0.018)	(0.018)	(0.019)	(0 .022)	(0.019)
$FinDepth_{t-1}$		-0.526***	-0.546***							-0.592***
		(0.177)	(0.177)							(0.158)
$IF_{t-1} \times FinDepth_{t-1}$			-1.242***							-0.647***
			(0.228)							(0.212)
$\left(\frac{L_S}{L_T}\right)_{t-1}$				0.493***	0.514***					
				(0.087)	(0.087)					
$IF_{t-1} \times \left(\frac{L_S}{L_T}\right)_{t-1}$					0.784***					
					(0.181)					
$\left(\frac{L_S}{GDP_S}\right)_{t-1}$						0.102***	0.109***			0.053
						(0.039)	(0.039)			(0.033)
$IF_{t-1} \times \left(\frac{L_S}{GDP_S}\right)_{t-1}$							0.154**			0.223***
							(0.076)			(0.066)
$\left(\frac{CL}{GL}\right)_{t-1}$								0.000*	0.000*	0.000
								(0.000)	(0 .000)	(0.000)
$IF_{t-1} \times \left(\frac{CL}{GL}\right)_{t-1}$									- 0.001**	-0.000**
									(0 .000)	(0.000)
Sargan test (p-value)	0.52	0.96	0.95	0.97	0.97	0.96	0.96	0.85	0.94	0.93
Hansens J (p-value)	0.41	0.96	0.96	0.97	0.98	0.96	0.97	0.96	0.95	0.88
Res AR(1) (p-value)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Res AR(2) (p-value)	0.33	0.71	0.74	0.73	0.81	0.69	0.70	0.65	0.65	0.60
Time/Province/Sector Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
n	38,912	38,912	38,912	38,912	38,912	38,912	38,912	35,214	35,214	35,214

Notes: (1) * p<0.10, ** p<0.05, *** p<0.01.

(2) All estimates are robust to heteroscedasticity and clustered at the firm level.

(3) Instruments are lagged marginal value product of capital dated $t-3$ and deeper.

Across all regressions, Q is positive and significant at the 1 percent level suggesting that firms' investment strategies are determined by the underlying business fundamentals. In column 1, we include only the measure of financial composition *mix*, *IF*. It is positive and significant at the 1 percent level. This association suggests that there is a cost of capital differential between internal and external finance and firms with cheaper internal funds invest more. It may not be the case that *all* firms are strictly financially constrained (favoring using internal funds relative to external formal or informal capital as a business strategy) but, as internal funds are limited, many of these firms may invest higher amounts if access to formal external finance is improved. This positive association can, in the majority of cases, identify firms with financially constrained behaviour.

Focusing on *FinDepth*, it can be seen that without the interaction, it has a negative and significant effect on investment. This could be explained by the fact that in provinces where credit to the private sector is high, many of the private sector firms are small and only undertake small-valued investments relative to SOEs and foreign firms (many of whom may dominate provincial economies). This may explain the direct negative relationship. More important is the interaction between *FinDepth* and *IF*. It is negative and statistically significant at the 1 percent level in line with our a priori expectations. The degree to which firms are reliant on using internal finance is decreasing in the volume of credit to the private sector in the province. This is a positive story for financial development. The *IF* variable is no longer significant once the interaction term is included. This suggests that firms' dependence on the use of internal resources for investment, and the degree to which there is a cost of capital differential between internal and external funds, is completely

determined by the volume of credit available to private sector operators.

Considering the measures of state interventionism in finance, we find a positive and significant relationship between investment and the levels of both measures. This can be explained in the same manner as above (investment volume per firm is higher in provinces with more SOEs). The interactions of the SOE loan share, $\frac{L_S}{L_T}$, and the SOE loan share relative to the SOE output share, $\frac{L_S}{GDP_S}$, are positive and significant in all regressions (at the 1 percent level for the former and the 5 percent level for the latter). This suggests that the degree to which firms face financing constraints and a reliance on internal funds is increasing in the use of finance by the SOEs. In scarce capital markets, state firms and private firms compete for limited financial resources.

The final indicator of financial development measures the degree of market financing in the provincial economy, $\frac{CL}{GL}$. On its own, it has a positive and significant relationship with investment, indicating that higher levels of market financing are associated with higher investment. The interaction term with IF is negative and significant at the 1 percent level.[10] Financing constraints decrease as lending is increasingly allocated on market based terms.

Column 10 presents the estimates when all three financial development indicators are included simultaneously. On its own *IF* is insignificant but the interaction with FinDepth is negative and significant, the interaction with $\frac{L_S}{GDP_S}$ is positive and significant and the interaction with $\frac{CL}{GL}$ is negative and significant. Financing constraints are completely

[10]The magnitude of the coefficient is small due to the fact that the average value of $\frac{CL}{GL}$ is higher than the other regressors in absolute terms.

dependent on the level of financial development and are decreasing in the provision of credit to the private sector, increasing in the use of finance by state-owned companies and decreasing in the share of lending allocated on market-based terms.

To demonstrate this dynamic and to identify the overall level of financial constraints on an annual basis, we estimate the marginal effect of *IF* on investment as follows:

$$\frac{\partial I}{\partial IF} = 0 + (-0.647) \cdot FinDepth + (0.223) \cdot \left(\frac{L_S}{GDP_S}\right) + (-0.0001) \left(\frac{CL}{GL}\right) \tag{10}$$

Using the annual average level of each of the provincial financial development indicators, we can chart the evolution of financing constraints in the Vietnamese economy over the sample period. The marginal effects are presented in table 3, the standard errors for the effect are calculated using a bootstrap method and the significance level is indicated. Overall, firms in Vietnam face a positive and significant financing constraint in 2002 and 2004, however, in 2006, no constraint is evident. In 2008, the cost of external capital is actually cheaper than the internal cost of capital and firms with a higher use of internal financing invest less. This suggests that the financial development that has taken place in Vietnam in recent years has had a positive effect on firms' investment activity by removing barriers to accessing external capital.

As our estimates only use one investment model, fundamental Q and one measure of financing constraints, *IF*, we test the robustness of our findings by: 1) re-estimating the model using a simple distributed lag accelerator model including *IF*; and 2) re-estimating both the Q and the accelerator model using cash flow as the indicator of financing con-

Table 3: Annual marginal effect of financing constraints on investment

Year	**Overall Marginal Effect**
2002	.051***
2004	.028***
2006	-.008
2008	-.066***
Overall	**.002**

Standard errors calculated using bootstrap methods on IF distribution

* p<0.10, ** p<0.05, *** p<0.01

straints (a well documented but critiqued approach). We present this purely as a robustness check on our main findings. These are presented in tables B.12, B.13, B.14 and table B.15 in Appendix B. The results are conclusive. Across all models, using both *IF* and cash flow, the interaction of constraints with *FinDepth* is negative and significant, the interaction with both measures of state interventionism is positive and significant and the interaction with market financing is negative and significant. This indicates that financing constraints are decreasing in credit to the private sector, increasing in the use of finance by SOEs and decreasing in the degree to which finance is allocated on market-based terms.

5.2. Results by firm characteristics

In this section, we investigate the distributional impact of financial development on financing constraints. We focus on private domestic firms, foreign firms, SMEs and service firms and test the interactions between financing constraints and financial development for each of these groups.

5.2.1. Private domestic firms and SMEs

Focusing on private domestic firms is important as previous research highlights the fact that these firms face higher financing constraints than foreign firms or state firms (Harrison and Mcmillan, 2003). In many cases, foreign investing firms bring external capital to invest in host economies and state firms benefit from easy access to capital through either implicit or explicit government guarantees. Private firms, especially non-listed firms, have more limited financing options and access credit mainly from domestic national or regional credit providers. Listed, large, state and foreign firms have ample access to international credit markets. Private domestic firms are also of interest as they are the backbone of any market economy and are expected to play an increasing role in driving economic activity in Vietnam in line with the economic reorientation away from the socialist structure.

Table 4 presents the results using only the sample of private domestic firms. The findings are identical to those for the sample as a whole. The Q statistic is positive and significant at the 1 percent level in all regressions. In column one, *IF* is positive and significant and the interactions individually and included together point to the same effects as identified for all firms. The interaction with *IF* and *FinDepth* is negative and

significant at the 1 percent level, the interaction with the indicators of state interventionism are positive and significant and the interaction with market financing is negative and significant. Interestingly the magnitude of the coefficients is higher for private domestic firms relative to all firms. This suggests that the benefits of financial development are more pronounced for domestic firms.

Table 4: GMM estimates for private domestic firms using Q model

$\left(\frac{I}{K}\right)_t$	**Constraint**	**Financial Depth**	**State Interventionism**		**Market Financing**	**Overall**
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Q_t	0.288***	0.285***	0.288***	0.288***	0.303***	0.302***
	(0.046)	(0.045)	(0.046)	(0.046)	(0.056)	(0.056)
IF_{t-1}	0.060***	-0.016	0.023	0.066***	0.039	0.005
	(0.023)	(0.027)	(0.025)	(0.023)	(0.029)	(0.032)
$FinDepth_{t-1}$		-0.595**				-1.059***
		(0.238)				(0.280)
$IF_{t-1}\times\ FinDepth_{t-1}$		-1.639***				-1.365***
		(0.309)				(0.371)
$\left(\frac{L_S}{L_T}\right)_{t-1}$			0.580***			
			(0.120)			
$IF_{t-1}\times\left(\frac{L_S}{L_T}\right)_{t-1}$			0.903***			
			(0.240)			
$\left(\frac{L_S}{GDP_S}\right)_{t-1}$				0.129**		0.078
				(0.052)		(0.055)
$IF_{t-1}\times\left(\frac{L_S}{GDP_S}\right)_{t-1}$				0.142		0.257**
				(0.099)		(0.109)
$\left(\frac{CL}{GL}\right)_{t-1}$					0.000**	0.001**
					(0 000)	(0.000)
$IF_{t-1}\times\left(\frac{CL}{GL}\right)_{t-1}$					-0.001***	-0.001*
					(0.000)	(0.000)
Sargan test (p-value)	0.85	0.80	0.82	0.84	0.84	0.81
Hansens J (p-value)	0.84	0.79	0.81	0.84	0.82	0.78
Res AR(1) (p-value)	0.0	0.0	0.0	0.0	0.0	0.0
Res AR(2) (p-value)	0.75	0.78	0.82	0.74	0.52	0.57
Time/Province/Sector Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
n	29,330	29,330	29,330	29,330	25,759	25,759

Notes: (1) * p<0.10, ** p<0.05, *** p<0.01.

(2) All estimates are robust to heteroscedasticity and clustered at the firm level.

(3) Instruments are lagged marginal value product of capital dated $t-3$ and deeper.

We now limit the sample to only private domestic SMEs. International research indicates that SMEs are the most constrained group in terms of accessing finance (Beck et al., 2006; Rand, 2007) and are expected to be major beneficiaries of financial development.

Our definition of an SME is a firm with less than 250 employees which is in line with the World Bank definition (Ayyagari et al., 2003). The results for the sample of SMEs are presented in table 5 and are in line with the findings for the overall sample and for private domestic firms. Constraints are decreasing with financing depth, increasing with state intervention in finance and decreasing in the degree of market oriented lending activity in the provincial economy. The magnitude of the coefficients is again higher suggesting that SMEs are affected to a greater degree than large domestic firms or state and foreign firms.

Table 5: GMM estimates for SMEs using Q model

$\left(\frac{I}{K}\right)_t$	**Constraint**	**Financial Depth**	**State Interventionism**		**Market Financing**	**Overall**
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Q_t	0.276***	0.273***	0.276***	0.276***	0.293***	0.274***
	(0.047)	(0.047)	(0.047)	(0.047)	(0 .059)	(0.055)
IF_{t-1}	0.057**	-0.026	0.016	0.061**	0.035	-0.001
	(0.024)	(0.030)	(0.027)	(0.025)	(0.031)	(0.033)
$FinDepth_{t-1}$		-0.625**				-1.134***
		(0.257)				(0.296)
$IF_{t-1} \times FinDepth_{t-1}$		-1.762***				-1.423***
		(0.335)				(0.398)
$\left(\frac{L_S}{L_T}\right)_{t-1}$			0.632***			
			(0.129)			
$IF_{t-1} \times \left(\frac{L_S}{L_T}\right)_{t-1}$			0.949***			
			(0.255)			
$\left(\frac{L_S}{GDP_S}\right)_{t-1}$				0.146**		0.081
				(0.057)		(0.059)
$IF_{t-1} \times \left(\frac{L_S}{GDP_S}\right)_{t-1}$				0.128		0.257**
				(0.105)		(0.114)
$\left(\frac{CL}{GL}\right)_{t-1}$					0.001**	0.001**
					(0.000)	(0.000)
$IF_{t-1} \times \left(\frac{CL}{GL}\right)_{t-1}$					-0.001***	-0.001**
					(0.000)	(0.000)
Sargan test (p-value)	0.91	0.86	0.85	0.89	0.92	0.67
Hansens J (p-value)	0.90	0.87	0.86	0.90	0.91	0.56
Res AR(1) (p-value)	0.0	0.0	0.0	0.0	0.0	0.0
Res AR(2) (p-value)	0.96	0.95	0.91	0.97	0.79	0.74
Time/Province/Sector Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
n	27,529	27,529	27,529	27,529	24,009	24,009

Notes: (1) * p<0.10, ** p<0.05, *** p<0.01.

(2) All estimates are robust to heteroscedasticity and clustered at the firm level.

(3) Instruments are lagged marginal value product of capital dated $t-3$ and deeper.

5.2.2. Foreign firms

In this subsection, we focus on determining whether or not financial development in the host economy affects foreign firms differently from private domestic firms. In many cases, foreign firms have ample access to international capital markets and are somewhat immune from domestic capital market developments. However, there is some evidence that foreign firms do compete with domestic firms for scarce capital resources in developing countries (Harrison and Mcmillan, 2003). As the number of foreign firms in the sample is only 6 percent with a further 2 percent joint ventures, we identify the effect on foreign firms by interacting a dummy variable, FOR, if the firm is solely foreign owned and JV if the firm is a joint venture, with the financing constraint measure and the financial development indicators. This ensures that the overall sample is representative while addressing issues of identification of the differential effect. The results for solely foreign firms are presented in table 6 and for joint ventures in table B.11 in Appendix B.

The interaction of *IF* and *FOR* is not significant. This indicates that foreign firms are no different to domestic firms in their use of internal finance. The interactions of *FOR* with the financial development indicators are insignificant with *FinDepth* and $\left(\frac{CL}{GL}\right)_{t-1}$ indicating that there is no differential effect for foreign firms in terms of the relationship between financing constraints and credit provided to the private sector or the degree of market financing of the economy.

There does seem to be some differential impact for foreign firms of state interventionism in financial markets. The interaction between *FOR, IF* and $\frac{L_S}{GDP_S}$ is significant and positive

Table 6: GMM estimates for solely foreign firms using Q model

$\left(\frac{I}{K}\right)_t$	**Constraint**	**Financial Depth**	**State Interventionism**		**Market Financing**	**Overall**
Q_t	0.219***	0.217***	0.218***	0.219***	0.225***	0.222***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.032)	(0.032)
IF_{t-1}	0.056***	-0.000	0.025	0.064***	0.045**	0.022
	(0.018)	(0.022)	(0.020)	(0.019)	(0.022)	(0.024)
FOR	-1.101	0.099	0.115	0.109	0.138	0.083
	(1.574)	(0.178)	(0.179)	(0.178)	(0.180)	(0.181)
$IF_{t-1}\times\ FOR$	0.031	0.079	0.056	0.001	0.081	0.088
	(0.050)	(0.050)	(0.050)	(0.058)	(0.060)	(0.071)
$FinDepth_{t-1}$		-0.537***				-0.881***
		(0.179)				(0.201)
$FOR\times\ FinDepth_{t-1}$		-0.155				0.879**
		(0.287)				(0.386)
$IF_{t-1}\times\ FinDepth_{t-1}$		-1.281***				-1.156***
		(0.239)				(0.277)
$IF_{t-1}\times FOR\times\ FinDepth_{t-1}$		0.594				0.003
		(0.656)				(0.888)
$\left(\frac{L_S}{L_T}\right)_{t-1}$			0.514***			
			(0.088)			
$IF_{t-1}\times\left(\frac{L_S}{L_T}\right)_{t-1}$			0.800***			
			(0.185)			
$IF_{t-1}\times FOR\times\left(\frac{L_S}{L_T}\right)_{t-1}$			-0.380			
			(0.655)			
$FOR\times\left(\frac{L_S}{L_T}\right)_{t-1}$			0.025			
			(0.326)			
$\left(\frac{L_S}{GDP_S}\right)_{t-1}$				0.116***		0.075*
				(0.041)		(0.043)
$IF_{t-1}\times\left(\frac{L_S}{GDP_S}\right)_{t-1}$				0.179**		0.261***
				(0.079)		(0.085)
$IF_{t-1}\times FOR\times\left(\frac{L_S}{GDP_S}\right)_{t-1}$				-0.416*		-0.396*
				(0.214)		(0.224)
$FOR\times\left(\frac{L_S}{GDP_S}\right)_{t-1}$				-0.147		-0.108
				(0.113)		(0.116)
$\left(\frac{CL}{GL}\right)_{t-1}$					0.000*	0.000**
					(0.000)	(0.000)
$IF_{t-1}\times\left(\frac{CL}{GL}\right)_{t-1}$					-0.001**	-0.000
					(0.000)	(0.000)
$IF_{t-1}\times FOR\times\left(\frac{CL}{GL}\right)_{t-1}$					0.001	0.001
					(0.001)	(0.001)
$FOR\times\left(\frac{CL}{GL}\right)_{t-1}$					-0.000	-0.001**
					(0.000)	(0.000)
Sargan test (p-value)	0.96	0.95	0.98	0.97	0.94	0.96
Hansens J (p-value)	0.96	0.95	0.97	0.97	0.94	0.96
Res AR(1) (p-value)	0.0	0.0	0.0	0.0	0.0	0.0
Res AR(2) (p-value)	0.70	0.75	0.81	0.70	0.65	0.70
Time/Province/Sector Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
n	38,912	38,912	38,912	38,912	35,214	35,214

Notes: (1) * p<0.10, ** p<0.05, *** p<0.01.

(2) All estimates are robust to heteroscedasticity and clustered at the firm level.

(3) Instruments are lagged marginal value product of capital dated $t-3$ and deeper.

at the 10 percent level. As the interaction between IF and $\frac{L_S}{GDP_S}$ is negative and significant, combining these effects suggests that the increase in financing constraints for domestic firms that occurs due to allocations of finance to SOEs is lessened for foreign firms. The magnitude of the coefficients indicate that the effect is actually nearly eliminated for foreign firms. This implies that foreign firms do not compete with SOEs for capital. An increase in the share of lending to SOEs does not affect the use of internal resources for foreign firms.[11] On this evidence, SOEs compete with domestic private firms, not foreign firms, for finance.

5.2.3. Services firms

The final group we evaluate are firms in service sectors. There are a number of reasons why service firms may interact differently with capital markets as compared to manufacturing firms and industrial firms. Service firms have different requirements for technology and capital. In some cases, where manufacturing firms require significant initial sunk investment costs, banks may view the risk profile of these firms differently. Service firms, especially those that are not internationally tradeable, like professional services or retail, are less exposed to international competition. This alters the risk profile of lending to these sectors for financial institutions and impacts their access to finance.

For these reasons, it is interesting to explore the differing effect of financial development on investment financing for services. To undertake this analysis, we define a binary indicator for whether or not a firm is in a market service sector, *SERV* (NACE 50 +).

[11]The results for joint ventures do not indicate and differential effects relative to private domestic firms.

This is interacted with the variables of interest and the results are presented in table 7.

While *IF* is positive and significant, the interaction with *IF* and *SERV* is negative and significant. This indicates that services firms face lower financing constraints than manufacturing and industrial firms. The interaction of *IF* and *FinDepth* is significant and negative both individually and in the regression controlling for all three effects. However, the interaction of *IF*, *FinDepth* and *SERV* is also negative and significant suggesting that while all firms benefit from a reduction in financing constraints due to increases in credit to the private sector, services firms experience a further reduction.

In the overall regression, the interaction of *IF* and state interventionism is insignificant but the interaction between *IF*, *SERV* and state interventionism is significant and positive. This suggests that the SOE use of credit deprives services firms of financing not manufacturing firms. The same finding in essence holds for market financing with the interaction of *IF* and $\frac{CL}{GL}$ insignificant and the interaction of *IF*, *SERV* and $\frac{CL}{GL}$ negative and significant.

These findings suggest that while all firms face a reduction in financing constraints with an increase in credit available to the private sector, services firms benefit from a reallocation of credit from the SOE sector and from more commercial allocation of financing.

5.3. Robustness check using provincial clustering

In this section, as a robustness check, we re-estimate the model clustering the errors at the province level. This controls for factors in the error term that are common across firms within a province. We conduct the analysis on the sample of all firms, private domestic and SMEs. The results are presented in table 8. The main findings are robust to clustering

Table 7: GMM estimates for service sector firms using Q model

$\left(\frac{I}{K}\right)_t$	**Constraint**	**Financial Depth**	**State Interventionism**		**Market Financing**	**Overall**
Q_t	0.287***	0.286***	0.290***	0.286***	0.304***	0.305***
	(0.045)	(0.046)	(0.047)	(0.045)	(0.056)	(0.056)
IF_{t-1}	0.114***	0.074**	0.092***	0.112***	0.128***	0.107***
	(0.027)	(0.030)	(0.029)	(0.027)	(0.036)	(0.037)
SERV	-0.015	-0.036	-0.026	-0.011	0.011	-0.021
	(0.069)	(0.072)	(0.071)	(0.069)	(0.076)	(0.077)
$IF_{t-1} \times SERV$	-0.134***	-0.251***	-0.171***	-0.114**	-0.237***	-0.278***
	(0.047)	(0.060)	(0.052)	(0.048)	(0.062)	(0.072)
$FinDepth_{t-1}$		-0.379				-0.550*
		(0.258)				(0.302)
$SERV \times FinDepth_{t-1}$		-0.550*				-1.345***
		(0.323)				(0.390)
$IF_{t-1} \times FinDepth_{t-1}$		-0.911**				-0.842**
		(0.363)				(0.415)
$IF_{t-1} \times SERV \times FinDepth_{t-1}$		-2.013***				-1.636**
		(0.657)				(0.800)
$\left(\frac{L_S}{L_T}\right)_{t-1}$			0.417***			
			(0.142)			
$SERV \times \left(\frac{L_S}{L_T}\right)_{t-1}$			0.399			
			(0.250)			
$IF_{t-1} \times \left(\frac{L_S}{L_T}\right)_{t-1}$			0.465			
			(0.286)			
$IF_{t-1} \times SERV \times \left(\frac{L_S}{L_T}\right)_{t-1}$			1.045**			
			(0.490)			
$\left(\frac{L_S}{GDP_S}\right)_{t-1}$				0.113*		0.124*
				(0.058)		(0.064)
$SERV \times \left(\frac{L_S}{GDP_S}\right)_{t-1}$				0.046		-0.120
				(0.106)		(0.113)
$IF_{t-1} \times \left(\frac{L_S}{GDP_S}\right)_{t-1}$				0.002		0.023
				(0.123)		(0.134)
$IF_{t-1} \times SERV \times \left(\frac{L_S}{GDP_S}\right)_{t-1}$				0.304		0.561**
				(0.202)		(0.232)
$\left(\frac{CL}{GL}\right)_{t-1}$					0.001**	0.000
					(0.000)	(0.000)
$SERV \times \left(\frac{CL}{GL}\right)_{t-1}$					-0.000	0.000
					(0.000)	(0.000)
$IF_{t-1} \times \left(\frac{CL}{GL}\right)_{t-1}$					-0.000	0.000
					(0.000)	(0.000)
$IF_{t-1} \times SERV \times \left(\frac{CL}{GL}\right)_{t-1}$					-0.002***	-0.002***
					(0.001)	(0.001)
Sargan test (p-value)	0.85	0.82	0.85	0.84	0.85	0.84
Hansens J (p-value)	0.85	0.80	0.82	0.84	0.83	0.82
Res AR(1) (p-value)	0.0	0.0	0.0	0.0	0.0	0.0
Res AR(2) (p-value)	0.77	0.86	0.88	0.75	0.54	0.59
Time/Province/Sector Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
n	29,330	29,330	29,330	29,330	25,759	25,759

Notes: (1) * p<0.10, ** p<0.05, *** p<0.01.

(2) All estimates are robust to heteroscedasticity and clustered at the firm level.

(3) Instruments are lagged marginal value product of capital dated $t-3$ and deeper.

at the province level with constraints decreasing in credit to the private sector, increasing in the use of credit by the SOEs and decreasing in the degree of lending on commercial terms.

Table 8: GMM estimates using province clustering with Q model

	All firms	Private domestic	SMEs
Q_t	0.079***	0.083***	0.084***
	(0.014)	(0.016)	(0.017)
IF_{t-1}	-0.042*	-0.041*	-0.046*
	(0.022)	(0.024)	(0.027)
$FinDepth_{t-1}$	-0.265**	-0.265*	-0.259*
	(0.130)	(0.137)	(0.143)
$IF_{t-1} \times FinDepth_{t-1}$	-0.449***	-0.476***	-0.523***
	(0.139)	(0.169)	(0.169)
$\left(\frac{L_S}{GDP_S}\right)_{t-1}$	0.015	0.023	0.022
	(0.060)	(0.072)	(0.074)
$IF_{t-1} \times \left(\frac{L_S}{GDP_S}\right)_{t-1}$	0.107*	0.155*	0.154**
	(0.064)	(0.080)	(0.077)
$\left(\frac{CL}{GL}\right)_{t-1}$	0.000***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
$IF_{t-1} \times \left(\frac{CL}{GL}\right)_{t-1}$	-0.000**	-0.000*	-0.000*
	(0.000)	(0.000)	(0.000)
Hansens J (p-value)	0.85	0.80	0.79
Time/Province/Sector Dummies	Yes	Yes	Yes
Sector-Province Dummies	Yes	Yes	Yes
n	35,419	29,330	29,330

Notes: (1) * p<0.10, ** p<0.05, *** p<0.01.

(2) All estimates are robust to heteroscedasticity and clustered at the province level.

(3) Instruments are lagged marginal value product of capital dated $t-3$ and deeper.

6. Conclusions

Facilitating access to investment finance for firms is one of the main mechanisms through which economies can benefit from financial development (Levine, 1997, 2005). By reducing imperfections in capital markets, financial reform can have a real effect on output by facilitating higher and more efficient investment by firms.

In this paper, we build on the existing research of Rajan and Zingales (1998), Love (2003) and Love and Zicchino (2006) and undertake the following: we estimate the effect of financing constraints on investment for a sample of firms in a developing country, using a measure of the firms' financial composition (Kashyap et al., 1993) to test for financing constraints. This explicitly controls for access to and the use of internal and external finance. Our data are taken from the Vietnamese Enterprise Survey and cover all firm sizes (small, medium and large) across private-, state- and foreign-owned firms in manufacturing, industrial and market service sectors. We measure financial development at the provincial level in Vietnam focusing on both financial depth (measured as credit to the private sector relative to output) as well as financial resource allocation. Our allocation measures, taken from Guariglia (2008), focus on state interventionism in finance and the degree of market-based lending in the economy. Our research is novel in that it is the first time that indicators of financial development measured within-country are linked to investment by small- and medium-sized, non-listed firms in a developing economy across both manufacturing and services.

We find that the neoclassical Q model performs as expected in explaining firms invest-

ment decisions with a positive and significant coefficient for Q. Firms' business strategies appear to follow standard neoclassical profit maximisation behaviour. When we include our main measure of financing constraints, the use of internal relative to external finance by the firm, we find a positive and significant association with investment. This is indicative of a differential cost of capital between internal funds and external funds. The interactions of financing constraints and financial development indicate constraints are decreasing in credit provided to the private sector, increasing in the use of financing by SOEs and decreasing in the degree to which finance is allocated on market-based terms. Increasing the volume of credit to the private sector and improving financial resource allocation decrease firm financing constraints.

We also investigate the distributional impact of financial development on financing constraints across firms. We find that the magnitude of the effects of financial development, across all measures of financial depth and resource allocation, are higher for private domestic and small- and medium-sized enterprises. There does not appear to be any differential effect for foreign firms of increases in financial depth or the allocation of credit on market-based terms. However, we do find foreign firms are not in competition with state firms for credit. It appears competition for domestic capital is between private and state firms. Focusing on services, the results indicate that service firms are less credit constrained and are the main beneficiaries of increases in financial depth and improvements in resource allocation.

These conclusions provide evidence that financial development alters the investment behaviour of firms by improving access to external capital. As financial development

increases, the differential cost of capital between internal and external finance is eliminated. This is an important finding from a development perspective. Financial reform policies can provide real growth benefits through firm investment activity. As the effect is greatest for SMEs and private domestic firms, this is further evidence of the benefits of financial development to the real economy. However, the backdrop of this research in Vietnam is a period of macroeconomic stability in which the authorities have balanced the capital market reform agenda against wider macroeconomic stability. If financial development is to continue to provide a growth impetus, stability in the wider macro environment as well as stability in the banking sector are required.

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Appendix A. Data and Sample Selection

The Vietnamese enterprise survey, the main data source used in this analysis, has a number of significant outliers within the sample. In line with previous literature and good

econometric practise, we undertaken a number of steps to select an appropriate sample. Following Love (2003) and Harrison et al. (2004) we perform the following additional steps to select the main sample:

- Drop all firm year observations with negative cash stocks, sales and negative debt or missing data on investment.

- Drop all observations which have an investment to capital ratio of greater than 10. While Love (2003) restricts the data set to those with investment to capital less than 2.5, we assume that in an emerging market context, there may be firms which are investing significantly and are in a high growth phase. We therefore view the inclusion of these firms as valid.

- Drop all observations for which the profit to capital and the sales to capital ratio is greater than 20. This omits firms for which capital is not a significant driver of sales growth. These firms do not conform particularly well to neoclassical investment models.

- We also drop observations with a cash stock to capital ratio of more than 20 and firms that report negative fixed assets.

- We exclude financial institutions, firms engaged in recreational, sporting and other non-market services and firms in the agricultural sectors. Our sample is therefore broadly defined as including those firms in industry and market services sectors.

These conditions provide us with a sample that is reflective of the underpinnings of the theoretical model. The definition of the variables used in the paper are presented in table A.9 below.

Table A.9: **Overview of variables in empirical model**

Variable	**Description**	**Source**
$\frac{I}{K}$	*Investment to beginning period capital stock*	VES
$\frac{S}{K}$	*Total sales to beginning period capital stock*	VES
$\frac{CF}{K}$	*Net income plus depreciation*	VES
HHI_j	*The Herfindahl index of revenue concentration (4 digit sector)*	VES
$FinDepth$	*Credit to the private sector as a percentage of output*	VES
(L_S)	*SOE Share of Outstanding Loans*	VES
$\left(\frac{L_S}{GDP_S}\right)$	*SOE Loans Share relative to SOE Output Share*	VES
$\left(\frac{CL}{GL}\right)$	*% of Loans by Commercial Banks to % Loans by Gov Banks*	VES
FOR	*Firms with 100% Foreign Ownership*	VES
JV	*Joint ventures with foreign companies*	VES
$SERV$	*Market Services Sectors*	VES
SME	*Firms less than 250 employees*	VES

Table A.10: **Sample Attrition**

Year	No of Firms	% of Total
2002	22,050	8%
2003	28,588	10%
2004	37,192	13%
2005	45,024	15%
2006	61,560	21%
2007	41,048	14%
2008	57,398	20%
Source: VES		

Appendix B. Additional Regression Results

In this section, we present additional supporting regression analysis that provides for robustness tests of the main findings.

Appendix B.1. Joint Venture with Foreign and Domestic

Appendix B.2. Accelerator Model with IF

Table B.11: GMM Estimates - ***Foreign-Domestic Joint Ventures*** - **Q Model**

$\left(\frac{I}{K}\right)_t$	**Constraint**	**Financial Depth**	**State Interventionism**		**Market Financing**	**Overall**
Q_t	0.219***	0.217***	0.218***	0.219***	0.224***	0.223***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.031)	(0.031)
IF_{t-1}	0.058***	0.003	0.028	0.065***	0.049**	0.027
	(0.018)	(0.021)	(0.020)	(0.018)	(0.022)	(0.023)
JV	-0.163	-0.156	-0.127	-0.181	-0.171	-0.175
	(0.171)	(0.173)	(0.173)	(0.171)	(0.180)	(0.179)
$IF_{t-1} \times JV$	0.016	0.069	0.018	0.041	-0.004	0.037
	(0.072)	(0.088)	(0.075)	(0.083)	(0.089)	(0.099)
$FinDepth_{t-1}$		-0.552***				-0.854***
		(0.177)				(0.197)
$IF_{t-1} \times FinDepth_{t-1}$		-1.272***				-1.163***
		(0.232)				(0.271)
$IF_{t-1} \times JV \times FinDepth_{t-1}$		1.178				0.911
		(0.895)				(1.002)
$JV \times FinDepth_{t-1}$		0.229				0.495
		(0.496)				(0.556)
$\left(\frac{L_S}{L_T}\right)_{t-1}$			0.522***			
			(0.088)			
$IF_{t-1} \times \left(\frac{L_S}{L_T}\right)_{t-1}$			0.787***			
			(0.183)			
$IF_{t-1} \times JV \times \left(\frac{L_S}{L_T}\right)_{t-1}$			0.361			
			(1.191)			
$JV \times \left(\frac{L_S}{L_T}\right)_{t-1}$			-0.474			
			(0.422)			
$\left(\frac{L_S}{GDP_S}\right)_{t-1}$				0.114***		0.076*
				(0.040)		(0.043)
$IF_{t-1} \times \left(\frac{L_S}{GDP_S}\right)_{t-1}$				0.157**		0.233***
				(0.077)		(0.083)
$IF_{t-1} \times JV \times \left(\frac{L_S}{GDP_S}\right)_{t-1}$				0.087		0.020
				(0.305)		(0.329)
$JV \times \left(\frac{L_S}{GDP_S}\right)_{t-1}$				-0.191		-0.189
				(0.145)		(0.148)
$\left(\frac{CL}{GL}\right)_{t-1}$					0.000*	0.000**
					(0.000)	(0.000)
$IF_{t-1} \times \left(\frac{CL}{GL}\right)_{t-1}$					-0.001**	-0.000
					(0.000)	(0.000)
$IF_{t-1} \times JV \times \left(\frac{CL}{GL}\right)_{t-1}$					0.000	-0.000
					(0.001)	(0.001)
$JV \times \left(\frac{CL}{GL}\right)_{t-1}$					0.001	0.000
					(.001)	(0.001)
Sargan test (p-value)	0.96	0.96	0.98	0.92	0.94	0.95
Hansens J (p-value)	0.96	0.96	0.98	0.97	0.95	0.96
Res AR(1) (p-value)	0.0	0.0	0.0	0.0	0.0	0.0
Res AR(2) (p-value)	0.71	0.75	0.82	0.71	0.66	0.71
Time/Province/Sector Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
n	38,912	38,912	38,912	38,912	35,214	35,214

* p<0.10, ** p<0.05, *** p<0.01

All estimates are robust to heteroskedasticity and clustered at the firm level

Instruments are lagged marginal value product of capital dated $t-3$ and deeper

Table B.12: GMM Estimates - ***All Firms*** - **Simple Accelerator Model**

	Constraint	**Financial Depth**		**State Interventionism**				**Market Financing**		**Overall**
(Δy_t)	2.751***	2.724***	2.716***	2.711***	2.720***	2.761***	2.784***	3.038***	3.039***	3.055***
	(0.502)	(0.496)	(0.495)	(0.493)	(0.495)	(0.507)	(0.513)	(0.624)	(0 .624)	(0.633)
IF_{t-1}	0.124***	0.129***	0.097***	0.120***	0.096***	0.125***	0.146***	0.198***	0.152***	0.149***
	(0.027)	(0.027)	(0.031)	(0.026)	(0.028)	(0.027)	(0.029)	(0.034)	(0 .038)	(0.041)
$FinDepth_{t-1}$		-1.392***	-1.401***							-1.653***
		(0.341)	(0.341)							(0.412)
$IF_{t-1} \times FinDepth_{t-1}$			-0.724**							-0.771*
			(0.343)							(0.416)
$\left(\frac{L_S}{L_T}\right)_{t-1}$				0.667***	0.687***					
				(0.141)	(0.142)					
$IF_{t-1} \times \left(\frac{L_S}{L_T}\right)_{t-1}$					0.707***					
					(0.262)					
$\left(\frac{L_S}{GDP_S}\right)_{t-1}$						-0.060	-0.046			-0.105
						(0.071)	(0.071)			(0.087)
$IF_{t-1} \times \left(\frac{L_S}{GDP_S}\right)_{t-1}$							0.387***			0.400***
							(0.134)			(0.148)
$\left(\frac{CL}{GL}\right)_{t-1}$								0.000	0.000	0.000*
								(0.000)	(0 .000)	(0.000)
$IF_{t-1} \times \left(\frac{CL}{GL}\right)_{t-1}$									- 0.001**	-0.001**
									(0 .000)	(0.000)
Sargan test (p-value)	0.57	0.37	0.37	0.38	0.37	0.40	0.40	0.61	0.62	0.60
Hansens J (p-value)	0.41	0.35	0.35	0.35	0.34	0.38	0.38	0.53	0.54	0.51
Res AR(1) (p-value)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Res AR(2) (p-value)	0.33	0.23	0.22	0.21	0.19	0.23	0.22	0.41	0.41	0.36
Time/Province/Sector Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
n	38,828	38,828	38,828	38,828	38,828	38,828	38,828	35,147	35,147	35,147

* p<0.10, ** p<0.05, *** p<0.01

All estimates are robust to heteroskedasticity and clustered at the firm level

Instruments are lagged marginal value product of capital dated $t-3$ and deeper

Appendix B.3. All firms - cash flow estimates of constraints

Table B.13: GMM Estimates - ***All Firms*** - **Q Model**

$\left(\frac{I}{K}\right)_t$	**Constraint**	**Financial Depth**	**State Interventionism**		**Market Financing**	**Overall**
Q_t	0.083***	0.032***	0.023**	0.028***	0.036***	0.041***
	(0.023)	(0.010)	(0.010)	(0.009)	(0.013)	(0.011)
$\left(\frac{CF}{K}\right)_t$	0.368***	0.007	0.180*	0.168	0.185**	0.086
	(0.078)	(0.103)	(0.104)	(0.119)	(0.093)	(0.122)
$FinDepth_{t-1}$		-0.712***				-1.041***
		(0.169)				(0.196)
$\left(\frac{CF}{K}\right)_t \times FinDepth_{t-1}$		-2.099*				-3.499***
		(1.209)				(1.076)
$\left(\frac{L_S}{L_T}\right)_{t-1}$			-0.595***			
			(0.081)			
$\left(\frac{CF}{K}\right)_t \times \left(\frac{L_S}{L_T}\right)_{t-1}$			0.145			
			(1.210)			
$\left(\frac{L_S}{GDP_S}\right)_{t-1}$				-0.097***		-0.108***
				(0.030)		(0.034)
$\left(\frac{CF}{K}\right)_t \times \left(\frac{L_S}{GDP_S}\right)_{t-1}$				-0.557		1.209***
				(0.713)		(0.211)
$\left(\frac{CL}{GL}\right)_{t-1}$					0.001***	0.001***
					(0.000)	(0.000)
$\left(\frac{CF}{K}\right)_t \times \left(\frac{CL}{GL}\right)_{t-1}$					-0.001***	-0.001*
					(0.000)	(0.000)
Sargan test (p-value)	0.22	0.10	0.06	0.18	0.41	0.83
Hansens J (p-value)	0.10	0.08	0.20	0.12	0.18	0.76
Res AR(1) (p-value)	0.0	0.0	0.0	0.0	0.0	0.0
Res AR(2) (p-value)	0.73	0.74	0.85	0.99	0.96	0.61
Time/Province/Sector Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
n	51,871	42,517	52,482	52,482	45,356	38,121

* p<0.10, ** p<0.05, *** p<0.01

All estimates are robust to heteroskedasticity and clustered at the firm level

Instruments are lagged CF/K, sales to capital dated $t-3$ and deeper,

as well as lags of variables in main equation where correct

Table B.14: GMM Estimates - ***All Firms*** - **Simple Accelerator Model**

$\left(\frac{I}{K}\right)_t$	**Constraint**	**Financial Depth**	**State Interventionism**		**Market Financing**	**Overall**
(Δy_t)	1.796***	0.243**	0.192*	0.273**	0.458***	0.400***
	(0.525)	(0.096)	(0.100)	(0.123)	(0.171)	(0.133)
$\left(\frac{CF}{K}\right)_t$	0.421***	-0.116	0.245**	0.162	0.230**	0.141
	(0.131)	(0.163)	(0.098)	(0.119)	(0.089)	(0.116)
$FinDepth_{t-1}$		-0.743***				-0.985***
		(0.171)				(0.206)
$\left(\frac{CF}{K}\right)_t \times FinDepth_{t-1}$		-6.331***				-3.484***
		(1.192)				(1.043)
$\left(\frac{L_S}{L_T}\right)_{t-1}$			-0.552***			
			(0.099)			
$\left(\frac{CF}{K}\right)_t \times \left(\frac{L_S}{L_T}\right)_{t-1}$			0.302			
			(1.219)			
$\left(\frac{L_S}{GDP_S}\right)_{t-1}$				-0.083**		-0.089**
				(0.033)		(0.036)
$\left(\frac{CF}{K}\right)_t \times \left(\frac{L_S}{GDP_S}\right)_{t-1}$				-0.909		1.147***
				(0.679)		(0.203)
$\left(\frac{CL}{GL}\right)_{t-1}$					0.001***	0.001***
					(0.000)	(0.000)
$\left(\frac{CF}{K}\right)_t \times \left(\frac{CL}{GL}\right)_{t-1}$					-0.001***	-0.001**
					(0.000)	(0.000)
Sargan test (p-value)	0.31	0.25	0.05	0.19	0.364	0.449
Hansens J (p-value)	0.22	0.27	0.11	0.14	0.352	
Res AR(1) (p-value)	0.0	0.0	0.0	0.0	0.0	0.0
Res AR(2) (p-value)	0.05	0.68	0.94	0.89	0.507	0.399
Time/Province/Sector Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
n	92,281	42,441	52,356	52,356	45,250	38,055

* p<0.10, ** p<0.05, *** p<0.01

All estimates are robust to heteroskedasticity and clustered at the firm level

Instruments are lagged CF/K, sales to capital dated $t-3$ and deeper,

as well as lags of variables in main equation where correct

Table B.15: GMM Estimates - ***Robustness Checks*** - **All Models**

$\left(\frac{I}{K}\right)_t$	**Q-IF**	**Q-CF**	**A-IF**	**Q-CF**
Q	0.112***	0.041***		
	(0.011)	(0.011)		
lnsales			3.055***	0.400***
			(0.633)	(0.133)
$FinDepth_{t-1}$	-0.592***	-1.041***	-1.653***	-0.985***
	(0.158)	(0.196)	(0.412)	(0.206)
$\left(\frac{L_S}{GDP_S}\right)_{t-1}$	0.053	-0.108***	-0.105	-0.089**
	(0.033)	(0.034)	(0.087)	(0.036)
$\left(\frac{CL}{GL}\right)_{t-1}$	0.000	0.001***	0.000*	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
IF_{t-1}	0.025		0.149***	
	(0.019)		(0.041)	
$IF_{t-1} \times FinDepth_{t-1}$	-0.647***		-0.771*	
	(0.212)		(0.416)	
$IF_{t-1} \times \left(\frac{L_S}{GDP_S}\right)_{t-1}$	0.223***		0.400***	
	(0.066)		(0.148)	
$IF_{t-1} \times \left(\frac{CL}{GL}\right)_{t-1}$	-0.000**		-0.001**	
	(0.000)		(0.000)	
$\left(\frac{CF}{K}\right)_{t-1} \times$		0.086		0.141
		(0.122)		(0.116)
$\left(\frac{CF}{K}\right)_{t-1} \times FinDepth_{t-1}$		-3.499***		-3.484***
		(1.076)		(1.043)
$\left(\frac{CF}{K}\right)_{t-1} \times \left(\frac{L_S}{GDP_S}\right)_{t-1}$		1.209***		1.147***
		(0.211)		(0.203)
$\left(\frac{CF}{K}\right)_{t-1} \times \left(\frac{CL}{GL}\right)_{t-1}$		-0.001*		-0.001**
		(0.000)		(0.000)
Sargan test (p-value)	0.92	0.83	0.59	0.60
Hansens J (p-value)	0.87	0.76	0.50	0.57
Res AR(1) (p-value)	0.0	0.0	0.0	0.0
Res AR(2) (p-value)	0.59	0.60	0.36	0.36
Time/Province/Sector Dummies	Yes	Yes	Yes	Yes
Sector-Province Dummies	Yes	Yes	Yes	Yes
n	35,124	38,121	35,147	38,055

* p<0.10, ** p<0.05, *** p<0.01

All estimates are robust to heteroskedasticity, clustered at the firm level

Instruments are lagged marginal value product

of capital dated and lags of variables in main equation

Institute for International Integration Studies
The Sutherland Centre, Trinity College Dublin, Dublin 2, Ireland