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# Abstract[*]

This paper presents an integrated overview of the literature linking institutions, financial development and economic growth. From the large body of research on institutional development, the paper first selects those contributions that make it possible to study the role of institutional arrangements in ameliorating/worsening the information frictions and transaction costs that characterize the development of financial markets. The paper then investigates the theoretical mechanisms by which these specific frictions affect economic growth and presents the stock of empirical evidence quantifying the impact of institutions on growth through financial development.

**JEL classifications:** G14, G28, G38, O16, O43

**Keywords:** Financial development, Financial frictions, Property rights, Contract enforcement, Transaction costs, Institutions, Economic growth

# 1 Introduction

Since at least the seminal works of Williamson (1985), North (1990), and, more recently, Acemoglu, Johnson, and Robinson (2005), institutions have been identified as the fundamental cause of long run economic growth.[1] They are viewed as the legal and social rules that govern economic systems, and, because of this intrinsic nature, they embody the structure of incentives in societies. Accordingly, the institutional theory of development has aimed at understanding how different rules and norms reward the creation of markets and other growth-enhancing activities.

This understanding is, however, far from complete, mainly due to the complex and multidimensional links between institutions and economic growth. In this survey we contribute towards this understanding by concentrating on one of these links: the level of financial development, understood in this work as the severity of financial market frictions. We first review the various channels studied in the literature through which institutions determine this level. And then we account for the various ways in which growth may be influenced by the level of financial development. The idea that well-functioning financial markets may be conducive to economic progress can be traced back to at least Bagehot (1873) and Schumpeter (1911, 1939),[2] although it was the development of formal models, comprehensive databases and statistical techniques that allowed economists to start disentangling the precise mechanisms by which this happens. That institutions matter for financial development is also an old idea, though one that has received considerably less attention. Simply put, poorly developed financial markets are characterized by high information and transaction costs, and institutions matter to the extent that they are the fundamental roots of these costs.[3]

The main goal of this work is to present an integrated account of the interlinkages between institutions, finance and growth. To our knowledge, this is the first attempt to present such an

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[1]See also the massive volume by Menard and Shirley (2005) for a review of the New Institutional Economics literature developed in the last 30 years. A concise overview of the competing hypotheses of development, namely, institutions, geography and policies can be found in Easterly and Levine (2003). See also Rodrik, Subramanian, and Trebbi (2004) who present empirical evidence favoring the institutions view and Glaeser, La Porta, Lopez-de Silanes, and Shleifer (2004) who underplay the role of institutions in favor of human capital and policies. Acemoglu and Robinson (2012) is a recent book-length analysis of the role of institutions in shaping growth.

[2]A famous quote from Schumpeter (1939) reads: "Capitalism is that form of private property economy in which innovations are carried out by means of borrowed money...Therefore, we shall date capitalism as far back as the element of credit creation" (pp.223-24).

[3]See North (1994a). For an account of the early history of institutions for financial markets, see North (1994b).

integrated account.[4] To this end, we explore the literature on institutions as the fundamental cause of growth, and look for those contributions that allow us to study the role of institutional arrangements in ameliorating/worsening specific types of information frictions and transaction costs that characterize the level of development in financial markets.[5] We then investigate the theoretical mechanisms by which these specific frictions affect economic growth and, to the extent available, present the stock of empirical evidence quantifying the impact of institutions on growth through financial development. Our secondary goal is to present an up-to-date survey. This effort is particularly valuable when it comes to the evolutionary nature of institutions and financial development, and to the modelling of financial frictions in *quantitative* general equilibrium growth frameworks, areas of research that have experienced intense development in recent years.

The survey also pays specific attention to the case of emerging and developing countries. Since these countries are generally characterized by poor institutions, the study of the linkages from institutions to growth has received interest from scholars. The literature surveyed in this area indeed indicates that poor institutions that manifest, for example, in poor creditor protection in developing countries (e.g., Latin America), have had effects on both the level and the variability of credit. Further work confirms that the finance-growth nexus seems to be more pronounced in those economies. A particularly important finding in that respect is that low financial development could have been a bottleneck in the process of resource reallocation following large-scale reforms implemented by many emerging countries in previous decades.

The reminder of this paper is organized as follows. Section 2 provides an overview of the survey, establishing its scope and providing a schematic summary. Section 3 studies the channels through which institutions and financial development are linked. Section 4 describes the theoretical mechanisms by which growth is hindered by the financial frictions that characterize the stages of financial development. Section 5 summarizes the empirical evidence on the various links between institutions, financial development and growth. Some final remarks are given in Section 6.

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[4]Of course, others have reviewed the literature on each of these subjects separately. The papers by Beck and Levine (2005) and Fergusson (2006) provide excellent surveys of the literature on the links between institutions and financial development. On the links between finance and growth, the comprehensive survey by Levine (2005) covers both theory and evidence, while the paper by Capasso (2004) provides a detailed analytical survey of the theoretical issues associated with asymmetric information, financial frictions and economic growth.

[5]Naturally, at some level of abstraction most forms of asymmetric information could be thought of as imposing costs on financial contracts as well. As such, they could be studied under a more general approach to transaction costs. However, in line with most of the literature, we treat the direct consequences of information asymmetries (e.g., adverse selection) as a separate issue.

# 2 Overview

This section lays out the three analytical blocks of this survey –institutions, financial development, and growth– and the various ways in which we will document their links. Since our survey concentrates on the institutional roots and growth consequences of financial development, the first order of business is to be specific about what we mean by the latter. Financial development is hereby understood as the process by which financial systems ameliorate –or eventually overcome– information and enforcement frictions in order to facilitate trade, mobilization of savings and the diversification and management of risk.

Notice that financial market imperfections can be found in both bank-based and securities-based financial systems. For instance, credit bureaus and rating agencies are arrangements emerging to deal with the same issue –asymmetric information– although they are typically used in different contexts; the former are mostly utilized by banks and other credit-granting institutions, while the latter are employed by potential investors in debt securities.

A schematic summary of our work is presented in Figure 1, where the use of arrows allows us to characterize the various connections across the three blocks highlighting the various channels through which institutions matter for growth via the level of financial development. Accordingly, we begin our inquiry into the first of these blocks ("Institutions" in Figure 1) by studying which types of political and economic institutions matter most for the process of financial development and their main causes. We identify four types, which are listed in the right portion of the first block in Figure 1. First, property rights institutions are a key aspect of financial transactions. For the most part, these institutions take the form of a legal framework aimed at reducing the consequences of asymmetric information (e.g., adverse selection) and asymmetric bargaining power (minority vs. controlling shareholders; monopolists vs. consumers). Second, institutions designed to guarantee the proper enforcement of contracts are also of paramount importance in financial contracting. These institutions include a strong and independent judicial system as well as the minimum possible amount of "legal formalism". Third, a stable macroeconomic environment is a prerequisite for a healthy pace of financial development, so we document how institutions that foster fiscal, monetary and financial policies can provide such an environment. Lastly, social norms and other types of informal institutions can determine people's trust and attitudes towards risk and interest bearing, which in turn helps explain their participation in financial markets and their relative use of financial instruments.
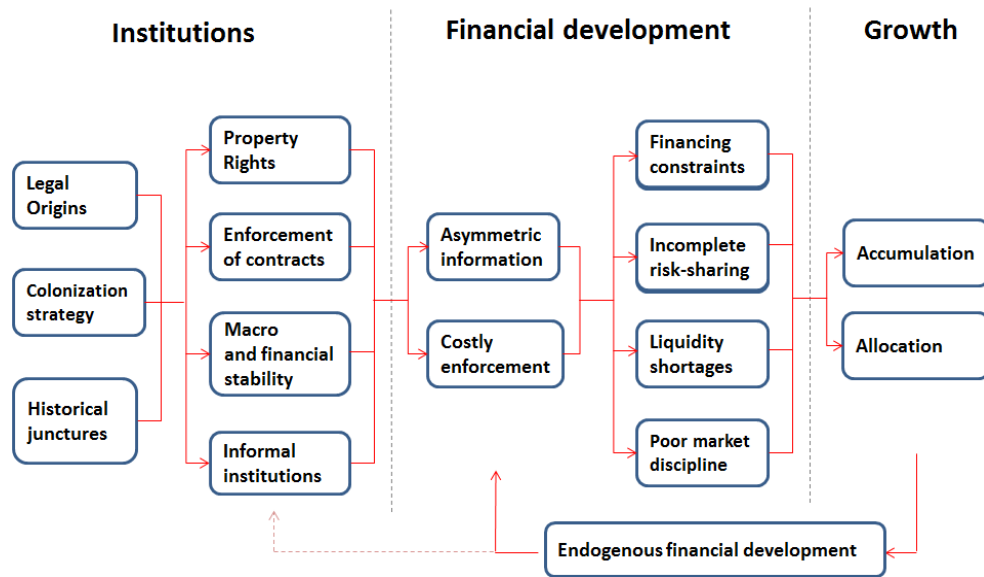
Figure 1. From Institutions to Financial Development and Growth

What are the causes of these types of institutions that shape the process of financial development? We identify three main sources of differences in the institutional framework that we highlight to the left of the first block in Figure 1: the inherited legal tradition ("legal origins") which historically has shaped the protection of private property rights; the type of extractive or inclusive colonization strategies which had profound effects on the relative emphasis given to the development of markets; and the many historical junctures that at various points in time allow for discrete changes in specific institutional arrangements.

A key hypothesis in our work is that the mechanism through which these four types of institutions impact the level of financial development is by determining the severity of financial market frictions. We identify two frictions, which constitute the first set of elements in the second block of Figure 1 on "Financial Development": those that materialize as information asymmetries and others that take the form of transactions costs among parties involved in financial markets. Protection of private property rights, the relative efficiency of judicial systems in enforcing contracts and the presence of strong social norms have the potential to reduce the severity of the two frictions by lowering the screening, monitoring and enforcing costs associated with transactions in financial markets. Similar arguments can be made with respect to macroeconomic and financial policies to the extent that they may determine the level of financial instability and market concentration that can exacerbate adverse selection and moral

hazard problems (through, for example, excessive risk taking and "too-big-to-fail" policies, respectively).

We consider these two frictions as being the main causes of financial development and we highlight four specific channels through which both may affect the severity of financial market imperfections. They constitute the second set of elements in the second block of Figure 1 on "Financial Development". First, the above mentioned frictions have the potential to reduce the supply of external finance, a phenomenon referred to in the literature as financial constraints. Second, in the presence of risk aversion, asymmetric information usually results in incomplete risk-sharing, leading to less than optimal demand for capital and/or inefficient allocation of inputs. Third, when certain assets are illiquid, adverse selection problems can exacerbate liquidity risks and result in liquidity shortages. Finally, high transaction costs (especially those associated with the enforcement of contracts) can lead to an inefficiently low level of debt and other financial instruments to the extent that they can enhance allocative efficiency by disciplining borrowers.

The third and final block in Figure 1, labeled "growth", describes the two channels analyzed in this survey through which the level of financial development can impact economic growth: the accumulation and allocation of reproducible factors of production. To that end, we describe the theoretical and empirical approaches that have studied how financial market imperfections -financing constraints, incomplete risk-sharing, liquidity shortages, and poor market discipline-affect the accumulation and allocation of factors.

We also note that the relationship between institutions, financial development and economic growth is not necessarily unidirectional. Growth may itself shape the pace of financial development and also the types of institutions in place, which we try to capture with the arrows going from the block "Growth" to the other two blocks. And while we do provide a brief account of the possible causal relationship running from economic growth to financial development ("endogenous financial development" in Figure 1), we acknowledge that such mechanisms are beyond the scope of this survey[6].

Our specific focus on the institutions-finance-growth link naturally forces us to leave out a number of other potential channels by which institutions can enhance economic growth. For instance, we abstract from issues such as the role of intellectual property rights in the process of innovation (Acemoglu, Antras, and Helpman (2007)), the taxation and regulation of commodity and labor markets (Parente and Prescott (1999), Botero, Djankov, La Porta, Lopez-de Silanes,

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[6]Fergusson (2006) presents a detailed analysis of the potential endogeneities in institutions to the degree of financial development.

and Shleifer (2004)), and, to a large extent, the interplay between the distribution of political power in society and growth-enhancing economic institutions (Weingast (1997)). There are also other frictions or market failures that may impact the level of financial development that we are leaving out such as coordination failures and negative/positive externalities. The former may impact the degree of risk sharing and availability of liquidity in an economy, thereby shaping macro and financial stability. Regarding the latter one could also argue that property rights and contract enforcement are key institutions for the development of financial tools to fund goods with positive externalities (e.g., public goods), and that negative externalities may also impact risk sharing.

# 3    Institutions and Financial Development

It has long been recognized that complex and risky transactions such as financial contracts require a third party that specifies property rights and enforces contracts, thereby constraining opportunism, shirking and cheating behavior (North (1989)). Moreover, because of its inter-temporal nature, financial contracting requires an institutional framework that promotes stability across time. In this section we survey the main theoretical contributions that link institutional arrangements with financial market outcomes. Table 1 offers a brief summary of the main channels through which institutions may impact financial development as well as the main determinants of the institutions analyzed in this section.

## 3.1    Property Rights and Contract Enforcement

Financial contracts are usually complex arrangements which try to foresee numerous contingencies and include various types of restrictive covenants. However, it is virtually impossible to anticipate all possible states of the world and the different types of opportunistic behavior that the parties may engage in. In this context, institutions -mainly in the form of legal rules and unbiased arbitrators- have an important role to play in:

  1. specifying property rights and protecting parties at disadvantage, and

  2. enforcing previously agreed-upon contract terms.

The role of these two types of institutions in shaping financial markets is the subject matter of an established strand of the literature referred to as "law and finance". The theory behind this

literature holds that in countries where legal systems enforce private property rights, support private contractual arrangements, and protect the legal rights of investors, financial markets develop rapidly and are able to support real activity.

A first step toward understanding the mechanisms by which institutions drive financial outcomes is the attempt by Acemoglu and Johnson (2005) to separate, inasmuch as possible, the relative contributions of (1) and (2) above. In particular, they emphasize the alternatives that agents have when any one of these institutional provisions fail. The authors claim that poor contract enforcement mainly takes the form of enforcement costs resulting from too much "legal formalism". As such, poor enforcement can be accounted for in contracts (e.g., demand higher ex ante returns), though possibly at considerable efficiency costs. On the other hand, when institutions fail to protect minorities and disadvantaged parties against powerful elites, the options are more limited since these failures are intimately linked to the distribution of power in society.[7]

One should bear in mind, however, that, as Glaeser, Johnson, and Shleifer (2001) point out, ex post verification of contract enforcement and ex ante regulation of property rights should be regarded as complements rather than substitutes in the process of institutional development. Glaeser et al. (2001) present a theory of arbitration (between financial contracting parties) and show, among other things, that reducing the costs of investment in information by law enforcers can improve enforcement efficiency. Thus, in the context of financial contracts, regulating in favor of, e.g., accounting standards, information-sharing schemes and disclosure practices may actually reduce the cost of overseeing bankruptcy procedures. Moreover, such regulation can serve to verify if parties are abiding by the terms of contracts, which in turn reduces the need for third-party arbitration and lowers the burden on the judicial system.

Using the arguments of the former paper to draw a defining line between the role of institutions in shaping (1) and (2), and the insights from the latter paper to bear in mind their complementary nature, we now elaborate on the several issues involved in the study of property rights and contract enforcement. First and foremost, we devote the next two sections (3.1.1-3.1.2) to describing the different contexts where institutions play a role in specifying and enforcing protection of financial contracting parties. Next (Section 3.1.3) we survey the literature that asks what can explain the (cross-country) differences in the degree of such protection

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[7]It should be noted however, that in some cases agents can circumvent the existing rules and practices regarding property rights. An illustration of this can be found in Reese and Weisbach (2002), who show that non-U.S. firms cross-list their securities in U.S. markets in order to increase protection of their minority shareholders relative to their home country. This practice seems to result in higher equity issues with stronger effects found in countries with weak investor protection.

and enforcement.

### 3.1.1 Specifying Property Rights and Protection from Powerful Elites

Institutional arrangements aimed at protecting disadvantaged parties can do so mainly by: (i) protecting minority shareholders against the controlling power of better informed shareholders and managers, (ii) protecting creditors against the consequences of asymmetric information and the risks of expropriation and (iii) protecting consumers (borrowers, depositors) against the power of monopolists. In what follows, we elaborate on each one of these types of institutional safeguards.

**Shareholder protection.** In equity markets, parties can be at disadvantage when there is asymmetric information and when controlling groups are unconstrained. For instance, when managers have private information, rational investors in capital markets use earnings reports to make inferences about the value of firms. Hence, poor accounting standards lower the quality of earnings reports and increase the variance of investors' estimates of firms' values, thereby reducing their willingness to hold equity unless they receive a premium to compensate for greater uncertainty (Ewert and Wagenhofer (2011)). In this context, institutional features of financial markets such as adherence to international accounting standards, the coverage by rating agencies and private research analysts can influence the cost of capital (Easley and O'Hara (2004)).

Additionally, when protection of minority shareholders is weak, controlling investors and management can divert funds toward private benefits.[8] As outlined by Modigliani and Perotti (1997), a number of detrimental consequences arise from this possibility. First, minority shareholders, knowing that the distribution of profits will be biased, consider buying shares only at a discount (the "equity premium"). Moreover, if private benefits are large enough, controlling shareholders will want to maintain control, limiting the amount of shares available to "outsiders", reducing the liquidity of stock markets, and the growth possibilities of the firm. In this context, Grossman and Hart (1988) provide a theory of why one share-one vote is optimal in terms of selecting an efficient management team and in maximizing the return to security-holders.

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[8] Johnson, Boone, Breach, and Friedman (2000) point out that incentives to divert funds may be stronger when economic prospects deteriorate, potentially amplifying the effects of exogenous shocks.

In the two cases described above, informational frictions interact with weak financial market institutions to reduce stock market participation and increase the cost of capital. Hence, adequate levels of shareholder protection have the potential to stimulate the use of equity instruments, increasing their liquidity and the overall level of stock market capitalization, one of the most widely used measures of financial development.

**Creditor protection.** An important consequence of poor shareholder protection is that debt will tend to dominate as the primary source of funding. Under these circumstances, creditors will usually secure claims through the firm's current assets rather than prospective returns, which naturally limits firm growth (see Section 4.1 below). Moreover, asymmetric information and commitment problems are not completely eliminated by the use of collateral in debt contracts, since there remains considerable uncertainty over the quality of such collateral and the ease with which creditors can seize it in the case of default.

Institutional arrangements can facilitate trade in debt instruments in at least two ways. First, Marco Pagano and coauthors have developed a theory around the role of information-sharing in credit markets. In this theory, information-sharing among lenders (through, say, credit bureaus) may arise endogenously for a number of reasons. For instance, lenders with localized geographical influence can improve their screening of borrowers that immigrate to their region of influence by obtaining information from the lender in the borrower's previous location. These information sharing schemes can therefore reduce adverse selection problems (Pagano and Jappelli (1993)) and discipline borrowers who will internalize the fact that information about their creditworthiness is shared among lenders (Padilla and Pagano (2000)).

Secondly, risk and return calculations in debt contracts depend upon the specification of priorities in the event of bankruptcy (e.g., secured versus non-secured creditors). In this regard, there is much debate concerning the benefits and costs of specifying and violating absolute priority rules (APR). On the one hand, violations of APR may encourage desirable ex ante investments in firm-specific human capital (Berkovitch, Israel, and Zender (1997)) and may also help address underinvestment problems in financially distressed firms with debt overhang (White (1989)). On the other hand, ex post violations of APR can have profound effects on the ex ante provision of incentives and may worsen well-known agency problems in the lender-borrower relationship (Bebchuk (2002)). While the relative importance of these forces may be an empirical question, it is likely that, at least under some circumstances, systematic violations of APR clauses will discourage lenders from supplying credit. In this context, the set of incentives and constraints faced by bankruptcy courts becomes an institutional feature

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that can shape the depth of credit markets.

**Protection against monopolists.**  So far we have considered only property rights institutions that protect investors. However, the pervasiveness of switching costs, network effects, and asymmetric information in financial markets leaves considerable room for financial intermediaries to exert market power (Vives (1990)) and, in this sense, savers and borrowers can also benefit from pro-competitive institutional arrangements. While we leave the analysis of the aggregate consequences of market concentration for a later section concerned with economic policy and financial stability (3.2), here we note that the issue of market power has two important microeconomic consequences for financial markets. First, recontracting costs in the financial industry tend to be very high -think, for instance, about the costs of constantly signing short-term contracts between a commercial/investment bank and an asset manager. This naturally provides incentives for vertical integration in banking as well as in other financial sub-industries (Grossman and Hart (1986)). In fact, there is ample evidence that higher market concentration driven by mergers in the banking sector is associated with anticompetitive pricing in both deposits (Simons and Stavins (1998)) and loans (Hannan (1991)). This in turn calls for the need to adopt institutional mechanisms that allow for proper oversight of merger processes and for an effective conduct of antitrust policy more generally.

Second, when creditor protection is imperfect, issues of seniority and collective action often result in bank-based lending being preferred over bonds, which naturally gives lenders an informational advantage over their competitors. It is precisely in this context in which Padilla and Pagano (1997) argue that information-sharing schemes of the type discussed before may help reduce the monopolistic rents that arise from isolated borrower-lender relationships. In contrast, Gehrig and Stenbacka (2007) suggest that if banks compete ex ante for clients and if customers face switching costs, future informational rents are a stimulus to entry.[9] In such a model, by reducing rents, information-sharing schemes have the potential to reduce participation. Again, while the relative size of these effects on competition and hence on financial development may be an empirical issue, policymakers should take into consideration the potential benefits of putting in place institutional arrangements that facilitate the gathering (and sharing) of borrower information.

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[9]Customers face switching costs when they invest time and effort to develop capabilities required to optimally use a given product. In the context of banking, Kim, Kliger, and Vale (2003) find that the average switching cost is about one third of the market average interest rate on loans.

### 3.1.2 Costly Enforcement of Contracts

In addition to specifying property rights and protecting disadvantaged contractual parties, institutional arrangements are responsible for preventing individuals from reneging on pre-specified contractual terms, both through commitment mechanisms and through third-party (usually state-run) arbitrators. Enforcing contractual terms can be costly, however, either because of the complexity and sophistication of financial contracts, and/or because of the inefficient operation of courts and regulators.[10]

Anticipation of these enforcement costs can have considerable incentive effects on the contracting parties. Jappelli, Pagano, and Bianco (2005) illustrate this point by studying a model in which opportunistic debtors may behave strategically in the face of inefficient courts. In their model, judicial inefficiency, which is associated with a lower recovery rate, can (i) exclude from credit markets borrowers with profitable projects but relatively little collateral, and (ii) incentivize various types of borrower opportunistic behavior such as strategic default.

Enforcing contracts may be costly for reasons other than court inefficiency, however. In fact, it has long been recognized within the law and economics literature that these costs increase with the sophistication of the contract terms (Williamson (1979)), with the specificity of the assets involved (Williamson (1983)) and with the degree of legal formalism (Acemoglu and Johnson (2005)). These issues are, needless to say, particularly acute in today's world of finance. On the other hand, if contracts are too simple or too generic, certain contingencies may require legal interpretation and incentives for renegotiation can arise (Schwartz and Watson (2004)).

Regardless of their source and nature, a more subtle consequence of enforcement costs is that short-term debt may be preferred by investors as a funding mechanism. This argument is advanced by Diamond (2004) in a model featuring multiple uncoordinated creditors, and the intuition behind it is that costly enforcement limits the commitment ability of lenders to enforce contracts. When borrowers have access to illiquid investment only, short-term debt can generate "firm runs", thereby creating incentives for lenders to enforce contracts in the first place. The resulting outcome is a financial market where maturity structure is constrained by high enforcement costs; that is, the market for long-term instruments would be shallower.

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[10] As Glaeser et al. (2001) bluntly put it: "In reality, courts in many countries are underfinanced, unmotivated, unclear as to how the law applies, unfamiliar with economic issues, or even corrupt. Such courts cannot be expected to engage in costly verification of the facts of difficult cases or contingencies of complicated contracts. Indeed, even when contracts are restricted by statutes, the courts may not have the resources or incentives to verify whether or how particular statutes apply."

### 3.1.3  Determinants of Property Rights and Enforcement Institutions

Given that the strength of property rights and contracting institutions determines the effective protection of investors and shapes the structure and workings of financial markets, it is worth asking, where do these institutions come from? Below we offer a succinct survey of the two main views about the subject: one that emphasizes the rather persistent character of institutions as a consequence of legal origins and geography; another highlighting the coevolution of politics, the distribution of political power in societies, and property rights-contracting institutions.

There is by now a large body of research devoted to assessing the role of *legal origins* as determinants of institutions (see, e.g., Glaeser and Shleifer (2002)). Focusing on those arrangements pertaining corporate finance and investor protection, scholars argue that the main features of the current corporate law systems around the world can be traced back to four European legal families: Scandinavian, German and French civil law, and English common law. Given that the Scandinavian tradition had no impact outside of Northern Europe, the emphasis has been on the remaining three.

The main differences in the early development of the three most important legal traditions are concerned with the relative importance of the legislative and the judiciary in the application of law. In the French civil tradition, for instance, the long history of king-appointed judges resulted in a deep popular distrust of the judiciary, and subsequent undermining of its role by the French Revolution and the establishment of the Napoleonic Code. In contrast, English and German legal traditions have always granted prominent roles to courts and judges. Moreover, the civil law tradition has tended to favor the rights of the State relative to private property rights, whereas the common law tradition has historically tended to side with private property owners against the State. Thus, by favoring private property rights and advocating a strong judiciary, English common law is more supportive of financial development than French civil law (Beck and Levine (2005)).

An important consequence of the relative active/passive role of the judiciary is the level of detail with which laws must be drafted by legislators. In this sense, the French civil law tradition requires a great deal of legal formalism and procedural rules. This has the direct effect of increasing the costs of enforcing financial contracts and the indirect effect of making the system relatively rigid, especially when compared to the common law system. Many researchers (going back at least to Posner (1973) and Rubin (1977)) argue that its flexibility gives the English legal tradition the ability to adapt to a changing economic environment, which in turn allows

for a more rapid process of financial innovation.[11]

A different strand of the literature has emphasized the *colonization strategy* as the key determinant of property rights and enforcement institutions. The now celebrated work of Acemoglu, Johnson, and Robinson (2001, 2002) and Acemoglu and Johnson (2005) suggests that geographic endowments, which determined the feasibility of settlements, permanently influenced institutional development in the New World through the extractive/inclusive nature of the colonization strategy. Their theory suggests that there were different types of colonization policies which created different sets of institutions. At one extreme European powers set up "extractive states" that did not introduce much protection of private property so as to transfer the resources of the colony to the colonizer. At the other extreme, other colonies were created trying to replicate European institutions with a strong emphasis on private property rights. This colonization strategy was influenced by the feasibility of settlements. In places where the environment was not favorable to European settlement there were more incentives to create weak property rights institutions, while those places more prone to permanent settlements were characterized by stronger property rights institutions. Finally, the theory argues that these colonial institutions persisted well after these colonies got their independence, thereby determining current economic performance.

This theory was elegantly taken to the data in Acemoglu et al. (2001), who regressed current economic performance in a large pool of countries on current institutions that foster property rights, and instrumented the latter by the mortality rates expected by the first European settlers in the colonies. This allowed them to estimate the impact of the exogenous variation in institutions on economic performance, getting rid of the potential endogeneity of growth on institutions. Their first-stage estimates show that mortality rates faced by the settlers more than 100 years ago explains a striking 25 percent of the variation in current institutions. And their two-stage estimates of the effect of institutions on economic performance is large. Importantly, they show that their results change remarkably little when they include other controls such as legal origins.

Some authors add to the study of colonization strategies by investigating the consequences of transplanting legal codes and rules into new environments and their evolution. In particular, Pistor, Keinan, Kleinheisterkamp, and West (2002) and Berkowitz, Pistor, and Richard (2001) agree that countries in which legal codes were transplanted can reveal different patterns of

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[11]Interestingly, the paper by Lamoreaux and Rosenthal (2005) advances an opposite theory: that in the nineteenth century, France had a more flexible and business-friendly legal system than the United States, which belongs to the common law tradition.

legal development than do origin countries but disagree on the quasi-permanent effects of colonization. Pistor et al. (2002) argue that characterizing corporate law systems purely based on colonial strategies could be insufficient, and that a better characterization is based on countries' relative standing and *evolution* in terms of flexibility-rigidity of its institutions. Moreover they argue that this characterization is by no means static, nor is it identical to one based on legal origins.

Along the same lines, the papers by Acemoglu, Aghion, and Zilibotti (2006) and Anderlini, Felli, Immordino, and Riboni (2013) present theories in which more rigid property rights institutions can be optimal for early stages of development, but may eventually become dominated by flexible arrangements at later stages. Finally, Tornell (1997) sides with the above mentioned evolutionary view and presents a theory of costly institutions in which countries may cycle from weak to strong private property rights and back. In this theory, poor economies initially lack the resources to invest in property rights institutions, but, as they grow, groups find it worthwhile to incur the cost of creating such institutions. Eventually, as the economy becomes very rich, rent-seeking becomes profitable, redistributive activity increases and the economy shifts back to a common property regime. This evolutionary view of institutions will be revisited below in Section 4.5, when we study the co-evolution of financial and economic development.

## 3.2 Economic Policy and Financial Development

Financial underdevelopment has been frequently associated with macroeconomic instability and regulatory failures. While a detailed study of stabilization policy and of financial regulation is beyond the scope of the current survey, in this subsection we give a brief overview of how certain institutional arrangements can induce a policy mix that is likely to foster financial development. In short, institutions shape macroeconomic and financial policy mainly through the government budgeting process, the degree of independence and accountability of central banks and financial supervisors.

### 3.2.1 Macroeconomic Policy and Financial Development

Perhaps the most obvious connection between macroeconomic policy and financial development is related to a low and stable rate of inflation. High and unpredictable inflation can hinder financial development mainly by lowering real returns on assets (Feldstein (1980)). and by

worsening asymmetric information problems. Specifically, in the presence of adverse selection, lower returns create further incentives for "patient" agents to pretend to be "impatient" and borrow rather than lend (Choi, Boyd, and Smith (1996), Huybens and Smith (1999)). Finally, the uncertainty created by inflation about future real returns discourages long-term lending, constraining the maturity structure of debt (as in e.g., Aarstol (2000)).

Fiscal policy can also have profound effects on financial stability and financial development. On the one hand, there is an old view pioneered by Gerschenkron (1962) that government participation in the financial sector can encourage the subsequent development of lending to the private sector. And in fact, the conventional wisdom is that a liquid market for public bonds is usually a precoursor of the development of corporate bond markets (Herring and Chatusripitak (2006)). However, large and persistent fiscal deficits capture a large fraction of private savings and limit the development of private credit markets, which can result in severe cases of financial repression (Bencivenga and Smith (1992)). This crowding out of private credit and investment is particularly concerning in developing countries, who already face a limited availability of funding sources for productive investment, and where the quality of public spending is relatively low (Caballero and Krishnamurthy (2004)).

Beyond crowding out considerations, periods of rapid accumulation of sovereign debt can end with episodes of default, which usually cause grave damage to the financial sector's balance sheet and result in economy-wide financial distress.[12] It is against this background that Alesina and Perotti (1999) introduce the concept of "budgetary institutions", namely, the rules and regulations according to which budgets are prepared, approved, and carried out. Such institutions need to address issues such as the competition for resources among decision-makers, which is known to result in "deficit bias" according to Velasco (1999), and the various types of agency problems which can influence the size, allocation, and use of budgeted resources. In this regard, available evidence suggests that fiscal rules (ex-ante constraints), top-bottom arrangements and more transparent procedures are conducive to fiscal discipline (Alesina, Hausman, Hommes, and Stein (1999)), and should therefore be conducive to greater financial stability and financial development.

### 3.2.2  Regulation, Competition Policy and Financial Openness

Turning to financial policy we note that the institutional apparatus is responsible mainly for (i) the competitive structure of financial markets and (ii) the relative independence with which

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[12]A survey of the theory and evidence on fiscal policy and debt sustainability is Chalk and Hemming (2000).

supervisors can enforce specific rules and regulations. In the financial industry these issues are considerably more controversial than in other sectors of the economy.

To begin with, financial regulation and supervision are archetypal examples of a technical task which requires more ability than effort and, as such, should be left to independent bureaucrats in the sense of Alesina and Tabellini (2007).[13] On the other hand, the complexity of the task at hand requires an elaborate set of accountability arrangements for independence to be effective (Hupkes, Quintyn, and Taylor (2005)), which in turn can make the whole independence enterprise prohibitively costly. In practice, these issues are likely to result in excessive emphasis on accountability of independent regulators/supervisors or, more worrisomely, in direct political control mechanisms (Quintyn et al. (2007)).

In addition to the above, the general support that economists lend to high levels of competition in many sectors of the economy is not as strong when it comes to financial markets. Since we have already discussed the issue of protecting financial consumers against monopolists, here we focus on the (rather complex) connection between competition and stability.[14] In banking, for instance, several authors (e.g., Vives (2001)) claim that there can be such thing as "too much competition" mainly due to a well known problem of risk-shifting in debt contracts.[15] In particular, greater competition can reduce the profits or quasi-rents available to bank managers and/or shareholders, which makes the gains from excessive risk-taking relatively more attractive (Allen and Gale (2000)). At the same time, less competitive environments give way to (i) bank incentives to charge higher interest rates to firms, which induces firms to assume greater risk (Boyd and De Nicolo (2005)) and (ii) the emergence of "too-big-to-fail" institutions, which increases moral hazard problems and bank risk-taking (Mishkin (1999)).

The empirical evidence available thus far regarding market concentration has been unable to settle the issue. On the one hand, cross-country evidence from the 1980s and 1990s gathered by Beck, Demirguc-Kunt, and Levine (2007) suggests that some degree of market concentration in the *commercial banking* industry is associated with more stable and less fragile financial markets. On the other hand, there is by now widespread agreement that in recent times, the sheer size and complexity of certain financial institutions, most notably investment banks, posed

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[13]In this survey we take a blanket approach to independence of financial regulation and supervision. At a deeper level, however, these are two separate objects. For a more nuanced treatement of these issues see Quintyn, Ramirez, and Taylor (2007).

[14]For comprehensive surveys on these issues see Allen and Gale (2003) and Claessens (2009).

[15]The risk-shifting problem can put simply as follows: when firms are debt-financed, managers (acting in the interest of shareholders) have an incentive to take excessive risks because debtholders bear the downside risk while shareholders benefit from the upside potential.

serious risks for the stability of financial markets in several developed economies. In particular, as the so-called shadow banking industry replaced traditional banking in leading the financial industry expansion, a handful of institutions that became "too big" and "too interconnected" to be allowed to fail suddenly became a challenge for central banks and regulatory agencies (Brunnermeier (2009)). These recent developments suggest that the previous findings that dismissed (some) concentration as a threat to commercial banking should not be used to draw conclusions about the whole modern financial architecture in which traditional banking plays a less prominent role.

The final link between economic policy and financial development that we consider is the one concerned with the degree of foreign competition and capital account openness. The point of departure of this analysis is the issue of whether capital account openness can contribute to developing domestic financial markets. At an abstract level, the trade in international financial assets has always been regarded by economists as an opportunity to enhance risk-sharing and carry out investment projects that would otherwise remain unfunded (van Wincoop (1994)). In Obstfeld (1994), this happens by giving financial intermediaries access to a larger set of assets. In such a framework, international diversification of risk allows domestic intermediaries to promote investment by increasing their exposure to local high-risk high-return projects.

An additional channel by which financial development may benefit from openness is associated with the efficiency gains of competition. In particular, Levine (1996) highlights that opening the competition in the financial system to foreign participants can accelerate the adoption of modern banking skills and technology, and stimulate the development of the underlying bank supervisory and legal framework.

## 3.3   Informal Institutions: Social Norms, Trust and Social Capital

So far we have discussed the role of formal institutions in shaping financial contracts and market outcomes. However, a number of authors have argued that certain norms and patterns of social interaction other than legislation -which we call "informal institutions"- also help determine the patterns of financial exchange and the development of financial interactions.

Systematic efforts to quantify the effects of the above mentioned social norms in financial markets have long been impaired because of the difficulties associated with comparing heterogenous set of social norms. In this sense, the paper by Knack and Keefer (1997) was a major leap forward. In their investigation of 29 market economies, the authors use data from the

World Values Survey to construct measures of "social capital". These measures capture the pervasiveness of cheating and opportunistic behavior such as avoiding public transportation fares or evading taxes, as well as the various ways in which people place trust in others. Results from regression analysis suggest that a higher stock of social capital is positively correlated with higher levels of investment to GDP.

Subsequent studies that investigated this issue in more detail suggest that the link between social capital and investment is likely to be found in financial markets. First, Calderon, Chong, and Galindo (1999) use cross-country data from the World Bank's World Value Survey to assess the role of trust in financial development. The authors hypothesize that trust is the natural complement of formal institutions because, complex as they may be, financial contracts simply cannot foresee all contingencies and the use of courts to arbitrate every possible discrepancy would be an extremely costly system to run. The results of Calderon et al. (1999) suggest that higher levels of trust are associated with more developed credit and stock markets, and with lower interest rate margins and overhead costs in the banking industry. In a similar vein, Guiso, Sapienza, and Zingales (2004) exploit the differences in social capital among Italian provinces and show that in areas with high social capital, citizens are more likely to use checks, invest in the stock market and have access to institutional credit.

The differences in attitudes and values such as social trust and religious beliefs seem to be particularly important for financial transactions popularly associated with chance, and characterized largely by anonymity, such as stock markets. In this regard, Hong, Kubik, and Stein (2004) suggests that higher levels of trust and social interaction can increase stock market participation via observational learning (i.e., word of mouth) and network effects. The latter is an instance of a more general idea that one's participation in certain markets is positively influenced by participation by others (e.g., the flow of information may be a function of market density). On the other hand, a recent study by Kumar, Page, and Spalt (2011) suggests that religious-induced gambling attitudes have a significant effect on financial outcomes. In particular, this paper shows that in countries with higher concentrations of Catholics relative to Protestants, investors are more likely to participate in stock markets, employees are more likely to accept stock-option plans, and initial public offerings tend to be more successful. The latter paper complements the evidence originally put forth by Stulz and Williamson (2003) in the sense that religion is an important determinant of creditor protection institutions.[16]

In sum, scholarly work on the subject of informal institutions suggests that these arrange-

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[16]It should be noted that in the regressions of Djankov, McLiesh, and Shleifer (2007), the effect of religion on credit market institutions (in particular creditor rights) vanishes once legal origins are accounted for.

ments play a significant role in fostering financial development and growth. However, it also reminds us that formal and informal institutions should not be viewed as substitutes but rather as complements in a more comprehensive enterprise of institutional development. The papers by Knack and Keefer (1997) and Johnson, McMillan, and Woodruff (2002a) provide persuading evidence that trust and norms of civic cooperation are stronger in countries with formal institutions that effectively protect property and contract rights.

# 4    Financial Development and Growth: Some Theory

Theory suggests that financial markets and instruments emerge as optimal responses to technological and informational constraints within a given set of "rules of the game" or institutions. In the previous section we studied how different sets of rules give way to differences in the absolute (e.g., credit to GDP) and relative (e.g., debt, equity) use of certain financial instruments and financial market structures. Accordingly, we now investigate the mechanisms by which these different institutional arrangements that determine financial market outcomes can have considerable effects on economic growth. Given the wealth of comprehensive surveys on the issues of finance and growth (in addition to the ones mentioned in the introduction, see, e.g., Capasso (2004)), our goal here is rather to identify contributions that allow us to explicitly trace the growth effects of institutions through financial markets.

Below, we study how different institutional arrangements that ameliorate or worsen asymmetric information and transaction costs (most notably, enforcement costs), can affect growth via the accumulation and allocation of reproducible factors of production through four channels: (i) financial constraints, (ii) incomplete risk-sharing, (iii) liquidity shortages and (iv) market discipline. Notice that if one allows for the possibility of externalities (e.g., spillovers from physical to human capital), both the accumulation and the allocation of factors can affect productivity in the broad sense of a neoclassical growth accounting exercise. We then present a brief account of the ways in which financial development may result endogenously from the process of economic development. In this regard, the literature is dominated by (i) the argument that high-growth economies eventually become rich enough to afford more efficient (and usually more costly) financial market institutions, and (ii) the notion that interest groups influence the political process by which institutions enhance or hinder financial development. Table 2 presents an overview of the topics covered in this section.

## 4.1 Financial Constraints

Perhaps the most widely studied form of financial frictions is one that involves financial constraints of various kinds, which usually are themselves optimal responses by agents to an underlying information friction or cost. In the classic work of Stiglitz and Weiss (1981), for instance, credit rationing results from ex-ante adverse selection and moral hazard. Likewise, ex-post moral hazard (e.g., the celebrated costly state verification model of Townsend (1979)) can also generate credit rationing as demonstrated by Williamson (1987). Financial constraints can also arise as a result of insufficient collateral or "pledgeable income" as in Holmstrom and Tirole (1997). In turn, collateral requirements typically result from the possibility of default or, equivalently, from costly or inefficient enforcement of financial contracts.

This type of market friction naturally constricts the accumulation of reproducible factors such as physical and human capital. In a neoclassical world, this limits the rate at which poor countries converge to higher levels of income. The effects are all the more important in a world with factor complementarities and external economies (e.g., Romer (1989)).[17]

### 4.1.1 Financial Constraints and Factor Accumulation

The most obvious way in which financial constraints can hinder economic growth is through their effect on the accumulation of reproducible factors, namely, physical and human capital. A careful exposition of the mechanism by which financial constraints, arising from imperfect enforcement, affect the accumulation of physical capital in a standard neoclassical world is provided by Azariadis and Smith (1999). This paper also derives the conditions under which the net effect on growth may not be negative.

Richer dynamics emerge when asymmetric information interacts with other market frictions such as adjustment costs and irreversibility of investment that distort the optimal scale of production. This case is analyzed in DeMarzo and Fishman (2007), where financial constraints result from moral hazard. Under these conditions, introducing financial specialists who can engage in long-term lending relationships (i.e., dynamic contracts) with entrepreneurs helps alleviate the agency problem, which in turn increases the return on capital, fostering capital accumulation and growth. Crucially, though, inter-temporal provision of incentives requires that the contract rewards good performance with higher current and future payoffs for the

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[17]Financing constraints also have important implications for business cycles which are left out of this survey given that our focus is on growth; for expositions of these mechanisms see the papers of Bernanke and Gertler (1989), Kiyotaki and Moore (1997), and more Fernandez and Gulan (2014).

entrepreneur, generating a positive correlation between past performance (or cash flow) and future investment.

The case of human capital is studied by Lochner and Monge-Naranjo (2002) building on the old observation that investments in education and training can be severely constrained since the underlying asset (human capital) is difficult to collateralize (Hart and Moore (1994), Becker (1975)). In the presence of credit restrictions, wealth distribution and family income become important determinants of human capital investment. The effect of financial constraints can be more pronounced in models of endogenous growth where physical capital has spillover effects on human capital as in de Gregorio (1996).

Another production factor that is difficult to collateralize is knowledge, and in recent years several theories of growth based on innovation (R&D) and financial constraints have emerged. For instance, Aghion, Howitt, and Mayer-Foulkes (2005) study a multi-country model of Schumpeterian growth in which R&D determines the country's capacity to absorb cutting edge technologies. In this context, financial constraints that arise from ex-post moral hazard hinder the country's absorptive capacity, its productivity level and long-run growth. Similarly, Pienknagura (2010) rationalizes the idea that some sectors of the economy are more financially dependent than others (see Rajan and Zingales (1998) below) through their relative R&D intensity. In particular, sector heterogeneity with respect to R&D ability implies that in high-ability sectors, firms will want to invest more in innovation, making them relatively more financially dependent. In this fashion, credit constraints disproportionately hurt the more productive firms, thereby lowering aggregate productivity growth. A more refined mechanism is found in Chiu, Meh, and Wright (2011) who show that in the presence of enforcement problems, a decentralized market for ideas may critically depend upon the availability of credit. In turn, a well-functioning market for ideas can be of great importance for growth if research and development activities are more efficiently carried out separately from traditional production activities.

### 4.1.2 Financial Constraints and Allocation

A series of recent papers that build on the "span of control" framework of Lucas (1978) -in which entrepreneurial ability is a determinant factor in occupational choice- have considered the effects of financial constraints that emerge from limited enforcement of contracts on the allocation of capital and ability. Antunes, Cavalcanti, and Villamil (2008), Amaral and Quintin (2010) and Buera and Shin (2013) study these effects in a standard one-sector model of neoclassical growth,

while Erosa and Hidalgo-Cabrillana (2008) and Buera, Kaboski, and Shin (2011) study multi-sector economies with sector-specific fixed operation costs. This complication further restricts entry into entrepreneurial activity and is meant to capture the observation that some sectors rely more heavily on external finance (see Rajan and Zingales (1998) below).

While in all of these papers there is a quantity effect on reproducible factors (as before), the main focus in all cases is on the allocation of capital and talent. Their common result is that financial constraints distort (i) the allocation of capital across active entrepreneurs (intensive margin) and (ii) occupational choice (extensive margin). In particular, some active and talented but poor entrepreneurs will face binding collateral constraints (inefficient scale), while less able but wealthy entrepreneurs can operate at the optimal scale. Similarly, poor but productive agents may delay entry until they accumulate sufficient assets while rich but incompetent ones may remain entrepreneurs. Thus, ameliorating financing frictions (e.g., lowering enforcement and other transaction costs) has the potential to improve the allocation of resources as well as increase total factor productivity and economic growth.

Alternatively, consider a model of multi-task firms which engage in both direct production and R&D activities and require investors to finance working capital. Valencia (2013) shows that when effort in R&D activities is unobservable, credit constraints arise and may result in inefficient allocation of effort toward less R&D and more direct production. Since innovation activities have current and future effects on growth, low levels of R&D effort lower the rate of aggregate growth. This paper also shows that credit constraints will be tighter when R&D and direct production are highly substitutable.

As a final illustration of the mechanism, suppose that there are two production technologies, one requiring skilled labor and yielding relatively high returns, and the other one requiring only unskilled labor but yielding lower returns. Unlike the models in the previous two paragraphs where ability is random, consider the possibility of investment in human capital. In this context, Galor and Zeira (1993) show that high enforcement and supervision costs that create borrowing constraints can limit investment in human capital, in turn reducing the implementation of more productive technologies and affecting long-run growth.

## 4.2  Risk-Sharing

The mechanisms presented above are independent from the assumptions made about agents' preferences. If risk aversion is introduced, a new channel by which financial factors can have

real effects emerges, since agents will want to smooth consumption across time and states of nature. Incomplete risk-sharing arising from severe informational frictions or financial market incompleteness can therefore lower the optimal demand for capital and/or result in inefficient allocations, ultimately harming economic growth (Arrow (1964, 1971)).

### 4.2.1   Risk-Sharing and Factor Accumulation

In the context of investment and growth, the presence of agency problems will prevent parties from perfectly sharing risks. An immediate consequence of imperfect risk-sharing is that entrepreneurs' optimal demand for capital is lower than that of a perfect risk-sharing economy. The contributions of Castro, Clementi, and MacDonald (2004) and Khan and Ravikumar (2001) illustrate precisely this point in a world in which financial frictions arise from moral hazard. Both papers highlight that in order to increase risk-sharing in the presence of financial frictions entrepreneurs would have to bear some of the risks from production. Combined with entrepreneurial risk aversion, this lowers the demand for capital. The demographic structure of the model in Khan and Ravikumar (2001) has the additional feature that financial specialists can offer long-term contracts and further reduce agency problems by providing intertemporal incentives.[18]

In subsequent work, Castro, Clementi, and MacDonald (2009) provide an extension to their earlier paper by studying a two-sector model in which a capital producing sector faces larger shocks (is "riskier") than a consumption goods sector. Financial frictions, again stemming from agency problems, generate incomplete risk-sharing and a wedge between the returns to investment in the capital and in the consumption goods sector that is only partially compensated by an increase in the price of capital. Less severe financial frictions will therefore induce a reallocation of resources away from the production of consumption goods and towards capital goods, potentially enhancing growth.

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[18]In Castro et al. (2004) there is a supply effect in addition to the demand effect mentioned above, though this effect is a consequence of their specific modelling assumptions (overlapping generations structure and short-term contracts). In particular, financial frictions redistribute income from agents with low propensity to save (olds) toward agents with high propensity to save (youngs). This increases the supply of capital for the following period and the net effect on capital accumulation depends upon the relative size of these opposing effects.

### 4.2.2 Risk-Sharing and Allocation

A classic example of how imperfect risk-sharing can drive an inefficient allocation of resources (and growth) is through the uncertainty associated with innovation activities such as research and development. In this context, King and Levine (1993b) show that if the risks involved in these activities are entirely diversifiable, financing them exclusively with internal funds results in inefficiently low levels of innovation.

A more nuanced example is found in Saint-Paul (1992), where greater division of labor and specialization drives long-run growth. Accordingly, agents need to acquire ever more specialized human and physical capital, which puts them at greater risks from idiosyncratic shocks. Financial frictions that prevent optimal risk sharing then result in inefficient technological choices towards more flexible, less specialized, less productive technologies. A similar yet more intricate mechanism is by Acemoglu and Zilibotti (1997), who explore the possibility that imperfect risk-sharing may stem from the limited availability of investment projects (securities), which in turn are heterogeneous with respect to risk, return and minimum size (indivisibilities). In this setting, no *single* agent would invest in high-risk high-return technologies because they require a larger minimum size and thus would carry disproportionately high weight on her portfolio. Thus, financial development has the potential to foster growth in at least two ways. First, by allowing different agents to pool resources and invest in many different projects, risks can be optimally diversified, making it feasible to invest in the high-risk high-return projects. This in turn increases the availability of projects, which allows for further diversification, incentivizing savings and more investment.

## 4.3  Liquidity Risks and Shortages

One of the most solid arguments for having well-functioning financial markets comes from the possibility of liquidity risks and liquidity shortages. This was the subject of study in the seminal paper of Diamond and Dybvig (1983) in the context of adverse selection, and in the subsequent contribution of Holmstrom and Tirole (1998) in the presence of moral hazard. Although these papers do not deal with economic growth explicitly, a natural implication of their results is that in the absence of financial markets, liquidity risks can constrain investment decisions, the allocation of resources and growth.

### 4.3.1 Liquidity Risks and Factor Accumulation

In the presence of heterogeneity with respect to impatience of the Diamond-Dybvig type,[19] and with liquid and illiquid investment opportunities, inefficient levels of precautionary savings and inefficient liquidation of productive investments may arise. Bencivenga and Smith (1991) show that, in this setting, banks improve upon the autarky equilibrium in two ways. First, banks can reduce the need for investment liquidation. Investment liquidation reduces the capital stock and, in the presence of externalities (as in endogenous growth models), has a direct effect not only on the level of output but also on its rate of growth. Secondly, banks reduce liquid reserve holdings of the economy as a whole, increasing the availability of funds for investment.

As shown by Ennis and Keister (2003) within this same framework, banks do not completely eliminate the need to hold liquid assets because of the possibility of bank runs. However, allocating more resources to investment through banks has the direct effect of increasing capital accumulation and growth, and the indirect effect of decreasing the "bank-run payoff", thereby reducing the probability of runs, the need for precautionary savings and the long-run average rate of growth.

A similar mechanism is studied by Levine (1991) with liquidity provision coming from stock markets. Firms invest in risky projects, which again implies that no agent is willing to invest all her wealth in a single firm. In this sense, stock markets have the potential to enhance investment through the traditional portfolio diversification channel. Two additional features of this model amplify the growth effects of financial development. First, projects are assumed to be heterogeneous with longer maturity investments yielding higher returns. With impatience of the Diamond-Dybvig type (i.e., liquidity shocks), agents may need to sell their equity holdings prematurely, which, in the absence of liquid stock markets, may force the firm into liquidation. Secondly, Levine (1991) assumes that the firm is a source of "social" capital in the sense that agents working together within the boundaries of a firm accumulate human capital. Accordingly, lower financial development (illiquid stock markets) increases the risk of liquidating projects prematurely due to impatience, which in turn threatens human capital formation and long-run growth.

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[19]In Diamond and Dybvig (1983), there are two types of agents whose preferences with respect to the timing of consumption (degree of patience) are uncertain and private information. Depending on the realization of their "patience" (i.e., whether they prefer to consume earlier or later), agents report their type to an institution holding their savings (the "bank") and receive transfers accordingly.

### 4.3.2  Liquidity Risks and Allocation

Adequate provision of liquidity services can also affect the allocation of resources as shown by Bencivenga, Smith, and Starr (1995) in a perfect foresight model. In their work, capital production technologies are heterogeneous with respect to maturity and return while agents are short-lived, so an intergenerational transfer of capital ownership is required. Introducing secondary markets helps this process but improvements are limited by the costs of transacting in these markets. Lower transactions costs have two distinct effects on growth. First, they close the gap between the marginal product of capital and the return that savers receive, increasing total savings and capital (this is the factor accumulation mechanism). More importantly, lower transaction costs make it affordable to choose more illiquid and more productive technologies, enhancing productivity growth and further increasing the rate of long-run growth.

In a similar context of heterogeneous technologies, a novel transmission mechanism has been devised by Aghion, Angeletos, Banerjee, and Manova (2010) when liquidity risks are compounded with financial constraints. In their model, long-term investment takes "time to build" and is subject to liquidity shocks before it comes to fruition. Such liquidity shocks can be covered by borrowing in order to shield the project from being terminated. Thus, tighter constraints imply a higher probability that long-term investment will be interrupted by a liquidity shock, which in turn reduces the willingness to engage in long-term investment. Because long-term investment enhances productivity more than short-term investment, this also reduces the mean growth rate of the economy.

## 4.4  Market Discipline and Allocation

Certain features of financial markets and instruments can further enhance allocative efficiency by disciplining entrepreneurs, as heralded by the early work of Jensen and Meckling (1976). For instance, debt contracts, while themselves the optimal solution to an information problem, can exhort market discipline on managers through the threat of bankruptcy. This is studied by Aghion, Dewatripont, and Rey (1999) in a model of endogenous growth in which the technological frontier is proportional to the density of new technology adoptions (as in Aghion and Howitt (1996)). If managers face private switching costs and are non-profit maximizers, they will be reluctant to adopt new technologies, which in turn reduces density and economic growth. In this context, the fact that creditors can demand payment and effectively force firms into bankruptcy when they underperform provides incentives for entrepreneurs to allocate resources to the use of

new technologies (rather than operating the obsolete), and therefore enhances economic growth. Naturally, the degree to which creditors and shareholders can discipline managers into efficient allocations depends crucially in the level of investor protection and enforcement, issues that were treated extensively in Section 3.[20]

## 4.5   Endogenous Financial Development

The mechanisms explored so far are built upon the assumption that financial development is exogenous to the economic structure and to the process of economic development. However, there is by now a well established strand of the literature that considers the coevolution of economic growth and financial development and we now present its main arguments. The simplest and most common way to obtain this joint behavior is to acknowledge that financial development is costly,[21] although recent papers have explored other possibilities including the interaction between political forces, growth and financial development.

### 4.5.1   Economic Growth and "Costly" Financial Development

Intermediation activities usually involve fixed costs of monitoring, screening and contracting. This observation is taken seriously by Greenwood and Jovanovic (1990) in the context of technological choice in the final goods sector, with risk and return of different technologies being inversely related. Under these conditions, economic growth and higher incomes makes intermediation "affordable", which in turn allows for efficient allocation of capital, risk pooling, and higher returns to be earned, further enhancing economic growth.

A similar argument can be made when technological heterogeneity is found in the capital goods sector, and stems from imperfect observability of returns as in Boyd and Smith (1996). Such conditions open the possibility of equity and debt coexistence in financing the production of capital, with debt funding the non-observable, higher returns technology. With economic growth (of the neoclassical type), bankruptcy costs rise in the capital goods sector. This may

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[20]The papers by Scharfstein (1988) and Maug (1998) also study the disciplinary role of financial markets through efficient monitoring and takeovers, although their emphasis is not on growth and thus the source of inefficiency that financial markets aim at fixing is less explicit.

[21]This line of reasoning follows from the argument made by, e.g., Rosenberg and Birdzell (1986) that, due to the high costs associated with improving institutional quality, richer societies can afford better institutions than poorer ones. For more on the two-way causality between institutions and growth, see Calderon and Chong (2000).

be due to the adoption of more specialized and complex technologies that make it increasingly difficult to verify returns, or due to a fall in the price of capital relative to labor. At any rate, as the economy grows, capital producers tend to fund themselves with equity and develop stock markets. This in turn means that fewer resources are spent on verification costs, compensating for the use of less productive technologies.

A particular instance of this argument can be found in the adverse selection literature. When there is asymmetric information with respect to borrowers' risk types it is well known that the optimal contract entails a separating equilibrium, but the question of how separation occurs can itself be critical. Separation can be achieved by rationing credit (as in Azariadis and Smith (1999)), or, as in Bose and Cothren (1997), by specifying a screening probability. If screening is costly, higher levels of capital and income make screening affordable. In turn, screening contracts give way to funding more projects, thereby further increasing capital accumulation and sustaining growth.

Another variation of the "costly institutions" mechanism arises with the risks of innovative activity as in De la Fuente and Marin (1996). In this setting, more and better monitoring allows for better risk-sharing, which in turn results in agents devoting more resources to innovation thereby enhancing growth. However, investment in information gathering activities is itself endogenous since it uses primarily capital: as the economy accumulates capital, its rental price falls, which makes monitoring more affordable, allowing for more risk-sharing, more innovation and more growth.[22]

### 4.5.2   The Political Economy of Financial Development

Recently, the intricate relationship between economic development and political equilibrium has been considered as a potential determinant of financial market outcomes. For concreteness, suppose that financial development is characterized by a single friction, namely, bankruptcy costs, and that each politician running for office proposes a policy that pins down the level and evolution of such costs (e.g., proposes to increase the number of bankruptcy procedures or

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[22]This is in stark contrast with Boyd and Smith (1996). In that paper, intermediaries monitor the production of capital using both inputs $(K, L)$ so a fall in the price of capital relative to labor means that monitoring costs are a larger fraction of capital produced $(K)$. To ilustrate this point, consider the case of a Cobb-Douglas monitoring technology. Using standard notation, we have that in general equilibrium $r = \alpha K^{\alpha-1} L^\beta$ while $w = \beta K^\alpha L^{\beta-1}$. Clearly as $K$ grows, $r$ falls but $w$ rises. The cost of monitoring a unit of capital $C(r, w) = \frac{rK+wL}{K}$ does not necessarily fall with capital accumulation.

the wages of bankruptcy judges) while interest groups vote on different policies (candidates).[23] Sevcik (2012) shows that in this setting, introducing heterogeneous agents implies that relatively wealthy individuals benefit from high bankruptcy costs, because they can fully collateralize loans. Higher productivity growth increases the return of capital and external finance access to less than fully collateralized agents, increasing the pool of voters who benefit from lower bankruptcy costs and diluting the political power of the wealthy elite. In this fashion, growth has the potential to shift the political equilibrium from lower to higher financial development.

This argument can be strengthened by an additional factor considered in Rajan and Zingales (2003) and Erosa and Hidalgo-Cabrillana (2008): entrepreneurs can benefit from capital market imperfections since these restrict output and allow them to extract monopolistic rents. Thus, a wealthy elite of entrepreneurs that enjoys either full access to external finance or monopolistic rents from output restrictions may have a vested interest in maintaining the status quo and can even have incentives to share their rents with financiers through higher borrowing costs in exchange for political support against financial development.

At the other end of this argument is the observation that some entrepreneurs may depend crucially on credit supply (as suggested by, e.g., Rajan and Zingales (1998)). In this case, entrepreneurs will have divided attitudes toward financial development, which adds complexity to the role of politics in setting financial policies. Becerra, Cavallo, and Scartascini (2012) formally pursue this argument and assess the predictions of these models against the data. These authors also argue that the subset of agents that benefit from financial development can depend on the fraction of financing that the government itself requires, since a deficit/debt-driven government would "crowd out" private financing, effectively increasing the cost of external funds and reducing the pool of beneficiaries from financial development. The empirical results of this paper support the idea that a combination of low opposition to financial reform (high fraction of capital intensive industries) and low government dependence on deficit financing go a long way in explaining cross-country differences in financial development.

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[23]In this case, as in the classic Costly State Verification models (e.g., Townsend (1979)), bankruptcy costs are one kind of transaction cost, and therefore assumed to be lost in the process of financial contracting.

# 5 Institutions, Financial Development and Growth: Empirical Evidence

Having identified the several theoretical mechanisms that link *institutions*, financial development and economic growth, we now apply ourselves to the task of reviewing the available empirical evidence regarding such links. We begin with an overview of the evidence on the institutional roots of financial development, and then turn the attention to the vast literature that aims at quantifying the links between financial development and economic growth. A final subsection pays closer attention to the empirical findings for developing economies. Tables 3 and 4 present an overview of the main hypotheses that have been tested by the empirical works covered in this section.

## 5.1 Institutions and Financial Development

Our first task in this section is to study the evidence on how institutional arrangements shape financial market outcomes. Similar to our presentation of the theoretical arguments in Section 3, we begin with the empirical studies concerning property rights and contract enforcement, and then give an account of the evidence regarding competition and financial openness.

### 5.1.1 Empirical Evidence on Property Rights and Enforcement Institutions

The arguments presented in Section 3.1 regarding the critical role of property rights and contracting institutions for the development of the financial system have an equally developed empirical counterpart which we survey in this section. The main questions addressed by this empirical literature can be summarized as:

1. Broadly speaking, can differences in property rights and contract enforcement account for the cross-country differences in financial market outcomes?

2. If so, what is the relative contribution of each of these two forces in explaining the differences in the various measures of financial development?

We begin with an overview of a series of influential papers by La Porta, Lopez-de Silanes, Shleifer, and Vishny (1997, 1998, 2000) which have studied the connection between legal rules

and various measures of corporate governance, corporate finance and financial development. La Porta et al. (1998) assemble and study a dataset of 49 countries coming from different legal families (common law and civil law variants), and measure the quantity (i.e., legal rights) and quality (i.e., enforcement) of investor protection. To this end, the authors use measures of institutional quality such as corruption, the rule of law, efficiency of the judicial system and accounting standards. More importantly, La Porta et al. (1998) construct indices of shareholders and creditor rights, which are assessed based on voting privileges, the ability of outsiders to oust management, mandatory dividend, one-share-one-vote regulations, absolute priority provisions, and the ability of secured creditors to regain possession of collateral after liquidation. The paper reports that common law countries offer the strongest protection to both shareholders and creditors, while French civil law countries offer the weakest. Moreover, proper enforcement does not make up for the lack of formal investor protection, as French civil law countries rank last in all measures pertaining the rule of law, corruption and the risk of expropriation.

Along similar lines, La Porta et al. (1997) assess the ability of firms in different legal environments to raise external finance through either debt or equity. Based on the theories presented in subsections 3.1.1-3.1.2, La Porta et al. (1997) hypothesize that better legal protection and higher quality of contract enforcement should enable investors to offer entrepreneurs money at better terms. This hypothesis is tested using aggregate data from 49 countries on equity and debt, and the authors' previously assembled data on investor protection. Through regression analysis, they find that measures of the rule of law have sizable positive effects on both the size of the stock market and the level of total private debt to GDP. Shareholder rights are also a major determinant of access to equity financing, while the effect of creditor rights on indebtedness is ambiguous. Such ambiguity of the effect of strong creditor rights on debt underscores countervailing supply and demand effects (see Cheng and Shiu (2007), Acharya, Amihud, and Litov (2011)), an issue that is difficult to address within this type of regression framework.[24]

Regarding legal origin, La Porta et al. (1997) conclude that in countries with a common law (English) tradition firms enjoy more access to equity financing -as measured by stock market capitalization and IPOs per capita- than in countries with French civil law tradition. This is not surprising since their own data on investor protection rank French civil law countries at

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[24]Consider, for instance, the case of a country which strengthens its protection of creditor rights. On the one hand, this has the effect that lenders are now willing to extend more credit (positive supply effect). However, due to the nature of debt contracts, strong protection of creditors implies that borrowers lose heavily in the case of default or bankruptcy, and therefore (if they are risk averse) will find debt instruments less attractive (negative demand effect). Hence, the net effect on the equilibrium level of lending depends on the relative sizes of demand and supply effects, which may be the underlying cause of the ambiguity found in the data.

the bottom of the distribution in terms of shareholder protection. These conclusions can be linked to the evidence put forth by Djankov, La Porta, Lopez-de Silanes, and Shleifer (2003) regarding the inefficiency of courts. After examining a sample of 109 countries, these authors conclude that excessive legal formalism, which is systematically greater in countries with civil law traditions, is mainly responsible for the poor performance of the judicial system in the resolution of commercial and financial disputes.

The main findings from La Porta et al. (1997, 1998) are confirmed by Beck, Demirguc-Kunt, and Levine (2003a), who extend the analysis to a larger sample and control for a number of additional factors such as geographic endowments, religion and length of independence. Beck, Demirguc-Kunt, and Levine (2003b) goes one step further and tries to establish one channel by which legal origins may matter for financial development: French legal origin countries are more likely to develop inefficiently rigid legal systems than British common law and German civil law countries, with adverse repercussions for financial development. Beck et al. (2003b) therefore shed light on the determinants of the rigid/flexible character of the legal system, and empirically validate one channel by which the arguments in Acemoglu et al. (2006) and Anderlini et al. (2013) may hold; that is, they show that more rigid legal environments can impede economic development through their negative effect on financial development.

Acemoglu and Johnson (2005) is perhaps one of the first papers that measures the relative contributions of property rights and contracting institutions to the process of financial development. To measure the cost of enforcing contracts the paper uses measures of legal formalism, procedural complexity and the number of procedures required to enforce the collection of commercial debts. As for property rights institutions, the paper focuses mainly on measures of constraints on the executive and expropriation risk. Like most of the literature on the subject, the paper addresses the endogeneity problems arising in this kind of work by instrumenting these institutional measures with legal origins as well as other variables that influenced the historical development of the state-society relations. Their results suggest that strengthening property rights institutions has a robust effect on both credit and equity markets. This is consistent with the case-study evidence provided by Glaeser et al. (2001) who argue that in Poland, where legal rules offered ample protection to investors, regulators were empowered and motivated, securities markets flourished, while in the Czech Republic, where lax regulation and poor enforcement prevailed, stock markets languished for more than a decade.[25]

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[25]The paper by Johnson, McMillan, and Woodruff (2002b) provides evidence that insecure property rights may hinder investment not only by limiting the availability of external finance, but also by reducing the entrepreneurs' willingness to reinvest their retained earnings (due to, e.g., the threat of expropiation).

A more controversial conclusion found in Acemoglu and Johnson (2005) is that the effect of contracting institutions is limited to equity markets, and that it is relatively small in size. This seems at odds with the evidence that costly enforcement of contracts leads to low recovery rates, especially in debt contracts (Djankov, Hart, McLiesh, and Shleifer (2008)). In fact, earlier empirical work by Padilla and Requejo (2000) using the sample of La Porta et al. (1997) claims that judicial efficiency and not creditor rights, is what seems crucial for credit market development. Using the model of opportunistic borrower and inefficient courts mentioned in Section 3.1.2, Jappelli et al. (2005) also provide evidence that judicial efficiency -measured by the length of ordinary civil trials and the number of civil suits pending- is robustly associated with more lending.

Subsequent empirical work has also called into question some of the results in Acemoglu and Johnson (2005). In a more recent and comprehensive paper, Djankov et al. (2007) study the determinants of bank credit in 129 countries. The authors establish that credit-to-GDP correlates positively with both stronger creditor protection and more efficient bankruptcy procedures. As in previous studies, their sample shows that creditor rights are strongly associated with income and legal origin, with richer and common law countries offering the strongest protection.

A major contribution of Djankov et al. (2007) is to go beyond the strict definition of legal creditor protection and study the role of information-sharing institutions in supporting credit markets. Other papers have studied the incidence of credit bureaus and other information-sharing schemes with similar results regarding financial market outcomes (e.g., Miller (2000), Jappelli and Pagano (2002), Love and Mylenko (2003)). However, the paper by Djankov et al. (2007) is the first to successfully assess, within a unified framework and in a large sample of economies, the relative importance of legal rules protecting creditors, their enforcement and information-sharing mechanisms in influencing financial market outcomes. Their main results may seem surprising at first sight: in generating high levels of credit-to-GDP, creditor protection matters more than information-sharing in rich countries, but the exact opposite is true in poor countries. In fact, legal creditor protection does not seem to matter at all in poor countries. The authors show that weak enforcement of contracts in poor countries is what drives this seemingly counter-intuitive result: if enforcement is weak, legal rules become lettre morte and alternative mechanisms of protection (e.g., reputation) such as credit bureaus become important.

In an effort to understand why the mere specification of property rights may not be enough, Claessens and Klapper (2005) investigate the question of how actual bankruptcy filings relate to countries' specific creditor rights and judicial efficiency. To do so, the authors provide a

detailed analysis of the main differences among bankruptcy procedures and their relative use in a panel of 35 countries. Their main results are in line with the evidence put forth by Djankov et al. (2007): in general, greater creditor protection alone is not associated with more use of bankruptcy, but in combination with high levels of judicial efficiency, it has the potential to increase the frequency of bankruptcy. There is one major exception, however: countries in which creditors can seize assets once a firm has filed for bankruptcy ("no automatic stay on assets") exhibit lower rates of bankruptcy filings. In fact, there are at least two effects at work here. On the one hand, a no automatic stay clause increases the expected recovery rate for the creditor, which increases the willingness of creditors to proceed with bankruptcy (as opposed to seeking out-of-court arrangements such as debt restructuring/renegotiation). On the other hand, entrepreneurs, knowing that their assets can be seized by creditors, may find bankruptcy unattractive, which increases the use of out-of-court mechanisms and reduces risk-taking that may lead to financial distress in the first place. The results from Claessens and Klapper (2005) suggest that the latter effect may be stronger than the former.

An intermediate link between legal provisions and financial market outcomes can be found in the various measures of accountability and corporate governance. In fact, La Porta et al. (2000) argue that cross-country differences in investor protection (understood broadly as legal provisions and efficient enforcement) can be a promising avenue towards understanding emerging patterns of ownership, control, and corporate governance in general. Klapper and Love (2004) look at this question in a sample of 14 emerging markets using firm-level data. This paper first establishes that firm-level governance is strongly positively related to country-level measures of investor protection such as creditor rights and enforcement of contracts. Next, they use regression analysis to conclude that high investor protection scores are associated with higher levels of market valuation, better operating performance and, more importantly, with more access to external finance.

Among the few papers that study the relationship between creditor protection and credit volatility are Galindo and Micco (2005, 2007).[26] Galindo and Micco (2005) propose a partial equilibrium model of creditor protection and credit volatility in which the equity multiplier increases with the parameters capturing legal protection and with the efficiency of bankruptcy procedures. They test this model by applying panel-data methods to a sample of developed and developing countries, and conclude that the impact of exogenous shocks to credit markets is larger in countries with poor creditor protection. In particular, in common law countries, which

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[26]A non-technical summary of this research can also be found in Chapter 12 of IDB (2005).

are characterized by high creditor protection and good contract enforcement, the elasticity of credit with respect to external shocks is half that observed elsewhere. In an effort to address endogeneity issues arising from the potential links between income and creditor rights, Galindo and Micco (2007) complement this exercise with evidence from vector autorregression (panel-VAR) where a measure of GDP is included. They too find that the response of credit growth to external shocks is significantly larger and, more importantly, lasts for about twice as long in countries with low creditor protection. Based on this evidence Galindo and Micco (2004) point out that the problem of weak creditor protection is particularly acute in Latin America and suggest that this may be one of the culprits for its shallow and volatile credit markets.

### 5.1.2  Macroeconomic Policy Institutions and Financial Development

There is ample evidence that monetary policy institutions do affect financial development (Khan, Senhadji, and Smith (2006), Piazzesi and Schneider (2009) and Boyd, Levine, and Smith (2001)) through the resulting level and predictability of inflation. In this sense, the classic case for central bank independence of Rogoff (1985) applies.[27] The issue is not yet settled however, since the recent financial crisis has renewed concerns over the optimality and even the ability of independent central banks to handle asset price inflation, which in turn can threaten financial stability (Blanchard, Dell'Ariccia, and Mauro (2010), Berger and Kismer (2013)).[28]

On the fiscal policy front, there appears to be an emerging consensus that large and persistent public deficits invariably result in excessive borrowing from the domestic financial system, and that this has severe adverse effects for financial development (Hauner (2009), Emran and Farazi (2009)). Moreover, the available evidence suggests that when governments conduct fiscal policy through participation in the banking industry, the result is a large and persistent public deficit, and a systematic crowding out of credit to the private sector (Gonzalez and Grigoli (2013)). In a detailed study of 92 countries and in the 1970-1995 period, La Porta, Lopez-de Silanes, and Shleifer (2002) find that higher government ownership of banks negatively affects the traditional measures of financial development (credit to private sector and stock market capitalization). Perhaps more importantly, this paper shows that government ownership of

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[27]Rogoff's argument, based on the classic time inconsistency problem of Kydland and Prescott (1977), is actually for central bankers who attach a relatively high weight to inflation (in their loss function), although he notes that this is likely to require a great deal of independence.

[28]For details on the cases for and against asset price management by central banks, see the book by Cecchetti, Genberg, Lipsky, and Wadhwani (2000) and the paper by Bernanke and Gertler (2001).

banks concentrates access to credit among the largest firms in and reduces the overall efficiency of the banking system (measured in terms of spreads and overhead costs).[29]

### 5.1.3   Regulation, Competition and Financial Openness

The available empirical evidence regarding the overall consequences of market concentration has been, so far, unable to settle the issue. On the one hand, cross-country evidence from the 1980s and 1990s gathered by Beck et al. (2007) suggests that some degree of market concentration in the commercial banking industry is associated with more stable and less fragile financial markets. On the other hand, there is by now widespread agreement that in recent times, the sheer size and complexity of certain financial institutions, most notably investment banks, posed serious risks for the stability of financial markets in several developed economies. In particular, as the so-called shadow banking industry replaced traditional banking in leading the financial industry expansion, a handful of institutions that became "too big" and "too interconnected" to be allowed to fail suddenly became a challenge for central banks and regulatory agencies (Brunnermeier (2009)). This suggest that the previous findings that dismissed (some) concentration as a threat to commercial banking should not be used to draw conclusions about the whole modern financial architecture in which traditional banking plays a less prominent role.

Turning to the issue of foreign competition and capital account openness, de Gregorio (1999) investigates the question of whether openness can contribute to develop domestic financial markets in a cross-section of developed and developing economies. That paper concentrates on four measures of capital account openness: international arbitrage figures, predictions from International-CAPM models, gross capital flows to GDP and the financial integration index by Montiel (1995). In the sample studied by de Gregorio (1999), these measures of financial openness appear to be strongly positively correlated with several indicators of financial development, including credit-to-GDP, stock market capitalization, stock market liquidity and stock returns volatility. This evidence conforms well with the results by Levine and Zervos (1998a) who find that, in a sample of 15 emerging economies, stock markets tend to become larger, more liquid, more volatile, and more integrated following the removal of capital controls.

General support for the positive effect of financial openness in financial development is also found in the evidence from panel data. In a panel of 21-42 countries and in the period 1980-2003,

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[29]The lower efficiency result as well as the persistent public deficits is associated with the higher costs and lower profitability of government banks as documented empirically by Micco, Panizza, and Yanez (2007).

Baltagi, Demetriades, and Law (2009) report that trade and financial openness are statistically significant determinants of banking sector development. In a larger sample of 108 countries over the period 1980 to 2000, Chinn and Ito (2006) find that a higher level of financial openness spurs equity market development only if a threshold level of legal development has been attained. Moreover, the authors indicate that the sequencing of financial development matters: for capital account openness to induce stock market development, an already developed banking sector appears to be required.

The papers reviewed in the last paragraph are mainly concerned with the link running from financial openness to growth, through financial development. In contrast, recent papers by Diaz (2012) and Bai and Zhang (2010) present evidence that information and enforcement frictions can themselves endogenously restrict capital flows and generate patterns of low financial openness. In these papers, enforcement costs have the potential to deter financial inflows, while decreasing prospects of financial autarky (i.e., increasing default penalties) can accelerate financial integration as in traditional sovereign debt models (e.g., Bulow and Rogoff (1989)).

## 5.2 Finance and Growth: The Evidence

Most of the literature linking financial and economic development is empirical. In this section, we attempt to present the main messages from this empirical literature, and, in the process, point to the challenges that it has tried to overcome. We first give an overview of the early studies which aimed at dissecting the effect of financial development on the immediate sources of economic growth (e.g., capital, productivity), along with a summary of the endogeneity problems that plagued these early exercises. Then we look at the papers that test the relationship between institutions and financial development and exploit this relationship to overcome endogeneity problems in assessing the finance-growth nexus. We also provide an account of the papers that study specific mechanisms by which the finance-growth nexus works (e.g., financial constraints, risk sharing), and close the section with a brief subsection devoted to the evidence available for developing countries.

### 5.2.1 Financial Development and Growth Accounting: Direct Links

The departure point for many cross-country empirical studies is the growth-type regression found in Barro (1991), which in turn descends directly from the neoclassical growth accounting

methodology of Solow (1957). Accordingly, researchers estimate equations of the form:

$$g_{it} = \gamma + \alpha FD_{it} + \beta X_{it} + \varepsilon_{it} \qquad (1)$$

where $g_{it}$ corresponds to growth (of output or some factor) in country $i$ during period $t$,[30] $FD$ is some indicator of financial development and $X$ is a vector of country-specific covariates.

King and Levine (1993a) is an early attempt to systematically control for various factors other than finance that may explain economic growth in a large cross-section of countries. Their analysis is based on growth regressions much like (1), and suggests that economic growth is positively and strongly correlated with financial market outcomes such as the liquid liabilities of the financial system and the fraction of credit going to private firms. King and Levine (1993a) also investigate the *channels* by which finance can influence growth. Their results confirm that both the accumulation channel and the allocation channel (described in Section 4) are at work -and in similar magnitudes- in the finance-growth nexus. These findings seem to be robust to different econometric methods and the inclusion of several additional control variables (King and Levine (1993b)). Levine and Zervos (1998b) show that these results are also robust to the use of stock market liquidity as proxy for financial development.

Another example of this method is by Benhabib and Spiegel (2000) who examine whether financial development affects growth solely through its contribution to growth in "primitives" or factor accumulation, or whether it also has a positive impact on TFP growth. Their results suggest that financial development is correlated with both TFP growth and investment (in both physical and human capital), but the measures of financial development that affect the former are not the same as those that affect the latter. In particular, the ratio of private sector liabilities to GDP appears to enhance TFP growth only, while the relative size of the banking sector drives growth in physical and human capital but not in productivity.

Finally de Gregorio (1996) presents evidence that countries with tight borrowing constraints (measured by credit availability and loan-to-value ceilings) have lower human capital accumulation mainly in the form of lower secondary school enrollment ratios. The paper shows that the growth effects of borrowing constraints can therefore be substantial and shows that they remain even after accounting for human capital, suggesting that other channels may be at work.

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[30]The unit of time is not homogenous in the literature. While in some papers t stands for a one year period, in others it refers to other frequencies.

**Addressing causality**  As is evident from the reduced-form equation (1), one can hardly expect to identify specific mechanisms that link institutions, financial frictions and growth like those listed in the theory sections of this survey. At most, regressions of that type can aim at estimating correlations between financial development and reproducible factors on the one hand, and efficiency or TFP on the other (the "channels"). More importantly, the arguments presented in Subsection 4.5 about the endogeneity of financial development to the process of economic and political development, suggest that simple regression analyses on (1) face serious econometric challenges and, as such, are unable to provide insights about the causal relationship between finance and growth. In this section we overview the research that aims at addressing these identification issues, mainly through the use of instrumental variables and more recent time series econometric techniques.

An early attempt to identify the aforementioned mechanisms in the data, while addressing endogeneity issues in the process, can be found in the pioneering work of Rajan and Zingales (1998). Using industry data from the United States, the authors first establish each industry's relative need for external finance ("technological demand"). They then use this as a benchmark for assessing the role of financial development in other countries, under the assumptions that (i) the United States has a relatively frictionless capital market, and (ii) such a technological demand carries over to other countries. In a cross-section of 41 countries, Rajan and Zingales (1998) conclude that sectors which are relatively more in need of external finance grow disproportionately faster in countries with more developed financial markets. More recently, Fisman and Love (2007) have contested the interpretation of these results. By directly including U.S. industrial growth in the Rajan and Zingales (1998) regressions, Fisman and Love (2007) conclude that it is not through financial dependence but more likely through the ability to harness global growth opportunities that financial markets affect economic growth. The intuition behind the latter result is that, since the United States has a well-developed financial market, industries in this country are able to respond perfectly to positive industry-specific shocks, while the response of industries in other parts of the world is constrained by a lower level of financial development.

The empirical finance-growth literature has also been able to exploit the time dimension of the data and has benefited from developments in multivariate time series methods. Important tools of this literature that can help address endogeneity issues are Granger causality tests and cointegration. An application of these techniques is by Neusser and Kugler (1998) who carry out long-run Granger causality tests to data from 13 OECD countries that include broad

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measures of financial development and industrial production. The authors find that, for most of the countries in the sample, there is some evidence of a long-run (cointegration) relationship. However, in this sample Granger causality tests do not lend support to the hypothesis that the relationship is unidirectional from finance to growth. These finding are later confirmed by the comprehensive study of Calderon and Liu (2002), whose novelty is the use of panel Granger causality test in a sample of 109 countries with similar results: financial development generally leads to economic growth, but Granger causality from economic growth to financial development is also present in most of the sample.

In a careful study of the time series properties of real and financial variables in five developed countries, Arestis, Demetriades, and Luintel (2001) also find mixed evidence about the role of financial development in Granger-causing real GDP, while pointing to the possibility that not all measures of financial development are equally endogenous. In particular, stock market measures, although in their sample exhibit a limited correlation with real variables, usually weakly satisfy exogeneity tests while banking measures do not.

### 5.2.2 Institutional Roots of the Finance-Growth Nexus

One of the first empirical papers linking institutions, finance and growth is by Demirguc-Kunt and Maksimovic (1998). The paper uses firm-level data to draw conclusions about the role of legal arrangements and financial frictions in preventing investment for growth. The authors' approach is reminiscent of the two-stage strategy used by Rajan and Zingales (1998). First, they identify firms in each country whose growth exceeds the maximum growth compatible with internal financing ("predicted growth"). They then examine how the proportion of firms in each country whose growth exceeds the predicted rate depends on the development of legal and financial systems. As an indicator of legal development, the authors use the Law and Order index (LOI) produced by the International Country Risk Guide. Demirguc-Kunt and Maksimovic (1998) apply these techniques to a cross-section of 30 countries and find that high values of the LOI increase the proportion of firms that grow at a level that requires access to external sources of long-term capital. In particular, the proportion of investment financed by equity in the sample is positively correlated with the efficiency of the legal system.[31] These results are complemented by evidence from a sample of 65 countries found in Wurgler (2000), who concludes that financial development in the form of stronger investor protection improves

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[31]As in some of the studies in the law and finance literature, the same association does not seem robust with respect to investment financed with long-term debt.

the allocation of capital and growth. In particular, countries with more developed financial sectors increase investment more in their growing industries, and decrease investment more in their declining industries.

Levine (1998) uses cross-country measures of legal origin, creditor rights, and the efficiency of contract enforcement developed by La Porta et al. (1998) as instrumental variables (IV) to extract the exogenous component of banking development. In the context of IV estimation, an additional equation is specified:

$$FD_{it} = \phi + \theta Z_{it} + v_{it}$$

where $Z$ is some variable uncorrelated with $\varepsilon$ in (1), but such that the estimate $\hat{\theta}$ is statistically significant. Under this conditions, $Z$ is considered a valid instrument for $FD$ and can be used in (1) to obtain consistent estimates of the effect of $FD$ on $Y$.

Levine (1998)'s confidence in the IV procedure stems from the fact that preliminary regressions on a cross-section of 42 countries show that the enforceability of contracts and, to a lesser extent, creditor protection, together account for a substantial fraction of the cross-country variation in private credit-to-GDP. In turn, the data show that the institutional component of banking development defined by creditor rights and the efficiency of contract enforcement is closely tied to long-run rates of per capita GDP growth, although the results are ambiguous about the relative importance of the capital stock and productivity channels. Using similar IV methods, Beck, Levine, and Loayza (2000a,b) show that the main results from Levine (1998) hold for a larger set of countries (70), and employing a wider set of financial development measures. Furthermore, Beck et al. (2000a) present evidence that (instrumented) financial development enhances growth mainly through measured productivity.[32]

### 5.2.3 Institutions, Financial Constraints and Capital Accumulation

Of all the mechanisms considered in Section 4, the effects of financial constraints on the accumulation of capital is by far the most widely studied one. The typical approach to assessing the importance of financial constraints in investment decisions is to directly estimate equations that result from semi-structural models of investment and financing decisions under financial market imperfections. Indeed, structural investment models have been used to study financial constraints at least since Fazzari, Hubbard, and Petersen (1988). The main theoretical

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[32]One more study is worth mentioning at this point: Haidar (2009) shows that in a sample of 170 countries, an index of investor protection that builds on but improves upon La Porta et al. (1998) is a good predictor of economic growth, even after accounting for the investment channel.

argument comes from Hayashi (1982), who shows that, under some conditions, the neoclassical model of investment yields average Tobin's $q$ as a sufficient statistic for investment. To fix ideas, consider the simplified investment problem under convex adjustment costs:

$$\max_{i_t, k_{t+1}} E_0 \sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t \left[ f(k_t) - i_t - \Phi\left(\frac{i_t}{k_t}\right) \right] \tag{2}$$

$$s.t.: \quad k_{t+1} = i_t + (1-\delta) k_t \tag{3}$$

where $i$ is investment, $f(k_t)$ is a neoclassical production function and $\Phi(\cdot)$ is a convex adjustment cost function. Let $\mu_t$ be the multiplier on (3) and define $q_t = \mu_t (1+r)^t$. Then, if for simplicity we assume $\Phi(\cdot) = \phi/2 (i_t/k_t - \delta)^2$, the first order condition with respect to investment yields:

$$\frac{i_t}{k_t} = \frac{1}{\phi}(q_t - 1) + \delta \tag{4}$$

that is, a firm's investment as a fraction of its size should only be a function of $q_t$ and parameters. Many researchers (see Hubbard (1998) for a survey) have used data on $(i_t/k_t)$ and $q$ to estimate directly equations similar to (4) in a traditional regression framework.[33] By adding a cash flow variable to (4) they suggest that a statistically and economically significant coefficient on this additional variable is a measure of the severity of financial constraints.[34]

Claessens, Ueda, and Yafeh (2010) is a recent application of this methodology, but stands out as an attempt to identify the institutional sources of financial constraints. In particular, the paper posits that low institutional quality manifests itself in (i) higher financial transaction costs, and (ii) higher required rate of return (through riskier contracts). In terms of the problem in (2)-(3), this paper assumes that $\Phi(\cdot)$ includes not just costs from, e.g., the adoption of new machinery, but also costs from raising external finance. The subtle point of Claessens et al. (2010) is that in countries where transactions costs are lower, $q_t$ will deviate little from its steady state (unity), and a lower investment rate would be required for it to adjust. Thus, the model predicts that institutional arrangements that reduce both the costs of installing

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[33] For instance, in the context of (fixed effects) panel data, equation (4) can be estimated as: $(i_t/k_t)_{jt} = \beta_{0j} + \beta_1 q_{jt} + \varepsilon_{jt}$ where $\beta_{0j} = 1/\phi + \delta_j$ and $jt$ corresponds to country $j$ in period $t$.

[34] This type of studies face a number of problems, however, some of which are studied in detail by Gomes (2001) who concludes that: "...the success of cash-flow-augmented investment regressions is probably due to a combination of measurement error in $q$ and identification problems." Moreover, a recent paper by DeMarzo, Fishman, He, and Wang (2012) shows that in general, dynamic agency problems imply that financial slack, not cash flow, is the appropriate proxy for financing constraints. See also the paper by Lorenzoni and Walentin (2007) for a model of financial constraints that studies several factors that can affect the correlations between investment, $q$ and cash flow.

new capital and the external finance premium may, in principle, have ambiguous effects on investment. The authors test their model predictions in a large panel of firms coming from 48 countries and the 1990-2007 period, using a variety of institutional quality measures from La Porta et al. (1998), the World Bank and the World Economic Forum. In all their regressions better institutions are associated with a lower required rate of return and with a higher speed of adjustment in Tobin's $q$. That is, the effect of institutions through financial frictions dominates the risk-premium effect. Importantly, better institutions seem to help disproportionately small firms as they reduce the disparity in $q$'s speed of adjustment (i.e., reduce financial constraints) between big and small firms.

Within the literature of investment models, the paper by Love (2003) is novel in two respects. From an analytical standpoint, the paper focuses on the investment Euler equation rather than the implied marginal/average $q$-equation, which requires somewhat restrictive exogeneity assumptions before taking it to the data. For illustration, consider adding a nonnegativity constraint for current profits to our model in (2)-(3). Then the multiplier $(\lambda_t)$ associated with this constraints equals the shadow cost of raising new equity and the investment Euler equation becomes:

$$
1 + \Phi'\left(\frac{i_t}{k_t}\right) = \left(\frac{1}{1+r}\right) E_t \left\{ \Theta_t \left[ f'(k_t) + (1-\delta)\left(1 + \Phi'\left(\frac{i_{t+1}}{k_{t+1}}\right)\right) \right] \right\}
$$

where $\Theta_t = (1 + \lambda_{t+1})/(1+\lambda_t)$. In this Euler equation, the stochastic discount factor $\Theta_t$ captures the external premium and, in the paper, is linearly related to cash holdings through financial development $(FD)$: $\Theta_t = a_0 + (a_1 + FD)\,Cash_t$. The paper therefore provides a testable hypothesis that more developed financial systems lower the elasticity of the external premium with respect to cash holdings (i.e., ameliorate financial constraints). From an econometric perspective, Love (2003) uses firm-level data and instruments $FD$ following Levine (1998) in an effort to uncover the sources of financial constraints, which in turn affect investment and growth. In particular, the paper uses measures of institutional quality (rule of law, corruption, efficiency of the judicial system) in order to extract the exogenous component of financial development. The regression analysis shows that better enforcement of financial contracts reduces the predictive power of internal resources on capital investment. That is, better institutions that are responsible for higher levels of financial development foster investment and growth by reducing the severity of financial constraints.

### 5.2.4 Institutions, Risk Sharing and Capital Accumulation

While most of the papers that study specific mechanisms by which institutions affect financial development and growth have focused on the existence of quantity restrictions, a handful of papers establish a link in the data between imperfect risk sharing, investment and growth (see Section 4.2.1). An early contribution in this strand of the literature is the paper by Himelberg, Hubbard, and Love (2002), which studies the effects of imperfect investor protection on the rental cost and optimal level of capital. In their model, investor protection is captured by a parameter that govern the difficulty with which insiders can divert profits for private use before distribution to outsiders. Such diversion is possible either because of information asymmetries (i.e., diversion is unobservable) or because contract enforcement is imperfect (e.g., bringing the case to court is costly). These frictions result in incomplete risk sharing, an idiosyncratic risk premium applied to the cost of capital, and a steady state level of capital below the first best. As the papers surveyed before in this subsection, Himelberg et al. (2002) use the first order conditions of an investment model to guide their empirical strategy and find ample support for the model predictions in a panel of firm-year data coming from 38 countries. Interestingly, the paper reports an important firm-level effect of investor protection: Firms with a larger fraction of intangible assets -which are inherently easier to "steal" than physical assets- are likely to benefit more from strong investor protection. This last observation is consistent with the results found in Claessens and Laeven (2003), which presents evidence that intellectual property rights contribute to explaining economic growth even after accounting for the level of financial development.

With a similar model of moral hazard (see Section 4.2.1) Castro et al. (2004) predict that better investor protection should lead to more risk-sharing which in turn results in (i) lower debt as a share of total external financing and, (ii) higher investment and more growth. The authors' findings from regression analysis in a sample of 46 countries are twofold. First, stronger creditor and shareholder rights are associated with higher equity/debt ratios and less ownership concentration. Second, more open economies, where investment is less dependent upon domestic savings, exhibit higher rates of capital accumulation and grow faster.

In the extension of Castro et al. (2004) to the two-sector model by Castro et al. (2009), the key driver of low investment is the fact that, because of its inherent higher risk, production of investment goods disproportionately suffers from imperfect risk-sharing driven by weak institutions (i.e., low investor protection). A calibrated version of this model shows that between

38 and 81 percent[35] of the cross-country variation in (log) investment can be accounted for by differences in investor protection. These results are complemented by regression analyses in which institutional variables (rule of law, one share-one vote) seem to reduce the relative price of investment goods, which in turn captures the degree of imperfect risk sharing.

### 5.2.5   Institutions, Financial Constraints and Misallocation

A number of papers have quantitatively studied the link between institutions, finance and economic development through the misallocation of capital. In particular, the models briefly surveyed in Section 4.1.2 try to explain differences in economic development by looking at the misallocation between productive but credit-constrained entrepreneurs and those with lower skills but larger collateral, which is in turn explained by imperfect enforcement.

In this spirit, Antunes et al. (2008) parametrize their model to mimic the U.S. economy in every aspect except the institutional framework, which is calibrated to reflect different measures of contract enforcement and intermediation costs from a number of developing countries. Counterfactual exercises then suggest that increasing intermediation and enforcement costs can reduce output per capita by 30 to 50 percent with the strongest effect observed in small open economies with quasi-exogenous interest rates.

With an identical methodology, Amaral and Quintin (2010) also find that differences in limited enforcement greatly disrupt the organization of production, and can account for over two-thirds of the differences in output per worker between the sample countries and the United States. The paper by Buera et al. (2011) also studies the quantitative effects of enforceability of contracts but highlight the asymmetry of these effects in different sectors of the economy. In their model, because fixed costs of operation are higher in the manufacturing sector, financial constraints that arise from enforcement problems disproportionately affect this sector (poorer but more productive entrepreneurs are unable to enter manufacturing). In particular, sector-level TFP is about 30% lower in services and roughly 50% lower in manufacturing when compared with the frictionless economy.

Finally, the model by Midrigan and Xu (2014) uses plant-level data from South Korea, China and Colombia to calibrate a model in which adopting more productive technologies is costly and potential entrants are credit-constrained by enforcement frictions. Results from their quantitative exercises show that differences in financial development account for only a modest fraction

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[35]This range follows from alternative calibrations of the model, which in turn follow two different estimates for the relative risk of producing in either sector.

of productivity losses via misallocation along the intensive margin (among entrepreneurs operating with more productive technologies), but may be responsible for large productivity losses via misallocation along the extensive margin (by preventing some entrepreneurs from operating under more productive technologies).

## 5.3  Evidence from Developing Economies

It is only natural to think that, if financial development enhances growth, then developing economies -which are in the process of converging to industrialized countries' income levels-should disproportionately benefit from reforms aimed at improving the functioning of financial markets. And while there is an early literature on the finance-growth nexus in developing countries (Gupta (1984), Patrik (1966)), it was thanks to the refinement of time series and panel-data econometrics and to the recent efforts to improve data collecting in these economies that scholars finally gained access to the insights of such links from the perspective of developing countries. In this section we briefly survey some recent contributions in this area which, for the most part, suggest that indeed the finance-growth nexus seems to be more pronounced in these economies.

In a comprehensive study that uses time series and panel data methods in a sample of 30 developing economies, Al-Yousif (2002) finds a strong association between financial development and growth, but points that the data suggests causation running either way. This contrasts with the findings of Christopoulos and Tsionas (2004) who report a unique cointegration relation between financial depth and growth, implying unidirectional causality from financial to economic development. These papers also provide an overview of the many obstacles found in researching these issues within developing countries, such as the pervasiveness of short samples, and the complex web of policy distortions that characterizes many such countries, which in turn exacerbates the identification of causal effects.

Within the literature of finance and growth in developing countries, the paper by Buera and Shin (2013) stands out in at least two respects. First, the paper is among the few general equilibrium models that is used for a quantitative analysis of financial development and growth in developing countries. Secondly, the paper studies the interaction between the removal of policy distortions like those mentioned in the previous paragraph, with the degree of financial development. The authors show that with low levels of financial development, the growth effects of removing such policy distortions are considerably delayed; in other words, low financial development acts as a bottleneck in the process of resource reallocation follow-

ing large-scale economic reforms. The quantitative assessment of this theory shows that the transitional dynamics predicted by the model closely match the time paths of key macro and microeconomic variables of several Asian economies (so-called "miracle economies") during the 1980s and 1990s.

Another recent effort to address causality is the paper by Eng and Habibullah (2011) which studies a panel of 70 developing countries. The authors use time series techniques to conclude that, while there may exist some reverse causality and non-causal correlation between finance and growth, the evidence favoring causation from finance to growth is much stronger. This result is confirmed by Enisan-Akinlo and Egbetunde (2010) using similar techniques (a VECM) for a number of sub-Saharan African countries.

In an effort to identify specific finance-growth channels in transition economies, Popov (2014) uses survey data from firms in 25 of these countries to study the effects of credit constraints on human capital. In particular, the author shows that, after controlling for unobserved heterogeneity and macroeconomic conditions, credit-constrained firms are about 40% less likely to offer on-the-job training than firms with access to credit markets.

Finally, the paper by Arizala, Cavallo, and Galindo (2013) uses panel data methods to replicate Rajan and Zingales (1998) but with productivity (TFP) rather than overall growth as their dependent variable.[36] This paper presents evidence in support of the productivity channel and, interestingly, reports that the association of financial development with productivity is stronger in developing countries. The paper also shows that financial development appears less important for industry-level TFP growth where macroeconomic volatility is higher.

# 6    Final Remarks

In this paper we have provided an up-to-date survey of the main theoretical and empirical research aimed at studying the links running from institutions to financial development and economic growth. The theoretical literature points to two main areas in which institutions play a key role in fostering financial development: the specification and enforcement of property rights in financial contracting, and the appropriate design and implementation of macroeconomic and financial policy. Financial development then enhances economic growth mainly by alleviating financial constraints, increasing risk sharing and providing adequate liquidity, which in turn allows for higher rates of capital accumulation and more efficient resource allocation.

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[36]Some of this research can also be found in Chapter 6 of IDB (2010).

From an empirical perspective, we have seen that the refinement of econometric techniques and the availability of more and better data has allowed for sharper inference regarding the links between institutions, financial development and growth. While the wealth of evidence suggests the existence of these links, the relative strength of such links and the existence of unidirectional causality -from institutions to finance to growth- is less certain.

It is against this background that we see the recent breed of quantitative general equilibrium models (Antunes et al. (2008), Amaral and Quintin (2010), Castro et al. (2009), Buera et al. (2011), Buera and Shin (2013), Midrigan and Xu (2014)) as a promising area to understand the mechanisms by which institutional, financial and economic development may affect one another. These models have the potential to improve upon the empirical strategies previously surveyed most notably because the latter are, to varying degrees, subject to the Lucas Critique. That is, estimating models such as (1), in which endogenous variables appear as unrestricted functions of exogenous or predetermined variables (e.g., the exogenous components of financial development) is inappropriate if one intends to use such models for the purpose of evaluating alternative economic policies. The main problem with reduced-form models like (1) is that its parameters are subject to theoretical cross-equation restrictions that follow from the fact that the endogenous variables of the models are chosen optimally by forward-looking agents. By contrast, general equilibrium models account for these cross-equation restrictions and can therefore be used to carry out counterfactual exercises such as the ones required to assess the growth effects of institutional reform aimed at improving the workings of financial markets. This unquestionable strength is what, in our thinking, makes these general equilibrium models a promising route for further research on the links between financial development and growth.

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## Table 1. Institutions and Financial Development: Channels and Determinants

| Channels/Determinants | Summary | Authors (years) |
|---|---|---|
| Channel: Property rights and contract enforcement | Institutions play a role by specifying property rights and protecting parties at disadvantage, and enforcing previously agreed-upon contract terms. | Glaeser et al. (01), Acemoglu and Johnson (05) |
| Channel: Property rights and protection from powerful elites | Institutions can protect disadvantaged parties by protecting minority shareholders against better informed shareholders/managers; protecting creditors against asymmetric information and the risks of expropriation; and protecting borrowers, and/or depositors against the power of monopolists. | Grossman and Hart (86, 88), White (89), Vives (90), Hannan (91), Pagano and Japelli (93), Berkovitch et al. (97), Modigliani and Perotti (97), Simons and Stavins (98), Padilla and Pagano (00), Bebchuk (02), Easley and O'hara (04), Gehrig and Stenbacka (07), Ewert and Wagenhofer (11) |
| Channel: Costly enforcement of contracts | Institutions can prevent individuals from reneging on pre-specified contractual terms, both through commitment mechanisms and through third-party arbitrators. This can be costly either because of the complexity of financial contracts or because of the inefficient operation of courts and regulators. | Williamson (79, 83), Diamond (04), Schwartz and Watson (04), Japelli et al. (05), Acemoglu and Johnson (05) |
| Determinants of property rights and enforcement institutions | Two main views about the origins of institutions emphasize, on one hand, the rather persistent character of institutions as a consequence of legal origins and geography; while, on the other, the coevolution of politics, the distribution of political power in societies, and property rights-contracting institutions. | Posner (73), Rubin (77), Tornell (97), Acemoglu et al. (01,02), Berkowitz et al. (01), Glaeser and Shleifer (02), Pistor et al. (02), Beck and Levine (05), Acemoglu and Johnson (05), Acemoglu et al. (06), Anderlini et al. (13) |
| Channel: Economic policy | Institutions shape macroeconomic and financial policy mainly through the government budgeting process, the degree of independence and accountability of central banks and financial supervisors. This induces a policy mix that involves macroeconomic policy, regulation, competition policy and financial openness. That mix can be associated with macroeconomic instability and regulatory failures, which in turn can foster or prevent financial development. | Gerschenkron (62), Feldstein (80), Bencivenga and Smith (92), Obstfeld (94), Levine (96), Alesina and Perotti (99), Alesina et al. (99), Mishkin (99), Huybens and Smith (99), Velasco (99), Aarstol (00), Allen and Gale (00), Caballero and Krishnamurthy (04), Boyd and De Nicolo (05), Alesina and Tabellini (07), Quintyn et al. (07) |
| Channel: Informal Institutions | Certain "informal institutions" such as norms and patterns of social interaction may also help determine the patterns of financial exchange and the development of financial interactions. | Knack and Keefer (97), Calderón et al. (99), Guiso et al. (04), Hong et al. (04), Williamson (03), Johnson et al. (02a), Kumar et al. (11) |

Source: Authors' compilation. For space considerations only the last two numbers of the year of publication are reported in column Authors. Contributions are reported in chronological order.

## Table 2. Financial Development and Growth: Some Theory

| Channels | Summary | Authors (years) |
|---|---|---|
| Financial constrains | Financial constraints, often viewed as optimal responses by agents to an underlying information friction or cost, can hinder growth by constricting the accumulation of reproducible factors such as physical and human capital and/or the allocation of capital and ability. | Stiglitz and Weiss (81), Williamson (87), Galor and Zeira (93), De Gregorio (96), Holmstrom and Tirole (97), Azariadis and Smith (99), Lochner and Monge-Naranjo (02), Aghion et al. (05), DeMarzo and Fishman (07), Antunes et al. (08), Erosa and Hidalgo-Cabrillana (08), Amaral and Quintin (10), Pienknagura (10), Buera et al. (11), Chiu et al. (11), Buera and Shin (13), Valencia (13) |
| Risk sharing | If risk aversion is considered, financial factors can have real effects since agents will want to smooth consumption across time and states of nature. Incomplete risk-sharing arising from financial market incompleteness can therefore lower the optimal demand for capital and/or result in inefficient allocation, ultimately harming economic growth | Arrow (64, 71), Saint-Paul (92), King and Levine (93b), Acemoglu and Zilibotti (97), Kahn and Ravikumar (01), Castro et al. (04, 09), |
| Liquidity risks and shortages | Adverse selection and/or moral hazard can lead to liquidity risks and shortages. The absence of well-functioning financial markets that can attenuate these risks may constrain investment decisions, the allocation of resources and growth. | Diamond and Dybvig (83), Bencivenga and Smith (91), Levine (91), Bencivenga et al. (95), Holmstrom and Tirole (98), Ennis and Keister (03), Aghion et al. (10), |
| Market discipline and allocation | Certain features of financial markets and instruments, like the threat of bankruptcy, efficient monitoring and the possibility of takeovers, can further enhance allocative efficiency by disciplining entrepreneurs. | Scharfstein (88), Maug (98), Aghion et al. (99) |
| Endogenous financial development | Financial development can also be thought of as endogenous to the economic structure and to the process of economic development. This can be modeled within a framework that assumes that financial intermediation is costly, making it "affordable" only to high income countries. Recently, the intricate relationship between economic development and political equilibrium has also been considered a potential determinant of financial market outcomes. | Greenwood and Jovanovic (90), Boyd and Smith (96), De la Fuente and Marin (96), Bose and Cothren (97), Azariadis and Smith (99), Rajan and Zingales (03), Erosa and Hidalgo-Cabrillana (08), Becerra et al. (12), Sevcik (12) |

Source: Authors' compilation. For space considerations only the last two numbers of the year of publication are reported in column Authors. Contributions are reported in chronological order.

## Table 3. Institutions and Financial Development: Empirical Evidence

| Channels | Summary of the main questions and hypothesis being tested | Authors (years) |
|---|---|---|
| From property rights and enforcement institutions to financial development | What is the relative contribution of property rights and contract enforcement when accounting for cross-country differences in financial market outcomes? Do certain legal origins have repercussions for finacial development? Does creditor protection matter more or less (or not) than information sharing in generating more credit? Does the level of development matter for this relation? Is investor protection correlated with access to external finance? Is creditor protection relevant when evaluating how exogenous shocks impact credit markets? | La Porta et al. (97, 98, 00), Padilla and Requejo (00), Glaeser et al. (01), Djankov et al. (03), Beck et al. (03a, 03b), Klapper and Love (04), Acemoglu and Johnson (05), Claessens and Klapper (05), Galindo and Micco (05, 07), Japelli et al. (05), Djankov et al. (07) |
| From macroeconomic policy to financial development | Do monetary policy institutions influence the level of financial development via inflation? Does the decisision of central banks to affect asset price inflation have an impact of financial stability? Do large and persistent public deficits result in adverse effects for financial development? Is higher government ownership of banks related to financial development through the overall efficiency of the banking system? | Boyd et al. (01), La Porta et al. (02), Khan et al. (06), Emran and Farazi (09), Haumer (09), Piazzesi and Schneider (09), Blanchard et al. (10), Berger and Kismer (13), González and Grigoli (13) |
| From regulation, competion policy, and financial openness to financial development | Is market concentration in the banking industry associated with more stable and less fragile financial markets? How did the financial crisis of 2008 change views on this question? Can capital account openness contribute to developing domestic financial markets? Are stock markets impacted after the removal of capital controls in emerging economies? Does the level of legal development matters for the size of this impact? Can capital flows be endogenously driven by financial development? | Levine and Zervos (98a), de Gregorio (99), Beck et al. (07), Baltagi et al. (09), Brunnermeier (09), Bai and Zang (10), Díaz (12) |

Source: Authors' compilation. For space considerations only the last two numbers of the year of publication are reported in column Authors. Contributions are reported in chronological order.

## Table 4. Financial Development and Growth: Empirical Evidence

| Channels | Summary of the main questions and hypothesis being tested | Authors (years) |
|---|---|---|
| From financial development to growth: direct links | What do growth regressions say when alternative proxies of financial developemnt are used as explanatory variables while controling for various others covariates? Are borrowing constraints linked to human capital accumulation? What occurs when identification and reverse causality are explicitly taken into account? | King and Levine (93a, 93b), de Gregorio (96), Levine and Zervos (98b), Neusser and Kugler (98), Rajan and Zingales (98), Benhabib and Spiegel (00), Arestis et al. (01), Calderon and Liu (02), Fisman and Love (07) |
| From financial development to growth: Institutional roots | Do measures of the efficiency of the legal system correlate with proxies of measures of financial development? Which variables are valid instruments to extract the exogenous component of financial development? Does the use of such instruments make it possible to identify effects of financial development on growth? | Demirguc-Kunt and Maksimovic (98), Levine (98), Beck et al. (00a, 00b), Haidar (09) |
| From financial development to growth: financial constraints and capital accumulation | How important have financial constraints been for investment decisions? Are empirical measures of Tobin's q a sufficient statistic to explain invesmtent dynamics? If not, do measures of institutional quality matter for such result? Is the elasticity of the external premium with respect to cash holdings related to the development of the financial system? | Hayashi (82), Fazzari et al. (88), Hubbard (98), Gomes (01), Love (03), Claessens et al. (10), DeMarzo et.al (12) |
| From financial development to growth: risk-sharing and capital accumulation | What are the effects of imperfect investor protection in the rental cost and optimal level of capital? Is incomplete risk-sharing coming from information asymmetries or imperfect contract enforceability related to idiosyncratic risk premium? Does better investor protection lead to more risk-sharing? | Himelberg et al. (02), Castro et al. (04), Castro et al. (09) |
| From financial development to growth: financial constraints and misallocation | Does imperfect enforcement lead to misallocation of resources between productive and unproductive producers? How much of this misallocation accounts for cross-country differences in output per capita? Are there asymmetric effects across sectors? Do misallocation costs come mostly from intensive or extensive margins? | Antunes et al. (08), Amaral and Quintin (10), Buera et al. (11), Midrigan and Xu (14) |
| From financial development to growth: the case of developing countries | Is the finance-growth nexus more pronounced in developing economies? Do reforms aimed at improving the functioning of financial markets have disproportionate benefits in these economies? Is there a one-way causality? Can low levels of financial development act as a bottleneck in the process of resource reallocation following large-scale economic reforms in these countries? | Patrik (66), Gupta (84), Al-Yousif (02), Buera and Shin (13), Eng and Habibullah (11), Enisan-Akinlo and Egbetunde (10), Arizala et al. (13), Popov (14) |

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