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Abstract

Traditional growth theory does not include financing and suggests that growth will be continuous. In fact growth is often discontinuous. In some periods there are booms with rapid growth which end in financial crises with low growth for sustained periods. This paper argues that the financial system plays a crucial role in understanding these variations in growth. High growth may require that firms and entrepreneurs take nondiversifiable risks in order to obtain high returns. This risk taking may lead to high growth but also to frequent crises. Although growth followed by crisis can be beneficial, this is not always the case. When a crisis follows the bursting of a bubble in asset prices, it can have very negative impacts on growth as in the U.S. Great Depression or Japan in the 1990s. For sustained growth policy should be devoted to avoiding bubbles, contagion, and financial fragility.

Key words: Growth, Crises, Bubbles, Contagion, Financial fragility
JEL classification: D9, E3, E5

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1 Classical views

What is the relationship between growth and the financial system? This is an old question that has received many different answers over the years.[1] Authors including Bagehot (1873) and Hicks (1969) emphasize that financial systems played a critical role in igniting industrialization in England by facilitating the mobilization of capital. Schumpeter (1912) argues that well-functioning banks encourage technological innovation by identifying and funding entrepreneurs with the best chances of successful innovation. On the other hand, many authors, such as Robinson (1952) and Lucas (1988), argue that financial systems do not matter for growth and financial development simply follows or reflect anticipation of economic development. In addition, the role of finance is often simply ignored in development economics. For example, Stern's (1984) review of development economics does not discuss the financial system, even in a section that lists omitted topics.

A reading of the traditional neoclassical literature on growth would suggest that financing is not important. In this literature there are two main sources of growth. The first is growth within the technological frontier caused by factor accumulation. The second is innovation that causes the technological frontier to move outwards. Innovation is necessary for an economy to experience sustained growth for a long period of time. However, factor accumulation can still be a large component of growth particularly for emerging economies that are a long way from the technological frontier.

Early models focus on factor accumulation as the engine of growth. In these models, reproducible inputs, such as physical and human capital, ultimately show diminishing returns. This feature leads the models to predict the convergence of economies towards a steady state. Growth based on factor accumulation stops eventually. Long run growth takes place as a result of exogenous technological progress.[2]

The next step was to try and model how innovation occurs rather than assuming that it is exogenous. Endogenous growth models usually contain an innovation "production" process. Innovation is the crucial source for long-run growth. Innovative activity requires the use of scarce resources, and the incentives for innovation are provided by monopoly profits. Because of this imperfectly competitive market structure, the market solution is not usually Pareto-optimal.[3]

[1] Levine (1997, 2003) provides excellent surveys of the literature on economic growth and financial development.

[2] See, e.g., Solow (1956), Swan (1956), Cass (1965) and Koopmans (1965).

[3] See, e.g., Romer (1987), (1990), Aghion and Howitt (1992), and Grossman and Helpman (1991).

These traditional approaches to growth do not consider the role of financial systems in the growth process. However, they suggest that if the financial system is to play a role it can be through its effect on factor accumulation or on innovation.

2 The role of financial systems

Financial systems channel household savings to the corporate sector and allocate investment funds among firms. They allow intertemporal smoothing of consumption by households and expenditures by firms. They allow both firms and households to share risks. These channels are the sources connecting financial development and financial structure to economic growth.

In this section, we overview the literature discussing financial systems and economic growth. The discussion is organized according to the particular role of the financial system analyzed in each study, including information acquisition and risk sharing. In doing so, we pay special attention to the relation between financial structure and the difference in outcomes. Whether the difference in financial structure results in different long run economic growth or not is an important economic policy concern.

2.1 Producing information and allocating capital

The information production role of financial systems is explored by Ramakrishnan and Thakor (1984), Bhattacharya and Pfleiderer (1985), Boyd and Prescott (1986), and Allen (1990). They develop models where financial intermediaries arise to produce information and sell this information to savers. Financial intermediaries can improve the ex ante assessment of investment opportunities with positive ramifications on resource allocation by economizing on information acquisition costs. As Schumpeter (1912) argued, financial systems can enhance growth by spurring technological innovation by identifying and funding entrepreneurs with the best chance of successfully implementing innovative procedures. For sustained growth at the frontier of technology, acquiring information and strengthening incentives for obtaining information to improve resource allocation become key issues.

Some studies have explicitly incorporated these channels in a growth model. Greenwood and Jovanovic (1990) construct a model in which financial intermediaries produce better information, improve resource allocation (by financing the firms with the best technologies), and foster growth. Growth means that more individuals can afford to join financial intermediaries, which improves the ability of the financial intermediaries to produce better

information. King and Levine (1993a) show that financial intermediaries may boost the rate of technological innovation by identifying those entrepreneurs with the best chances of successfully initiating new goods and production processes.

These models focus on financial systems based on intermediaries. As for the role of markets, what is often indicated is the inherent free-riding problem when it comes to incentives for information acquisition. However, there is one important area in which markets potentially perform better than intermediaries. It is where people have diversity of opinion and there is genuine disagreement about the optimal decision. This idea is explored by Allen and Gale (1999). They ask whether financial markets or banks are better at providing finance for projects that involve the development of new technologies. Allen and Gale argue that with new technologies investors are likely to have diversity of opinion that arises from differences in prior beliefs, rather than differences in information. The advantage of financial markets is that they allow people with similar views to join together to finance projects. This will be optimal provided the costs necessary for each investor to form an opinion before investment decisions are made are sufficiently low. Finance can be provided by the market even when there is great diversity of opinion among investors. Intermediated finance involves delegating the financing decision to a manager who expends the cost necessary to form an opinion. There is an agency problem in that the manager may not have the same prior as the investor. This type of delegation turns out to be optimal when the costs of forming an opinion are high and there is likely to be considerable agreement in any case. The analysis suggests that market-based systems will lead to more innovation than bank-based systems. Hence, the role of the market might be more important in the phase of economic growth at the technological frontier.

2.2 Risk Sharing

One of the most important functions of a financial system is to achieve an optimal allocation of risk. There are many studies directly analyzing the interaction of the risk sharing role of financial systems and economic growth. These theoretical analyses clarify the conditions under which financial development that facilitates risk sharing promotes economic growth and welfare. Quite often in these studies, however, authors focus on either markets or intermediaries, or a comparison of the two extreme cases where every financing is conducted by either markets or intermediaries. The intermediate case in which markets and institutions co-exist is rarely analyzed in the context of growth models because the addition of markets

can destroy the risk-sharing opportunities provided by intermediaries. In addition, studies focus on the role of financial systems that face diversifiable risks. The implications for financial development and financial structure on economic growth are potentially quite different when markets cannot diversify away all of the risks inherent in the economic environment.

One importance of risk sharing on economic growth comes from the fact that while savers generally do not like risk, high-return projects tend to be riskier than low return projects. Thus, financial markets that ease risk diversification tend to induce a portfolio shift towards projects with higher expected returns as pointed out by Greenwood and Jovanovic (1990), Saint-Paul (1992), Devereux and Smith (1994) and Obstfeld (1994). King and Levine (1993a) show that cross sectional risk diversification can stimulate risky innovative activity for sufficiently risk-averse agents. The ability to hold a diversified portfolio of innovative projects reduces risk and promotes investment in growth-enhancing innovative activities.

In addition, better risk diversification in international financial markets may enhance economic growth by exploiting the benefit from trade in goods across economies. Standard models in international trade predict that each country specializes in producing a smaller number of final goods to maximize the gains from trade. However, as Helpman and Razin (1978) show, if uncertainty is introduced, the risk-averse nature of consumers results in imperfect specialization that reduces the gains from trade. In such circumstances, financial development that allows the trading of contingent claims provides better risk-sharing opportunities without changing production possibilities. Therefore, financial development in an international context will enhance growth by allowing each economy to specialize in producing a small subset of goods, but at the same time will allow the diversification of the increased income risk from specialization.

Risk-sharing plays a key role in promoting growth when agents face liquidity risk as well. The standard link between liquidity and economic development arises because some high-return projects require a long-run commitment of capital, but savers do not like to relinquish control of their savings for long-periods. Hicks (1969) argues that products manufactured during the first decades of the Industrial Revolution had been invented much earlier. Rather, the critical innovation that ignited growth in the 18th century England was capital market liquidity.

Levine (1991) takes the Diamond and Dybvig (1983) setup for liquidity demand, models the endogenous formation of equity markets, and links this to a growth model. As stock market transaction costs fall, more investment occurs in the illiquid, high-return project. If illiquid projects enjoy sufficiently large externalities, then greater stock market liquid-

ity induces faster steady-state growth. Bencivenga, Smith and Starr (1995) construct a model in which high-return, long-gestation production technologies require that ownership be transferred throughout the life of the production process in secondary securities markets. Smaller transaction costs enhance liquidity and induce a shift to longer-gestation, higher-return technologies. Bencivenga and Smith (1991) show that, by eliminating liquidity risk, banks can increase investment in the high-return, illiquid asset and accelerate growth. They presume pre-existing impediments to liquid equity markets. DeGregorio (1996) constructs a model where financial systems can promote growth with accumulating human capital by easing liquidity constraints.

The above studies focus on the role of either markets or intermediaries and the benefit of financial development is emphasized by comparing the situation where each individual has to bear the idiosyncratic risks and the situation where such risk can be traded in the financial system. Analysis in which markets and intermediaries co-exist is rare because of the disintermediation effects of having markets. The basic reason for the existence of banks in the Diamond and Dybvig (1983) model is to provide liquidity insurance that smooths consumption across states. In markets, investors constantly rebalance their portfolios to earn the highest rate of return. Liquidity insurance requires that investors accept lower returns than the market offers in some events in order to get higher returns in others. A financial institution that has to compete with financial markets will face disintermediation when the market return is higher than the bank's smoothed return, even though the insurance provided by financial institutions would make everyone better off than they would be without it.

Fecht, Huang, and Martin (2004) are able to consider the case where banks and markets coexist by adopting a different approach. They consider a model with a Diamond and Dybvig (1983) setup but there is the possibility for individual agents to trade in markets only when they incur costs. Better risk sharing of liquidity shocks by intermediaries can be preserved as long as the cost to participate in markets is relatively high and the portion of individual market participants is not too large. They point out the possible trade-offs between better risk-sharing and a higher growth rate (as a result of more risk taking in investment with a higher return), and show some cases where more bank-based financial systems experience better liquidity insurance at the cost of a lower growth rate.

Acemoglu and Zilibotti (1997) consider an environment in which markets are not complete and it is costly to produce assets that increase diversification opportunities. In the model, they endogenize the degree of market incompleteness and examine the impact of di-

versification choices on economic development led by capital accumulation. Key properties of their model include 1) high-return, risky projects that are indivisible and require a large initial investment, 2) people dislike risk, 3) there are lower-return, safe projects, and 4) capital is scarce. The desire to avoid highly risky investments slows down capital accumulation, and the inability to diversify risk introduces a large amount of uncertainty in the growth process. They point out that decentralized equilibrium is inefficient and takes a much longer time to emerge from the "primitive accumulation" stage with highly variable output because individuals do not take into account their impact on others' diversification opportunities.

These studies shed some light on the relationship between the risk sharing role of the financial system and growth. However, one limitation of the literature is that it does not consider the effect of non-diversifiable risk. As we will see below, this is an important omission as there can be important interactions between non-diversifiable risk and growth.

2.3 Empirical evidence

Our review of the theory has indicated that the degree of sophistication of a country's financial system and the type of financial system may have an important impact on growth. This naturally raises the question of what is the empirical evidence on the relationship between growth and the financial system. We start by considering the relationship between the development of financial systems and then consider bank-based versus market-based systems.

Does financial development matter for growth?

Although the seminal work of Goldsmith (1969) that studies the finance-growth nexus was inconclusive, the majority of empirical evidence now available seems to show a positive relationship between the measures of financial development and economic growth. Hence, the task for researchers is to provide evidence on the causality from finance to growth, as well as confirming the robustness of effects.

Numerous researchers have applied different econometric methods to pick up the correlation between financial development and growth. The pioneering works, including the work by Goldsmith (1969), adopt cross-country growth regression analysis. As for recent research, King and Levine (1993b) conduct a study with 77 countries for the time period of 1960-89. They add financial development (FD) indicators to a growth regression and find a strong positive relationship between financial development and growth.

One of the key issues in the field is which indicators for financial development should

be used. Depending on the choice of indicators, there can be differences in results, and different interpretations of results concerning potential routes connecting the financial aspect of economies and the real side of economies. King and Levine (1993b) used measures such as (1) liquid liabilities of banks and nonbank financial intermediaries (currency + demand and interest-bearing liabilities) over GDP, (2) bank credit over the sum of bank credit and central bank domestic assets, (3) credit to private enterprises over GDP. These measures were shown to have positive correlation with economic growth, and became standard variables for later studies. La Porta, Lopez-de-Silanes and Shleifer (2002) suggest an alternative financial development indicator capturing government involvement with the financial sector. They used the degree of public ownership of banks, and find higher degrees of public ownership are associated with (1) lower levels of bank development and (2) slower economic growth.

Also, there are studies, such as Atje and Jovanovic (1993) and Levine and Zervos (1998a), that measure financial development by stock market related variables. Levine and Zervos (1998a), which builds on Atje and Jovanovic (1993), try several stock market development indicators including turnover ratio (total values of shares traded on a country's exchanges over stock market capitalization). They find that both the initial level of turnover ratio and banking development (bank credit) enter the growth regression significantly. Therefore, they conclude that banks and stock markets provide different financial functions. They also emphasize the mere size of stock market is not significant, and what matters is a variable capturing how active the market is.

Benhabib and Spiegel (2002) obtain results in line with Levine and Zervos (1998a) suggesting different functions from different financial services. In their study, financial development is positively related to total factor productivity growth, as well as the accumulation of physical and human capital. Moreover, different indicators of financial development are linked with different components of growth.

In confirming the direction of causality, King and Levine (1993b) made use of the long length of the data they have. They consider the predictability of 1960 financial development for the next 30 years' growth. Since it is unlikely that financial development at a point in time reflects growth far in the future, their finding that the degree of financial development at 1960 is positively correlated with the next 30 years' growth indicates finance leads growth.

Furthermore, some studies test this direction of causality by using instrumental variables that are correlated with financial development but not with growth beyond their link to financial development. Levine (1998, 1999), Levine, Loayza, and Beck (2000) (LLB) use La Porta, Lopez-de-Silanes, Shleifer, and Vishny's (1998) (LLSV) measures of legal origin as

instrumental variables. Economies can be put into four types of groups depending on whether their commercial/company laws derive from English, French, German, or Scandinavian law. Since the choice of legal system is mostly realized through colonization, it is plausible to take it as exogenous. Also, it is correlated with the degree of financial development. Their results show a strong positive connection between instrumental variables and growth.

Other researchers have tried to see the direction of causality with time-series analysis such as Granger-type causality tests and vector autoregressive procedures. Also, some studies focus on a limited number of countries so that they can make use of much longer time series of data, as well as taking more detailed country-specific measures of financial development into account. Some studies have mixed results over causality, however the majority of research seems to suggest financial development or certain changes in financial aspects of an economy lead to stronger growth.

With this time-series methodology, pioneering work by Jung (1986) and Demetriades and Hussein (1996) finds causality frequently runs both ways, especially for developing economies. However, more recent work by Xu (2000), which extends Jung (1986) with VAR analysis , rejects the hypothesis that finance simply follows growth. In addition, Christopoulos and Tsionas (2004) shows that causality runs from finance to growth in the long-run with panel unit tests and panel co-integration analysis.

For some industrial economies, longer time-series data is available. Rousseau and Wachtel (1998) studied five industrial economies over a century. They document that the dominant direction of causality runs from finance to economic growth. Sometimes, a study covers only one country. Rousseau and Sylla (1999) examine the historical role of finance in the U.S. from 1790-1850. They find strong support for finance led growth. Rousseau (1998) investigates the Meiji era of Japan (1868-1884) and shows that the financial sector was instrumental in boosting Japan's explosive growth prior to the first world war.

Some time-series analysis follows the effects on economic variables from a change in the financial system. Bekaert, Harvey, and Lundblad (2001a, 2001b) examine the effects of opening equity markets to foreign participation. Financial liberalization boosts economic growth by improving the allocation of resources and the investment rate. [4]

Regional analysis within a country is also helpful, though not perfect, to deal with the issue of causality and concern over the possibility that aggregate financial development variables simply reflect other country specific omitted characteristics. Studies of this kind also

[4] Although the endogeneity of liberalization choice casts a potential problem on causality, the worldwide trend toward financial globalization in the past two decades adds some exogenous force towards liberalization.

confirm the positive relation between finance and growth. Jayaratne and Strahan (1996) study U.S. liberalization over the restrictions on interstate branching in some states. They show that branch reform boosted bank-lending quality and accelerated real per capita growth rates. Guiso, Sapienza, and Zingales (2002b) examine individual regions of Italy. They find that local financial development (1) enhances the probability that an individual starts a business, (2) increases industrial competition, and (3) promotes the growth of firms.

Confirming the relationship between finance and growth at a microeconomic level seems to be a recent trend as well. Industry level analysis is pioneered by Rajan and Zingales (1998), in which they study 36 industries in 42 countries. They test whether industrial sectors that are relatively more in need of external finance develop disproportionately faster in countries with more developed financial markets or not. They find that this is the case. Their unique methodology involves using the U.S. market to identify external dependence. Their financial development measures are stock market capitalization plus domestic credit over GDP and accounting standards. Beck and Levine (2002) confirm the Rajan-Zingales findings with different financial development measures. Wurgler (2000) documents that countries with a higher level of financial development both increase investment more in growing industries and decrease investment more in declining industries than financially underdeveloped economies.

Firm level analysis tends to focus on identifying some particular channels from finance to growth, and/or some intermediate phenomenon likely to be related to firm/economic growth. Demirguc-Kunt and Maksimovic (1998) test whether the greater financial development removes impediments to the exploitation of profitable growth opportunities or not. High turnover and high bank assets over GDP is positively related with the excess growth of firms compared to the growth rate achievable only with retained earnings and short-term borrowing. As is the case in Levine and Zervos (1998a), stock market size does not matter. Love (2003) examines whether financial development eases financial constraints (not growth though). Sensitivity of investment to internal funds is greater in countries with less developed financial systems. Claessens and Laeven (2003) examine the effect of financial development on the availability of external funds, and the impact of legal systems on financial development. They find that countries with legal systems that do not do well at supporting financial development tend to (1) have less external financing of firms, and (2) allocate external financing toward fixed assets.

To summarize, the currently available empirical studies show that (1) There is a strong positive effect from finance to growth, (2) The result seems to be able to survive the issue

of causality and robustness of results against inclusion of omitted variables that capture the economies' characteristics.

Bank-based or market-based?

The empirical literature discussed so far has focused on confirming the finance-growth nexus. For that purpose, several financial development measures are proposed and used. Some of them capture financial development in the banking sector, whereas some capture financial development in the stock market. Some earlier studies, such as Levine and Zervos (1998a) referred to in the previous section, seem to suggest a potential difference in channels connecting the structure of financial systems and economic performance. As we saw earlier in the theory section there are a number of important differences between banks and markets. Are different financial systems performing different functions, or do they constitute different ways of doing the same thing? Can we say that one system is "better" than another? There are numerous subsequent studies pursuing these questions. As we will see the evidence is mixed.

Initially, analysis comparing financial systems focused on a small set of developed countries. For example, Allen and Gale (2000a) discuss financial systems in five industrial countries. Depending on the relative importance of banks compared to financial markets (i.e. organized markets for securities such as stocks, bonds, and derivatives) on allocating resources in the corporate sector, Germany, Japan, and France are considered to have bank-based systems, and the U.S. and U.K. have market-based systems. However, all of these countries show similar long-run growth rates compared to developing countries. Hence, the marginal effect of having different financial systems on growth is not strong within this group.

In order to make progress on this issue, the debate must be broadened to include a wider range of national experiences. For this sake, Beck, Demirguc-Kunt, and Levine (2001) construct a large cross-country, time-series database on financial structure for up to 150 countries from 1960-95. Demirguc-Kunt and Levine (2001b) classifies countries into bank- and market-based by using data from Beck, Demirguc-Kunt, and Levine (2001). Also they document the tendency for national financial systems to become more market-based as they become richer.

There are several studies concluding that financial structure does not matter in accounting for growth based on the expanded data set on financial structure. Beck, Demirguc-Kunt, Levine, and Maksimovic (2001) document that countries do not grow faster with either market-based or bank-based financial systems. They emphasize that what matters more is the overall level of financial development and the efficiency of the legal system in protecting

outside investors' rights in terms of inducing a higher economic growth rate. Levine (2002) allows for the possibility of a different effect of bank-based systems for poorer countries, or countries with weaker legal systems or otherwise weaker institutions. But still he did not find any difference.

The irrelevance of financial structure is also documented at the industry as well as the firm level. For example, Beck and Levine (2002) provide evidence that financially dependent industries do not expand at higher rates in bank-based or market-based financial systems. They use Rajan-Zingales' (1998) method and confirm that greater financial development accelerates the growth of financially dependent industries, but financial structure does not matter. Also, according to Demirguc-Kunt, and Maksimovic (2002), firm's access to external finance is not easier, and firms do not grow faster in either market-based or bank-based financial systems.

However, these results are not fully conclusive. Tadesse (2002) finds that while market-based systems outperform bank-based systems among countries with developed financial sectors, bank-based systems fare better among countries with underdeveloped financial sectors. Also, countries dominated by small firms grow faster in bank-based systems and those dominated by larger firms in market-based systems. This research suggests that economies might need more nuanced financial development policies depending on the current state of their financial and economic level.

Furthermore, even if aggregate cross-country level classification of financial structure does not matter much for overall economic growth, financial structure may still affect types of activities at the microeconomic level. Carlin and Mayer (2003) find a positive association between information disclosure (the effectiveness of the accounting system), the fragmentation of the banking system (low bank concentration), and the growth of equity finance and skill-intensive industries. Their result is consistent with the view, as suggested by Allen and Gale (1999), that having financial systems that allow diverse views matters for financing high-technology firms.

3 Growth, crises, and bubbles

Although the traditional growth literature did not consider the role of the financial system, the more recent empirical and theoretical literature suggests that the financial system does play a significant role in the growth process. However, the factors focused on in the literature discussed in the previous section do not explain one important aspect of growth in many

countries. This is that growth is often discontinuous. In some periods there are booms with rapid growth which end in financial crises with low or negative growth for sustained periods. How can this variation in growth be understood? We will argue that the financial system plays a crucial role in understanding these variations in growth.

There is also the issue of whether such variation is good or bad. We will argue that sometimes it can be good. The models of risk sharing discussed above focused on diversifiable risk. High growth may well require that firms and entrepreneurs take significant non-diversifiable risks in order to obtain high returns. This risk taking may lead to high growth but also to frequent crises. For instance, the U.S. financial system experienced frequent financial crises during the latter part of the nineteenth century and the early part of the twentieth century. During this time the average growth rate was high, however. There is also some recent empirical evidence that countries with higher growth rates have a higher frequency of crises.

However, in some cases the negative effects of boom-bust cycles are so extreme that the variation in growth is bad. This appears to be the case when bubbles in asset prices lead to severe corrections that are followed by a prolonged reduction in growth rates. The classic examples of this kind of event are the Roaring Twenties, the Great Crash of 1929, and the Great Depression in the U.S. and the 1980's bubble and the subsequent lost decade of the 1990's in Japan. Table 1 and Figure 1 provides a comparison of these two episodes in terms of growth of real GDP. In the U.S. relatively high growth rates in the 1920's were followed by a very severe contraction from 1930-1933. After that, except for 1938, output grew at high rates especially after the outbreak of World War 2. In Japan the relatively high growth rates of the 1980's continued for two years after the collapse in stock market prices. The decline in growth coincided with the start of the fall in real estate prices. Although the collapse in growth was not nearly as severe as in the U.S. in the Great Depression it has been much longer lasting.

The negative experience of the Great Depression was so severe for the U.S. and many other countries that extensive financial regulation and other measures were put in place to make sure that nothing like it ever happened again. These measures, particularly those put in place in much of Europe and Asia, effectively restricted risk taking to a great degree. They were effective in preventing banking crises, however. From 1945-1971 there was only one banking crisis in the world. This occurred in Brazil in 1962. Apart from that there were none. As Bordo and Eichengreen (2000) document this is very different from previous and subsequent periods. The prevention of crises was achieved at a high cost, though. The

measures to prevent crises were so severe that they effectively prevented the financial system from allocating resources. Starting in the 1970's and accelerating in the 1980's financial systems were deregulated. With the ability to take more risks banking crises returned. In some cases this financial liberalization has been beneficial but in others it has led to bubbles and significant reductions in growth.

This view of the relationship between growth and financial systems suggests that finance is of first order importance. It is quite a different perspective than the traditional neoclassical view of growth as a result of factor accumulation and innovation. We start by considering the literature on growth and crises and then go on to consider bubbles and crises, contagion and financial fragility, financial liberalization and banks versus makets.

3.1 Growth and crises

The research that tries to formally analyze the overall cost of financial crises in terms of economic growth and welfare is relatively new. The main result is to show that it is possible both empirically and theoretically for economies to grow faster and have higher welfare with crises than without them.

Ranciere, Tornell and Westermann (2003) start by reporting an empirical observation that countries that have experienced occasional crises have grown on average faster than countries without crises. They take an endogenous growth model where the production technology for non-tradable goods, which are used as inputs for tradable consumption goods, is linear in reproducible capital consisting of non-tradable goods. Firms can issue default-free bonds either in domestic or foreign currency to finance their investments, but the non-tradable sector faces contract enforceability problems that might constrain their borrowing to a function of their net worth, which inefficiently depresses investments. The government provides systemic bailout guarantees only when a certain ratio of firms becomes insolvent. The only source of uncertainty in this model is self-fulfilling real exchange rate depreciation that depends upon the realization of a sunspot which occurs with a certain (exogenous) probability. They show that an economy may be able to attain higher growth by taking more credit risk in the form of currency mismatch even though it may experience occasional crises. This is because taking more credit risk that comes along with a government guarantee eases the borrowing constraint for the sector whose investment is the source of endogenous growth.

Gaytan and Ranciere (2002) study the effect of the liquidity function of banks on in-

vestment and growth for different stages of economic development. They take a neoclassical growth model together with Diamond-Dybvig type banks that provide insurance against idiosyncratic liquidity shocks. The economy has a short-term liquid production technology as well as a long-term illiquid technology. As the economy grows, the return from the illiquid technology diminishes. If a bank chooses "exposed banking" it promises a larger payment to early consumers than the amount it can pay by liquidating the long-term asset, and it faces the risk of a self-fulfilling bank-run. In this case, a bank-run arises depending upon the realization of a sunspot with some (exogenous) probability. Instead, a bank can choose "covered banking" where it constrains its portfolio in a way that it can always respond to early withdrawals from patient depositors. Banks' maximization involves the optimal choice between exposed and covered banking. The authors show that middle-income countries may find it optimal to be exposed to liquidity crises, while poor and rich economies have more incentives to develop a fully covered banking system.

The empirical research on crises and growth is sparse. An exception is Ranciere, Tornell, and Westermann (2003) who study both industrial and developing economies for the time period between 1980 and 1999. They capture crises as the negative skewness [5], i.e. bumpiness, of credit growth, and document that there is a positive link between this crisis measure and growth. That is, countries that have experienced occasional crises have growth on average faster than countries with smooth credit conditions.

Another exception is Loayza and Ranciere (2002). They first note that the growth literature (e.g. King and Levine (1993b), and Levine, Loayza, and Beck (2000)) finds a positive relationship between financial development measures, such as private domestic credit and liquid liabilities, and economic growth, whereas the currency and banking crises literature (Kaminsky and Reinhart (1999)) often finds such variables useful in predicting crises. In their empirical analysis, they tried to differentiate the short-run and long-run effect of these financial development variables on growth. They found that a positive long-run relationship between financial development and output growth co-exists with a mostly negative short-run relationship. In addition, the long-run positive relation still holds even for the economies in Latin America where many of the crisis episodes occur.

In summary, crises are not necessarily bad for growth and for welfare. Why then are crises so often regarded as awful events to be avoided at any cost? As we will see next when

[5] As we will mention later, financial fragility is sometimes measured with variance in economic variables in the literature on crises and/or economic liberalization. The authors emphasize that extreme events such as crises cannot be well capture by variance.

crises follow a bubble in asset prices they can be very damaging.

3.2 Bubbles and crises

Financial crises often follow what appear to be bubbles in asset prices as in the Great Crash of 1929 in the U.S. A more recent example is the dramatic rise in real estate and stock prices that occurred in Japan in the late 1980's and their subsequent collapse in the early 1990's. Norway, Finland, and Sweden had similar experiences in the 1980's and early 1990's. In emerging economies financial crises of this type have been particularly prevalent since 1980. Examples include Argentina, Chile, Indonesia, Mexico, and most recently the South East Asian economies of Malaysia, Indonesia, Thailand and South Korea.

These bubbles in asset prices typically have three distinct phases. The first phase starts with financial liberalization or a conscious decision by the central bank to increase lending or some other similar event. The resulting expansion in credit is accompanied by an increase in the prices for assets such as real estate and stocks. This rise in prices continues for some time, possibly several years, as the bubble inflates. During the second phase the bubble bursts and asset prices collapse, often in a short period of time such as a few days or months, but sometimes over a longer period. The third phase is characterized by the default of many firms and other agents that have borrowed to buy assets at inflated prices. Banking and/or foreign exchange crises may follow this wave of defaults. The difficulties associated with the defaults and banking and foreign exchange crises often cause problems in the real sector of the economy which can last for a number of years. There is a significant interaction between the financial system and growth.

The Japanese bubble in the real estate and stock markets that occurred in the 1980's and 1990's provides a good example of the phenomenon. Financial liberalization throughout the 1980's and the desire to support the U.S. dollar in the latter part of the decade led to an expansion in credit. During most of the 1980's asset prices rose steadily, eventually reaching very high levels. For example, the Nikkei 225 index was around 10,000 in 1985. On December 19, 1989 it reached a peak of 38,916. A new Governor of the Bank of Japan, less concerned with supporting the U.S. dollar and more concerned with fighting inflation, tightened monetary policy and this led to a sharp increase in interest rates in early 1990 (see Frankel (1993), Tschoegl (1993)). The bubble burst. The Nikkei 225 fell sharply during the first part of the year and by October 1, 1990 it had sunk to 20,222. Real estate prices followed a similar pattern, although the decline did not start to occur until the early 1990's.

The next few years were marked by defaults and retrenchment in the financial system. The real economy was adversely affected by the aftermath of the bubble and growth rates during the 1990's have mostly been slightly positive or negative, in contrast to most of the post war period when they were much higher.

Many other similar sequences of events can be recounted. As mentioned above, Norway, Finland and Sweden also experienced this type of bubble. Heiskanen (1993) recounts that in Norway lending increased by 40 percent in 1985 and 1986. Asset prices soared while investment and consumption also increased significantly. The collapse in oil prices helped burst the bubble and caused the most severe banking crisis and recession since the war. In Finland an expansionary budget in 1987 resulted in massive credit expansion. Housing prices rose by a total of 68 percent in 1987 and 1988. In 1989 the central bank increased interest rates and imposed reserve requirements to moderate credit expansion. In 1990 and 1991 the economic situation was exacerbated by a fall in trade with the Soviet Union. Asset prices collapsed, banks had to be supported by the government and GDP shrank by 7 percent. In Sweden a steady credit expansion through the late 1980's led to a property boom. In the fall of 1990 credit was tightened and interest rates rose. In 1991 a number of banks had severe difficulties because of lending based on inflated asset values. The government had to intervene and a severe recession followed.

Mexico provides a dramatic illustration of an emerging economy affected by this type of problem. In the early 1990's the banks were privatized and a financial liberalization occurred. Perhaps most significantly, reserve requirements were eliminated. Mishkin (1997) documents how bank credit to private nonfinancial enterprises went from a level of around 10 percent of GDP in the late 1980's to 40 percent of GDP in 1994. The stock market rose significantly during the early 1990's. In 1994 the Colosio assassination and the uprising in Chiapas triggered the collapse of the bubble. The prices of stocks and other assets fell and banking and foreign exchange crises occurred. These were followed by a severe recession.

Kaminsky and Reinhart (1996, 1999) study a wide range of crises in 20 countries including 5 industrial and 15 emerging ones. A common precursor to most of the crises considered was financial liberalization and significant credit expansion. These were followed by an average rise in the price of stocks of about 40 percent per year above that occurring in normal times. The prices of real estate and other assets also increased significantly. At some point the bubble bursts and the stock and real estate markets collapse. In many cases banks and other intermediaries were overexposed to the equity and real estate markets and about a year later on average a banking crisis ensues. This is often accompanied by an exchange

rate crisis as governments choose between lowering interest rates to ease the banking crisis or raising interest rates to defend the currency. Finally, a significant fall in output occurs and the recession lasts for an average of about a year and a half.

How can events such as these be understood? Allen and Gale (2000b, 2003) provide a theory of bubbles and ensuing crises based on the existence of an agency problem. Standard theories of asset pricing assume that investors purchase assets with their own wealth. In most financial systems, this is not the whole story. Intermediation is important. Many of the agents buying real estate, stocks, and other assets do so with other people's money. The purchase of real estate is usually debt financed. If the investment is successful, the borrower repays the loan and retains the difference between the value of the asset and the principal and interest. If the investment is unsuccessful, the borrower has limited liability and the lender bears the shortfall. Similarly, a large proportion of stocks are held by mutual funds, pension funds, and insurance companies. Money managers also have incentives to take risk. If their investment strategy is successful, they may be rewarded by a share of the returns, but most importantly they will attract new investors in the future. Because they receive management fees in proportion to the assets under their control, they will be significantly better off as a result of their good performance. If the investment strategy is unsuccessful, there is a limit to the downside risk that the manager bears. In the worst case, she will be fired but in any case her liability is limited. Thus, when intermediaries make investment decisions, the incentive scheme they face has convex payoffs.

The agency problem of excessive risk taking associated with limited liability is crucial for the analysis. If the penalties for default on debt or the reputational loss from being fired from an intermediary are sufficiently high then there will not be an incentive to take risks. Hence the theory can be thought of as applying to cases where these factors are insufficient to prevent risk taking.

If there is an agency problem of the type described the people making the investment decisions will have an incentive to take on risky projects. The fact that lenders are unable to observe the characteristics of a project means the borrowers can shift risk to the lenders and increase the payoff to themselves. This causes investors to bid up the prices of risky assets above their fundamental values and there is a bubble. The more risky the asset the greater is the amount that can be shifted and the larger the bubble. This risk can come from two sources. The first is asset return risk. The second is financial risk. This is the risk associated with future financial conditions such as the amount of credit that will be available.

3.3 Contagion, financial fragility and growth

We have argued that the bursting of bubbles in asset prices can have very negative impacts on growth with the U.S. Great Depression and Japan's lost decade being the prime illustrations. Although similar in some respects, these two episodes also display important differences. In the U.S. Great Depression, the stock market collapse in 1929 was followed by a dramatic fall in GDP and banking crises as shown in Table 1 and Figure 1. Growth resumed albeit from a low level in 1934 and with the exception of 1938 was quite robust. In Japan the sequence of events was rather different. Growth continued after the collapse of the stock market in 1990 until 1991 when real estate prices started to fall. Growth did fall but there was not the massive contraction in GDP that the U.S. suffered. There was no widespread banking crisis on the scale of the banking crises in the U.S. However, the lower growth rates continued until at least 2003. Why were these experiences so different?

One answer is that the U.S. experienced problems of contagion and financial fragility while Japan did not. However, by avoiding these problems Japan prolonged its period of low growth. We will consider both these aspects in turn.

Contagion and financial fragility are associated with discontinuities arising from the operation of the financial system. Allen and Gale (2000c) focus on a channel of contagion that arises from the overlapping claims that different regions or sectors of the banking system have on one another through interbank markets. When one region suffers a banking crisis, the other regions suffer a loss because their claims on the troubled region fall in value. If this spillover effect is strong enough, it can cause a crisis in the adjacent regions. In extreme cases, the crisis passes from region to region and becomes a contagion. Aghion, Bolton and Dewatripont (1999) also consider a model of contagion through interbank markets. In their model there are multiple equilibria. In one equilibrium there are self-confirming beliefs that a bank failure is an idiosyncratic event and in the other there are self-fulfilling beliefs that a bank failure signals a global shortage of liquidity. Lagunoff and Schreft (2001) study the spread of crises in a probabilistic model. Financial linkages are modeled by assuming that each project requires two participants and each participant requires two projects. When the probability that one's partner will withdraw becomes too large, all participants simultaneously withdraw and this is interpreted as a financial crisis. Van Rijckeghem and Weber (2000) document linkages through banking centers empirically.

The notion of financial fragility is closely related to that of contagion. When a financial system is fragile a small shock can have a big effect. Allen and Gale (2004) show how an

arbitrarily small shock can lead to a collapse in asset prices. There is effectively contagion through market prices. The reason that a small shock can have a big effect is that the supply of liquidity is endogenous. Liquidity will only be supplied if price variations make it profitable to hold liquid resources with a low return.

The banking crises and dramatic collapse in asset prices in the U.S. in the early 1930's are perhaps consistent with these kinds of models of contagion and financial fragility. They arise because of hard constraints where bankruptcy is imposed and assets are liquidated quickly.

In contrast, in Japan contagion and fragility appear to have been avoided by having soft constraints with regard to bankruptcy and liquidation. Hoshi and Kasyap (2004) persuasively argue that the length of Japan's period of low growth can be explained by the willingness of banks to keep lending at a subsidized rate to firms with little prospect of ultimate recovery. This practice is known as "ever-greening." The firms that are supported in this way in turn compete with other firms and ensure low profitability in many sectors. While undesirable from the perspective of prolonging the low growth period, this type of soft application of bankruptcy constraints does ensure contagion and financial fragility are avoided. An important question for future research is to find some balance between preventing contagion and financial fragility while at the same time avoiding prolonged periods of low growth.

3.4 Financial liberalization, crises, and growth

As the above discussion indicates, financial sector regulation can play a significant role in taming crises. Both domestic regulation controlling the activities of financial institutions and restrictions on international capital flows seem to be important. In particular, the policy trilemma of combining financial opening with exchange rate stabilization policy and maintaining economic stability by way of autonomous monetary policy is well known. We have also discussed whether the economic variability arising from crises is good or bad for growth. Sometimes, the cost of occasional crises seems to be relatively small compared to the growth enhancing effect of financial liberalization, but not all the time. Especially, crises following bubbles in investment and asset prices seem to impose extremely costly recessions on an economy.

These observations lead us to a cost-benefit analysis of financial deregulation and liberalization. Occasional, costly crises seem to be inevitable in a deregulated environment. At the same time deregulation and globalization allow more risk-taking and higher expected

returns as well as a better allocation of capital. Which economies are better off with financial liberalization together with the associated risk of financial crisis? Were the recent episodes of financial globalization, which often ended with a crisis, growth-enhancing overall?

Tornell, Westermann, and Martinez (2004) studied 52 economies from 1980-1999 to answer these questions. They point out that in developing countries, (1) financial liberalization indeed leads to financial fragility and incidents of crises, but (2) financial liberalization also has led to higher GDP growth. In fact, faster-growing countries are typically those that have experienced boom-bust cycles. Their conclusion is that occasional crises are the byproduct of financial liberalizations that eventually enhance economic growth.

This conclusion is in line with the majority of the empirical finance-growth literature described above that confirms a positive relationship between financial development and economic growth. However, such direct research on liberalization, financial fragility, and economic growth is still sparse. A more nuanced conclusion is warranted when we look at each of the three related literatures and try to synthesize results.

There are numerous studies on the effect of financial liberalization on economic growth and/or welfare, which do not necessarily consider the issue of financial crises. Prasad et al. (2003) and Obstfeld and Taylor (2004) provide excellent reviews. After an extensive survey on the empirical literature relating liberalization and growth, Prasad et al. (2003) point out the following. First, they note that it is difficult to establish a robust causal relationship between the degree of financial integration and output growth performance.[6] Second, they indicate that there is little evidence that financial integration has helped developing countries to better stabilize fluctuations in consumption, which is a better measure of well-being than output. In the end, they conclude that while there is no proof in the data that financial globalization has benefited growth, there is evidence that some countries may have

[6]For example, Quinn (1997) showed a positive relation between capital account liberalization and economic growth, and Bekaert, Harvey and Lundblad (2001a) found that stock market liberalization led to a 1 percent increase in per capita GDP growth over a five-year period. Henry (2003) finds that stock market liberalization in emerging markets decreases the aggregate dividend yield (the cost of capital), increases the growth rate of capital by 1.1% and per worker output by 2.3% per year. At the firm level, Chari and Henry (2002) find that stock market liberalization increases the growth rate of firms' capital stock. In contrast, Rodrik (1998) and Kaay (1998) find no significant relationship. Also, there are a number of papers that find a positive effect of capital account liberalization on growth, conditioning on the level of industrialization (Klein and Olivei (2000)), the level of development of an economy (Edwards (2001) and Arteta, Eichengreen, and Wyplosz (2001)), the institutional and sociological characteristics of an economy (Bailliu (2000) and Chanda (2001)).

experienced greater consumption volatility as a result.

What leads to this conclusion? We've already seen how costly crises can be. Therefore, the question is why the potential and/or attained growth-enhancing benefit from liberalization is not necessarily enough to compensate for the risk of a crisis. The growth-enhancing benefits of internationalization come from 1) capital accumulation, as emphasized in neoclassical growth models, and 2) better international risk-sharing allowing agents to specialize in high-risk and high-return projects. Recent empirical and quantitative evidence on the size of these benefits are discouraging. As for the benefit from capital accumulation, Gourinchas and Jeanne (2003) conducted a simulation based on a Ramsey growth model and concluded that the benefit from this channel was quite small for developing economies. The result comes from the fact that productivity in developing countries is much lower than in developed economies, and developing economies have in fact the level of capital near the steady state determined by their lower technology level. Mere financial opening does not enhance growth significantly. Rather, it is productivity-increasing economic reforms that increase the benefit of liberalization by shifting up the steady state level of capital.

Based on this study, Obstfeld and Taylor (2004) emphasize the role of good institutions in increasing the effective productivity in an economy and hence increasing the benefit from financial opening. The benefit from risk-sharing can be detected by examining volatility in consumption. Internationalization may not necessarily reduce output volatility, as emphasized in Helpman and Razin (1978) and Obstfeld (1994), due to more specialization in high-risk and high-return projects. However, the better risk-sharing opportunities allows trading of output variability to attain consumption smoothing. The empirical evidence seems to be quite discouraging for developing economies in this respect. Bekaert, Harvey and Lundblad (2002) show that equity market liberalization significantly decreases the volatility in output and consumption growth for the time period excluding 1997-2000. With the data for the Asian crisis years, 1997-2000, the negative effect on consumption growth variability is weakened for emerging markets. Capital account openness reduces the volatility of output and consumption, but not as much as the effect from equity market liberalization. In addition, capital account openness increases the volatility of output and consumption in emerging markets. Overall, the potential benefit from capital accumulation without other economic reforms seems to be low and the achieved benefit so far from international risk sharing seems to be also low compared to the first-best benchmark models. So once we take the cost of crisis into account, the net benefit of financial opening for developing economies will be small or could be negative.

Our take on this empirical result, as discussed at length in previous subsections, is that the benefit of financial opening may be much smaller in an economy facing agency problems and other market failures compared to first best outcomes. In a second best world with agency problems, excessive risk-taking may result in bubbles in investment and asset prices that tend to arise at the time of increased uncertainty from deregulation and structural change. This eventually increases the cost of subsequent financial crises. Let us note that our view shares some common elements with the Obstfeld-Taylor view that emphasizes the role of better institutions and higher effective productivity in increasing benefit from financial opening. The agency problem we emphasize is one of the underlining distortions which gives importance to institutional aspects, such as contract enforceability, shareholder rights protection, and rule of law. Once again, it seems that more research, both theoretical and empirical, is needed in this area to identify the precise nature of second best outcomes to help reach definitive conclusions.

3.5 Banks, markets, and crises

The debate on bank-based versus market-based systems discussed in the previous section has an additional dimension of complexity when we consider the relation between financial architecture and economic stability. Economic instability, such as the one triggered by a financial crisis, is often regarded to be growth impeding as discussed above. The difference in financial architecture may matter for growth since one system may be better at maintaining financial/economic stability. For example, one popular policy discussion triggered by the Asian crisis seems to favor markets over banks for enhancing economic resilience against a bad shock. That is, with more developed bond markets, the Asian crisis would have been much milder. Is this true? Can the mere replacing of bank loans by bonds increase the stability?

The answer does not seem to be that simple. To begin with, judging whether an economy is truly bank-based or market-based is a complex task. For example, according to the criteria proposed in Demirgüç-Kunt and Levine (2001), Korea is classified as market-based and yet has experienced a crisis with a subsequent recession as serious as say Thailand which is classified as bank-based. Demirgüç-Kunt and Levine (2001) classified Korea as market-based because of its relatively large equity market. Korea has a relatively well-developed corporate bond market as well. The deep crisis in Korea seems to suggest that the mere existence of large bond markets does not enhance resilience very much. In fact, a large

portion of corporate bonds is held by financial institutions that implicitly promise fixed payments to households. This type of securitization may not enhance risk-diversification in bond markets and hence makes an economy less market-based than suggested by mere observation of market size.

4 Concluding remarks

The traditional growth literature emphasizes factor accumulation and innovation as the engines of growth. The role of the financial sector is not considered. More recently a large literature has documented theoretical reasons for the importance of the financial system in determining growth. A large empirical literature has confirmed that in practice financial systems are important for growth.

We have argued that the view that the conventional literature espouses is one of continuous growth. However, the process of actual growth is often discontinuous with booms followed by crises. The experience of the Roaring Twenties and the Great Depression was an extreme example. In many countries it led to significant regulation and other measures to ensure that banking crises, contagion and financial fragility would be eliminated. The measures severely limited the amount of risk that could be taken. They were successful in that from 1945-1971 banking crises were eliminated. However, the allocational role of the financial system was impaired. With financial liberalization, which relaxed the restrictions on risk taking, crises returned. There is some evidence that higher risk taking and accompanying crises can be good in terms of long run growth and economic welfare. However, if there are asset price bubbles then subsequent crises can be very damaging. Japan's 1980's bubble and its subsequent lost decade provides an example of this. However, it might have been even worse had contagion and financial fragility not been avoided. In the Great Depression these appear to have been quite detrimental. Our conclusion is that for sustained growth policy should be devoted more to avoiding bubbles, contagion, and financial fragility. Crises can be beneficial for growth but not if the crises follow large asset price bubbles or if they involve contagion and financial fragility.

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Table 1: A Comparison of the US Great Depression and Japan's Lost Decade

US	Real GDP Growth Rate (%)		Japan	Real GDP Growth Rate (%)
1920	-1.9%		1980	3.6%
1921	-3.4%		1981	3.0%
1922	6.9%		1982	2.8%
1923	13.9%		1983	1.6%
1924	2.8%		1984	3.1%
1925	2.2%		1985	5.1%
1926	6.1%		1986	3.0%
1927	0.6%		1987	3.7%
1928	1.8%		1988	6.8%
1929	6.5%		1989	5.3%
1930	-8.6%		**1990**	5.3%
1931	-6.4%		1991	3.3%
1932	-13.0%		1992	1.0%
1933	-1.3%		1993	0.2%
1934	10.8%		1994	1.1%
1935	8.9%		1995	1.9%
1936	13.0%		1996	3.6%
1937	5.1%		1997	1.8%
1938	-3.4%		1998	-1.2%
1939	8.1%		1999	0.2%
1940	8.8%		2000	2.8%
1941	17.1%		2001	0.4%
1942	18.5%		2002	-0.3%
1943	16.4%		2003	2.7%

Figure 1: A Comparison of the US Great Depression and Japan's Lost Decade, Real GDP Growth Rate (%)