International Finance 4:3, 2001: pp. 335–362

Growth and Finance: What Do We Know and How Do We Know It?*

Paul Wachtel**

Stern School of Business, New York University.

Abstract

The role of financial sector development in economic growth has become a major topic of empirical research in just the last ten years. A standard approach to explaining growth has emerged and the literature has examined the role of the aggregate amount of financial intermediation, bank lending and the influence of equity market development. More recently, the literature has examined aspects of institutional development and infrastructure on growth. Despite the econometric difficulties encountered, there is an emerging consensus about the role of the financial sector in growth. Panel data sets have produced impressive results but they are often fragile. Estimates with recently developed dynamic panel techniques have provided additional evidence. This paper summarizes the consensus and discusses the techniques that have been used and the problems encountered.

*Earlier versions of this paper were presented at the XIII Villa Mondragone International Economic Seminar: 'Financial Markets, the New Economy and Growth', University of Rome 'Tor Vergata', 25–26 June 2001 and at the Asian Regional Seminar on Financial Reform and Stability sponsored by the IMF and the Administrative Staff College of India, Hyderabad, India, 29–30 March 2001.

**Andrew Hook, Michael Leahy, Peter L. Rousseau and Benn Steil provided helpful comments and Jennifer Zhao estimated the regression. In addition, helpful comments from the referees are appreciated.

I. Introduction

Development economics has changed profoundly in the course of one generation. Twenty-five years ago, the emphasis among development economists was on planning and allocation mechanisms, which separated the development community from the core of mainstream market-oriented economics. Academicians who followed development issues were often peripheral to the cutting edge in the economics literature. However, that has all changed in recent years and development issues are now at the forefront. As part of this transformation, the term 'development' (which connotes a directed process) has been largely replaced by the term 'emerging markets'. The very term emphasizes the private sector and the market-oriented paradigm of contemporary economics. In no other area is the change in thinking more striking than in analysis of the role of the financial sector – banks and capital markets – in the development process.

The modern literature on economic growth starts with Robert Solow's work in the mid-1950s for which he was awarded the Nobel Memorial Prize in Economics. The early theoretical and empirical literature focused on the role of capital and labour resources and the use of technology as the sources of growth. For the most part, any possible role of the financial sector in the growth process was ignored. To the contrary, development economists up until the 1970s would often advocate explicit manipulation of the financial sector in order to achieve development goals. Credit subsidies to favoured activities were the rule rather than the exception. Inflation was attractive, since a tax on financial assets gave governments with an otherwise weak tax base the resources that could be given to development industries.

A few influential economists began to draw attention to the contribution of the financial structure to growth and the benefits of liberalization, in particular, Goldsmith (1969) and McKinnon (1973). Economists slowly acknowledged that credit allocation, interest rates ceilings and high reserve requirements were undesirable. Generally, high inflation, negative real rates and inflation taxes create distortions that lead to extensive resource misallocations and discourage saving and the use of intermediaries. The pejorative term 'financial repression' was introduced to refer to restrictive policies that inhibited the operation of the financial sector. In 1990, McKinnon (1990, p. 12) could write with confidence that:

> Now, however, there is widespread agreement that flows of saving and investment should be voluntary and significantly decentralized in an open capital market at close to equilibrium interest rates.

However, the path towards liberalization is characterized by McKinnon as a minefield where one misstep might be the last.

The financial sector – both domestic markets and international capital flows – was often the most heavily controlled and regulated component of the economy. However, a major shift towards a market-oriented approach began about twenty-five years ago. Although capital controls prevailed around the world in both developed and less developed economies, there have been significant liberalizations in recent years.[1] Today, countries that maintain capital controls are almost self-conscious pariahs in the international community. The domestic corollary of capital account liberalization is financial sector liberalization that has occurred at a somewhat slower pace. Nevertheless, support for directed credit, interest rate ceilings and government ownership of financial institutions have also disappeared. The prevailing paradigm is that competitive private sector capital markets should be able to gather savings at market rates of interest and allocate capital to the most efficient private sector projects.

The contemporary paradigm hardly needs restatement. Economists now take it for granted that a well-developed, market-oriented financial sector contributes to economic growth. However, it is curious how little evidence there is that relates the financial sector to economic growth and stability. The paradigm of financial liberalization was widely accepted before there was evidence to relate it to economic growth. The objective of this paper is to review some of that evidence.

We begin with a section on financial services and growth that poses and answers a fundamental question. The question is motivated by the observation that the financial services industry is very large and it is simply whether we are 'getting our money's worth'. The answer is provided by a review of the growth enhancing roles of financial services.

We then turn to the empirical literature on the relationship between financial sector development and economic growth. Only recently – since the 1990s – has a large body of empirical knowledge accumulated that relates financial sector development – the depth and activity of financial intermediaries – to growth. The standard approach used in the literature will be described and the results are summarized. The sensitivity of the consensus results to changes in the specification is discussed.

The next section reviews the extended empirical evidence that relates economic growth to other aspects of the financial sector. First, the development of equity markets and the role of non-bank financial intermediaries are examined. Second, there has been considerable recent interest in the quality of

[1]The IMF reports large numbers of countries taking measures to liberalize capital flows while the number of tightening measures has declined (IMF, 1999, ch. III).

financial institutions and the environment in which they operate (such as the legal and regulatory frameworks).

Finally, we briefly review the empirical work on financial sector development and the occurrence of economic crises that can inhibit growth. The relationship to growth is obvious if crises are more likely to occur in countries with less developed financial sectors.

II. Observations about Growth and the Financial Sector

About 8% of US GDP is produced by the financial services industry – depository and non-depository institutions, brokers, insurance carriers and agents. The largest part of the industry – depository institutions or banks – accounts for two-fifths of the industry total. Financial services are an extraordinarily large part of the US economy, larger than agriculture and mining together and half as big as manufacturing.[2]

What are we buying from this large industry? Are we getting our money's worth?

Simply speaking, the industry provides payments services and savings (or intermediary) services. For sure, these are of great value, but still the size of the industry in the USA defies understanding. Perhaps, there are additional pay-offs from the industry's activities that justify its large size. The additional pay-offs come from the allocative role of financial intermediation. Well working financial intermediaries improve the efficiency of allocation of capital resources, encourage savings and lead to more capital formation. We get our money's worth from the financial industry because it expands our opportunities and leads to a more productive allocation of resources.

King and Levine (1993a) were among the first to emphasize that the efficiency-enhancing aspect of financial sector development is more important than the impact on the amount of investment. The impact of the financial sector on resource allocation cannot be over emphasized. Think of countries with high rates of investment and savings and poor growth experience. The Soviet Union always had high savings rates; there was always an abundance of machinery and equipment. It simply was not allocated to effective uses.

That is not to say that the amount of capital formation is not an important indicator of economic growth. Generally speaking, countries with higher investment to GDP ratios experience higher growth rates. Table 1 shows average annual real per capita GDP growth rates for countries grouped by their average investment ratios. There is a clear but not overwhelming tendency for countries with higher investment rates to have higher real per

[2]Detailed data on product by industry are from Lum and Moyer (2000).

Table 1: Investment Rates and Growth

	Initial investment ratio				
	<20%	20–25%	25–30%	30–35%	>35%
(1) Growth rate 1980–88	1.0%	0.6%	2.3%	4.8%	3.4%
(2) Growth rate 1989–98	–0.9	0.5	0.3	–0.1	2.9
(3) Growth rate 1980–98	–0.4	0.7	1.9	1.3	4.3

Notes: For row 1, the investment to GDP ratios are for 1979–83 and, for row 2, 1988–92. For row 3, average growth rates and investment rates for the 1980-98 period are used. GDP growth is per capita; it is per capita GDP converted to international dollars using PPP rates and further corrected for US inflation. Investment is gross domestic investment. There are 87 countries with data for the entire period and a population of at least 2 million. Calculated from the *World Development Indicators (2000)*.

capita growth in the subsequent decade. The simple correlation of investment ratios and subsequent growth rates was 0.43 in the 1980s and 0.24 in the 1990s (see note to Table 1 for exact data definitions). There is substantial variation in growth rates among countries with similar investment ratios. The standard deviation of growth rates within each group for the investment ratio is often as large as the growth rate itself.

Thus, we see that countries with similar levels of capital investment can have widely diverse growth experiences. The ability to allocate investments efficiently – the role of the financial services industry – is very important and that is why developed countries like the USA are getting their money's worth when a large part of GDP is devoted to the financial sector.

In the process of providing payments and intermediary services, the financial industry promotes the efficient allocation of resources. There are at least four ways in which the financial sector improves allocations. They are described in the surveys by Pagano (1993) and Levine (1997) and in the summary by Khan (2000) and presented as a rationale for the endogenous growth model in King and Levine (1993a). First, the financial sector improves the screening of fund-seekers and the monitoring of the recipients of funds, which improves the allocation of resources. Second, the industry encourages the mobilization of savings by providing attractive instruments and savings vehicles. This may also increase the savings rate. Third, economies of scale in financial institutions lower costs of project evaluation and origination, and facilitate the monitoring of projects through corporate governance. Finally, financial intermediaries provide opportunities for risk management and liquidity. They promote the development of markets and instruments with attractive characteristics that enable risk sharing.

Broadly speaking, the role of the financial sector in all economies is to channel resources from savers to investment projects. A single institution – a

bank – can provide these various functions or it can be provided by a variety of institutions. Modern economies have a wide range of market-oriented institutions for facilitating intermediation. In planned economies, this process is conducted by administrative arrangements with few, if any, market-oriented elements of the financial sector. In many less-developed and transition economies, the only ubiquitous financial institutions are banks.

A successful financial sector will have a broad continuum of financing techniques that channel resources to investment opportunities. They can be organized into three groups as follows: entrepreneurial finance, banking and capital markets.

Entrepreneurial finance

Entrepreneurial financing begins with self-financing by the entrepreneur. It also includes the use of trade credit (inter-firm lending). Although entrepreneurial finance is very important, the paucity of data on the financial activity of new enterprises often makes it difficult to examine how much investment goes on and how well it is channelled. In many places, there are government efforts (often of dubious value) to provide formal institutional structures for financing of start-ups.

Bank lending

As firms grow, they will turn to formal financial sector institutions for financing needs, starting with banks. In some countries, bank lending to the business sector is a simple extension of government soft budget lending but, in more advanced economies, bank lending at the behest of the government ceases, and bank lending to business is on commercial terms.

There is a considerable debate concerning the relative merits of bank dominated financial sectors and those that give equal weight to capital markets. The sound provision of money services and sound monetary policy calls for a very conservative approach to banking, while financing of investment projects is inherently a risky activity. There are inherent conflicts when banks are the sole providers of financial services. Nevertheless, banks are central institutions that provide transactions services and credit evaluations and relationships with customers that are important sources of information to other credit market sources.

Capital market financing

Access to capital markets can start at the early stages of a firm's development with venture capital. Initially, institutions provide *angel financing*: i.e. start-up capital when an entrepreneur lacks the track record needed for bank financing or even trade credit. More established firms would utilize *private equity* or *private placements* for long-term financing needs. And finally, large firms are

likely to turn to capital market flotation using *publicly traded equity or bonds.* Private sector bond markets have developed in only a few countries while equity markets are quite common.

US Flow of Funds data give some idea of the size of the different components. In 1999, the total non-financial business sector raised $678 billion (excluding foreign direct investment in the USA). Of this, capital market financing (corporate bonds, commercial paper, equity etc.) was 19%, loans from banks and other financial intermediaries and all mortgage lending came to 47%, and, finally, trade credit and all other sources of financing came to 34% of the total.[3]

A distinguishing characteristic of US capital markets is the broad variety of instruments and institutions and the fact that no particular mode of financing dominates. It is tempting to conclude that the depth of the financial system in the USA is a strong determinant of its success although there is little formal testing of such a hypothesis. Many countries, including highly developed ones, have more limited financial sectors than the USA. Banks dominate corporate finance in the so-called German or European model compared to the greater importance of capital markets in the Anglo-Saxon model.[4]

A few studies emphasize the importance of a broad variety of financial sector activities. Bonin and Wachtel (1999) and United Nations (1999) emphasize the role of capital markets as well as banks in the financial sector development of emerging and transition economies. Furthermore, recent financial crises have led policy makers to focus on the development of the financial sector beyond banks and equity markets. Herring and Chatusripitak (2000, p. 4) conclude that 'the absence of a bond market may render an economy less efficient and significantly more vulnerable to financial crisis'.

III. The Evidence on Financial Sector Development and Growth

As noted earlier, economists seemed to have fully accepted the liberal orthodoxy in support of financial liberalization before there was much firm

[3]The capital markets proportion is small for two reasons. First, many mortgages included under bank financing are really direct capital market instruments and second, in 1999 there was almost $150 billion in stock buy backs by corporations.

[4]The differences have been diminishing in recent years as a result of globalization, technological and regulatory changes. One of the consequences of European unification is the increased importance of capital markets on the continent. In the USA, regulatory changes virtually allow continental style universal banking where banks are involved in the entire spectrum of financing.

evidence demonstrating the relationships between financial sector development and economic growth. In this section, we turn to empirical evidence published in the last decade that relates broad measures of financial sector development to growth; in the following section, we examine the more recent literature that is only now beginning to examine how different financial sector structures and characteristics impact growth.

Empirical investigations of the relationship between financial sector development and economic growth began to appear in the 1990s with King and Levine's (1993a, b) cross-country studies for the post-war period and Wachtel and Rousseau's (1995) evidence from long-time series for several countries. These studies showed that the depth of financial sector development and greater provision of financial intermediary services are associated with economic growth. In the decade since those studies appeared, there has been a veritable explosion of empirical interest in the finance–growth relationship.

In his extensive survey article, Levine (1997) cites Goldsmith (1969) as the first cross-country study of growth and financial development. Goldsmith introduces the idea of using a broad measure of the size of financial intermediaries (his specific choice is the value of intermediary assets to GDP) as an indicator of the provision of intermediary services. Looking at decade averages for 35 countries for about 100 years, he finds broad indications of a relationship between finance and growth. Goldsmith's work was econometrically unsophisticated and did not seem to spur much research interest at that time. More extensive econometric work was needed to hold constant other determinants of growth and to identify the direction of causality. Efforts in this direction did not appear until the 1990s.

Barro (1991), King and Levine (1993a, b) and Barro and Sala-I-Martin (1995) introduced growth studies with cross-country data sets for the post-war period that have become the benchmark for other studies. Their empirical specifications are widely used. King and Levine included measures of intermediary activity, developed from IMF and World Bank data sources that are available for a large number of countries. Table 2, reproduced from Levine (1997, p. 705), shows values for the indicators in 1985 for 116 countries divided into quartiles by real GDP per capita. The four measures of financial sector development are the ratios of:

- liquid liabilities of the financial system to GDP
- bank credit to bank and central bank credit
- claims on the non-financial private sector to total domestic credit, and
- gross claims on the private sector to GDP

The relationships are clear: richer countries have more developed intermediaries and market-based private sector institutions are more important

Table 2: Aggregate Measures of Financial Development

	Very rich	Rich	Poor	Very poor	Correlation with real per capita GDP
DEPTH	0.67	0.51	0.39	0.26	0.51
BANK	0.91	0.73	0.57	0.52	0.58
PRIVATE	0.71	0.58	0.47	0.37	0.51
PRIVY	0.53	0.31	0.20	0.13	0.70
REAL GDP per capita (87$)	13 053	2376	754	241	

Notes: Derived from Levine (1997). DEPTH = Ratio of liquid liabilities of the financial system (currency plus demand and interest bearing accounts of banks and non-bank intermediaries) to GDP. BANK = Ratio of bank credit (domestic deposit money banks) to bank credit + central bank credit. PRIVATE = Claims on the non-financial private sector to total domestic credit. PRIVY = Gross claims on private sector to GDP.

than in poorer countries. Financial intermediary liabilities are over two-thirds of GDP in very rich countries and about half as much in below median income countries. Central banks allocate as much credit as commercial banks in below median income countries, while they are only about one-tenth as large in the very rich countries. Almost three-quarters of credit is extended to the private sector in the richest countries, almost twice the percentage in the poorest countries.

In this section, we present the standard regression framework that has been widely used in the literature and discuss some of its drawbacks.[5] We use results from my papers with Peter Rousseau to illustrate the empirical consensus concerning the relationship between growth and financial depth. Finally, some of the drawbacks of the standard approach are noted.

A. The Standard Empirical Framework

Formal econometric investigations have developed a now standard form (due to King and Levine) for regression estimates with panel data:

$$X_{it} = \alpha F_{it} + \beta Z_{it} + u_{it}$$

X_{it} is the growth of per capita real GDP or the real capital stock or a measure of total factor productivity growth in the ith country for some time period, t.

[5]There is some literature that utilizes somewhat different frameworks to address some of the same issues, such as the work done for the OECD growth project; see Leahy et al. (2001).

Z_{it} is a standard set of conditioning variables that usually includes the log of initial real GDP per capita (a convergence effect) and the log of initial secondary school enrolment rate (human capital investment). Additional conditioning variables may include the ratio of government consumption to GDP (measure of private sector activity), the inflation rate, a black market exchange rate premium, ratio of exports plus imports to GDP (a measure of openness of the economy) among others. Finally, F_{it} is one of the measures of financial sector development.

There are at least two serious econometric problems with regressions of this type. First, there may be simultaneity or reverse causality between the finance variable, *F*, and economic growth, *X*. Simply speaking, rich countries might have well-developed financial sectors because the income elasticity of the demand for financial services is large. That is, wealthy people demand banking services. Second, the regression specification assumes that any unobserved country specific effects are part of the error term. Thus, correlation between the error term and included variables in *F* or *X* is likely, which leads to biased estimation of the regression coefficients. Modern econometrics offers a number of approaches to solving these problems.

To deal with simultaneity, researchers have used predetermined (initial) values for the independent variables or instrumental variable estimation. Since the underlying relationship is a long-run one, the time period for observations is often set as a 5- or 10-year period. To avoid simultaneity, the independent variables are then measured as the initial (first year) values of the observation period. For example, if *X* is the average growth rate for 1960–65, then *F* and *Z* are the 1960 values for the respective variables. More recent studies by Levine, Loayza and Beck and Rousseau and Wachtel have introduced the use of instrumental variables to ameliorate the effects of simultaneity between *F* and *X*. Typically, the instruments are initial values of the regressors and, perhaps, some contemporaneous indicators not included as regressors, such as the inflation rate and relative size of the government sector and the degree of openness.

Rousseau and Wachtel (2000) argue that neither of these approaches does an adequate job at solving the simultaneity problem. The predetermined components of the *F* measures remain correlated with the contemporaneous measures. In addition, the *X* measures tend to be serially correlated. Thus, the techniques described do not remove all doubt of causality from *X* to *F*.

Techniques for examining dynamic interactions among variables have long been available for time series where extensive data series are available. Vector auto regression (VAR) is a widely used technique procedure for looking at causality from lagged *F* to current *X* and vice versa. Wachtel and Rousseau (1995) and Rousseau and Wachtel (1998), among others, have applied VAR to the handful of countries with adequate data for very long periods of time. The

results are consistent with the cross-country data analyses for the post-war period.

Panel VARs with a large number of cross-country observations and relatively few time series observations can be estimated with recently developed econometric techniques (Holtz-Eakin et al. 1988). Estimating panel VARs is made more accessible when the panel techniques introduced by Arrelano and Bond (1991) are used. Rousseau and Wachtel (2000) implement their technique to estimate panel VARs with annual data and develop Granger causality tests. Beck et al. (2000) and Levine et al. (2000) also find that measures of financial sector development have a significant causal effect on growth in panel VAR estimates.

The second econometric problem noted above is the estimation bias introduced in any panel estimation from unobserved country-specific influences. One way of dealing with this is to include country fixed effects (dummy variables) in all estimated equations. However, the co-linearity between the fixed effects and the phenomenon under investigation leads to very imprecise and unstable coefficient estimates. A measure of the financial structure such as the ratio of credit to GDP varies considerably among countries but changes slowly over time in any given country. Thus, the country fixed effects explain much of the panel variation in the financial structure variable. We show the sensitivity of the standard specification to the inclusion of country fixed effects below. Although many econometricians would argue in favour of such country fixed effects, most analysts reject this approach or the simple solution of differencing the data on practical grounds. However, the Arrelano–Bond estimator ameliorates the country-specific effects by differencing a VAR specification in levels of the data and leads to better estimates.

B. Summary of Evidence on Financial Depth and Growth

Despite the formidable econometric problems, a wide body of literature has firmly established a consensus in support of a relationship between financial sector development and economic growth. My work with Peter Rousseau illustrates both the approaches taken and the results established.

Rousseau and Wachtel (2000) examine the ratio of the broad money supply to GDP with panel data that include two 8-year average observations for 47 countries. Similarly, Rousseau and Wachtel (2001) use seven 5-year averages (1960–95) for 84 countries. These studies present results with panel data sets using instrumental variables. The first paper also presents panel VAR models with 47 countries and 16 annual observations, estimated with our application of the Arrelano and Bond procedures.

The ratio of broad money to GDP averages about 40%; it is larger in countries where the depository institutions are more actively intermediating between savers and investors; and it is smaller where the banks do little more than provide transactions services. Our results indicate that increasing that ratio by 10 percentage points (increasing the activity and depth of the depository institutions) will, particularly in countries without high inflation, increase the rate of growth by between 0.6 and 1.0 percentage points a year.

To address the issue of causality more directly, we estimate VAR systems with the same data using the Arrelano and Bond approach. We find evidence of significant causality from financial measures to real GDP and no evidence of feedback from GDP to the financial variables. These estimates indicate that an increase in M3 that raises its average share in output by 10 percentage points would raise output per capita over five years by 4.1% or 0.8% per year.

A change in the ratio of M3/GDP of 10 percentage points is quite large. For any given country, the ratio is serially correlated and trends occur slowly. However, there is a lot of variation among countries at different stages of financial development and, at any given time, the distribution of the ratio across countries is quite diffuse. In 1987, the ratio is less than 40% in 38% of the countries, between 40 and 60% in 34% of the countries and over 60% in 38%.[6] Thus, an increase of 10 percentage points is not unreasonable for a country experiencing financial sector deepening. Both the VAR and panel results indicate that such a change would have profound effects on growth.

The results in Beck et al. (2000), which extend Levine's earlier work and also introduce panel estimation, are very similar to Rousseau and Wachtel (2000). This paper introduces an improved measure of financial sector development – the ratio to GDP of credits from financial intermediaries to the private sector from a World Bank data set. This measure excludes credits from the central bank and government and also credits among financial intermediaries. They estimate a variant of the now standard specification with data for 77 countries for 1960–95 in two ways. First, they estimate a cross-section regression with instrumental variables (using 35-year average data). Second, they estimate a panel of five-year averages with the Arrelano and Bond technique.

When initial income and average years of schooling are the only conditioning variables, both estimation procedures give very similar results. An increase of the private credit to GDP ratio of 10 percentage points from its mean of 27.5% results in an increase in the annual growth rate of 0.69% with the cross-section and 0.74% with the panel. When a broader set of conditioning variables is used, the estimates vary between 0.5 and 1%.

[6]This is based on our sample of 46 countries with active equity markets.

C. Drawbacks of Standard Approach

In some respects, the standard panel model is very robust but, in other respects, estimation issues lead to problematic results.[7] Table 3 shows the effects of different estimation procedures using the panel data from Rousseau and Wachtel (2001) and the standard specification. The first equation is estimated by ordinary least squares (OLS) and the independent variables are all initial values (value for the first year of each 5-year period). Estimates are indistinguishable from the second equation that uses contemporaneous values for the government and liquid liabilities variables and estimates the equation with instrumental variables. The choice of technique to correct for simultaneity is immaterial. Both of these equations include fixed effects for time periods but not for countries. Country fixed effects as well are included in the last column.

The introduction of country fixed effects, shown in the last column, has a profound effect on the results. The fixed effects dominate the equation; the proportion of variance explained almost doubles and some of the coefficients have the wrong sign. The finance effect is still positive but the coefficient is very small and barely one-tenth of a standard error from zero. Figure 1 shows the strong relationship between the fixed-effect coefficients and the average ratio of liquid liabilities to GDP. The between-country differences in the finance ratios are more important than the differences over time, and thus the fixed country effects and the finance ratios convey largely the same information. This should not be surprising, since financial depth evolves slowly over time and the regressions span less than 40 years of data.

Table 3: Panel Estimates for 5-Year Average Real Per Capita GDP Growth

	OLS	IV	OLS
Constant	–0.726 (1.0)	–0.743 (1.0)	
Log of initial real GDP	–0.203 (1.5)	–0.199 (1.5)	–3.447 (5.4)
Log initial secondary school enrolment	0.841 (3.7)	0.819 (3.7)	–1.715 (3.7)
Government expenditure to GDP	–0.060 (2.6)	–0.063 (2.5)	–0.081 (2.3)
Liquid liabilities to GDP	0.027 (4.7)	0.028 (5.0)	0.001 (0.1)
Fixed effects	Time periods	Time periods	Time periods and countries
Corrected R^2	0.233	0.247	0.440

Source: Panel with 426 observations from Rousseau and Wachtel (2001) for 80 countries, 1960–95. Absolute values of *t*-statistics are shown in parentheses.

[7]Temple (1999) discusses why *ad hoc* growth equations are difficult to interpret and estimate.

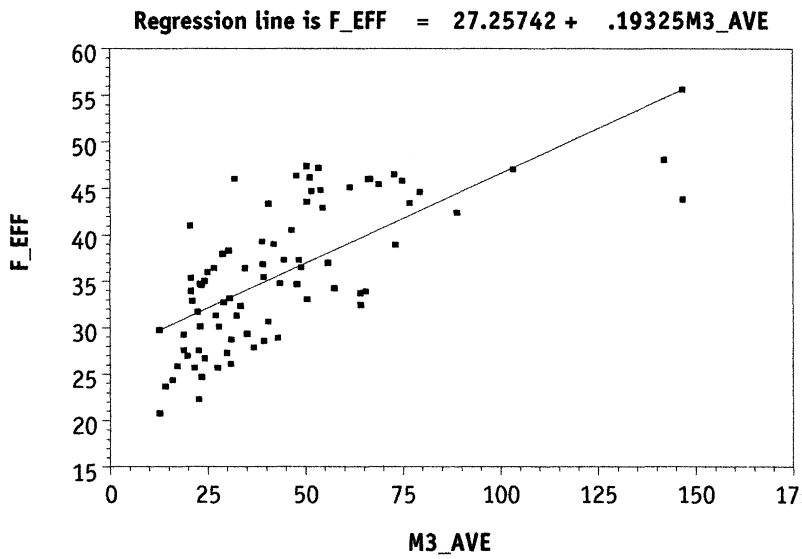

Figure 1: Fixed effects (F_EFF) and average ratio of liquid liabilities to GDP (M3_AVE)

Proponents of the standard growth rate equation would argue that the specification does not call for country fixed effects. The equation is derived from a production function relationship and so the country-specific unobserved effects disappear with the differencing; but, the fact that they enter the equation significantly suggests that the country effects persist. The standard regression model might not be an adequate framework for making inferences about the change in financial depth on growth from cross-country comparisons. However, this issue highlights the importance of the recent papers with panel VAR estimates that remove the country fixed effects by differencing.

All in all, the consensus result seems well established. There are, of course, questions that can be posed. For example, Luintel and Khan (1999) find some evidence of bi-directional causality between financial sector development and growth in a VAR analysis of developing countries. The econometric issues are complex and efforts to address them have left the empirical consensus intact.

Estimation issues aside, there are at least two reasons why the consensus model is only the first stage of an important research agenda. First, even the refined measure of financial depth introduced by Levine and Beck provides a highly aggregated picture. There is wide variation in these financial sector ratios that is hard to understand. For example, the 1987 ratio of M3 to GDP is 73% in Spain and 51% in Sweden. Does this reflect more advanced financial sector development in Spain or greater reliance on bank based financing?

Second, a thrust of our earlier discussion was the variety of financial sector institutions and activities that contribute to efficient intermediation. The aggregate measures mask a rich and diverse set of activities and tells us little about how intermediation affects growth.[8] In the next section, we discuss recent empirical work that extends our understanding of the relationship between growth and the financial sector beyond the simple measures of financial depth.

IV. Other Dimensions of Financial Sector Development

There are many aspects of financial sector development that can contribute to economic growth; only a few have been examined closely in the empirical literature. Often there is little data available on the activities and characteristics of specific financial institutions. Recent developments in the growth literature have concentrated on equity markets and on important characteristics of the financial sector environment.

A. Role of Equity Markets

The first efforts to extend the empirical literature start with a look at the activities of specific financial institutions. In particular, there is considerable interest in the role of equity markets. There are probably two reasons for this. First, data on equity market activity are available and second, the stock market – Wall Street – always attracts attention as the paramount symbol of capitalism. In fact, many countries have organized equity markets that are often quite active.

The literature examined in previous sections uses various credit aggregates to measure financial intermediation, since most financing comes from banks or related institutions. Banks dominate financing in many places and, even in the most advanced industrialized countries, equity markets are only a small part of the overall financial markets. Most new investment is funded either internally by firms, through banks and other intermediaries, or directly through bond markets. New issuance of stock is never a large fraction of total sources of funds. Nevertheless, the existence of a stock market is important, even when equity issuance is a relatively minor source of funds (Steil 2001).

[8]Kenny and Williams (2001) provide a scathing critique of the empirical growth literature (without any reference to the role of finance). In their view, there is little consensus or robustness and most models are overly simple.

Why is this so? First, an equity market provides investors and entrepreneurs with a potential exit mechanism. An equity market gives the venture capital investor the ability to realize the gains from a successful project when the company makes an initial public offering. The option to exit through a liquid market mechanism makes venture capital investments more attractive and might well increase entrepreneurial activity generally (Lerner 2001).

Second, capital inflows – both foreign direct investment (FDI) and portfolio investments – are potentially important sources of investment funds for emerging market and transition economies. International portfolio investments have grown rapidly in recent years and portfolio flows tend to be larger to countries with organized and liquid markets.[9] Thus, the existence of equity markets facilitates capital inflow and the ability to finance current account deficits.[10]

Third, the provision of liquidity through organized exchanges encourages both international and domestic investors to transfer their surpluses from short-term assets to the long-term capital market, where the funds can provide access to permanent capital for firms to finance large, indivisible projects that enjoy substantial scale economies.

Finally, the existence of a stock market provides important information that improves the efficiency of financial intermediation generally. For traded companies, the stock market improves the flow of information from management to owners and quickly produces a market evaluation of company developments. As firms increasingly link the compensation of their managers to stock price performance, a deep equity market may also provide managers with incentives to exert more effort in monitoring risky, high-return projects. Finally, the valuation of company assets by the stock market provides benchmarks for the value of business assets, which can be helpful to other businesses and investors alike.

B. Empirical Evidence on Equity Markets

There have been several efforts to examine empirically the specific role of equity markets in real sector activity starting with Atje and Jovanovic (1993), who construct a cross-country panel for the 1980s and show that trading volume has a strong influence on growth after controlling for lagged investment

[9]This is particularly true in the transition economies (EBRD 2000).

[10]Portfolio flows can also be destabilizing since a change in market sentiment can lead to massive outflows, which often lead to exchange rate crises (as in Mexico in 1995 and the Czech Republic in 1997).

while bank credit does not. Demirgüç-Kunt and Levine (1996) provide a descriptive investigation. Levine and Zervos (1996, 1998) introduce equity market measures to the standard growth–finance cross-section specifications discussed earlier. Finally, a more comprehensive effort to examine the dynamic relationships is found in my paper with Peter Rousseau (Rousseau and Wachtel 2000).

In our paper, we use two measures of stock market development as financial sector indicators in the panel regressions: the ratio of market capitalization to GDP and the ratio of total value traded to GDP. Both have a positive coefficient, but only the latter is significant at the 1% level. We also use a VAR model to examine causality and dynamic interactions among growth, a measure of financial intermediation and a stock market indicator. Table 4 summarizes the results of panel equations with alternative measures of financial sector development.

The results indicate that the development of a liquid and highly capitalized equity market increases growth. The mean ratio of value traded to GDP was just 10% in 1987; the panel regression results indicate that an increase in the ratio of 10 percentage points would add 0.5% to the growth rate. Similarly, a 10-percentage point increase in the ratio of M3 to GDP (with a 1987 mean of 59%) would increase the growth rate by 0.15%. The equity market effects are of similar magnitude as the effect of more developed financial intermediaries.

Equity markets affect growth even though new equity issuance is always small. The markets are important because they assist the flow of information, which improves the efficiency of allocation. How equity markets provide information and affect efficiency improvements is an issue that merits further investigation; see some suggestion in Morck et al. (2000).

Table 4: Equity Markets, Financial Depth and Growth: Summary of Panel Regression and VAR Estimates

	Country mean		Effect on growth rate of a 10 percentage point increase	
Ratio to GDP of:	1987	1995	Panel regression model	VAR (5-year horizon)
Liquid liabilities (M3)	58.73		0.15	0.8
Market capitalization	29.12	65.11	0.08	0.4
Total value traded	10.75	24.22	0.52	1.0

Source: Calculated from Rousseau and Wachtel (2000).

C. Other Components of the Financial Sector

Research efforts so far have not examined the impact of other financial markets or instruments on economic growth in a similar cross-country framework. A major reason for this is that data on other types of financial intermediaries (for example, private placements, venture capital, bond issuance, commercial paper) are not part of any standardized data collection efforts and are often simply not available. Furthermore, the number of countries with these other instruments and markets is not large. Although, banks and related intermediaries are found everywhere and equity markets are found in most places, bond markets, commercial paper, organized venture capital industry, etc. are really quite rare. Thus, research efforts have turned in a slightly different direction; they have focused on the relationship between economic growth and the quality of the financial sector environment.

D. Financial Sector Environment and Structure

There are several aspects of financial sector environment and structure that allow for and encourage the operation of financial intermediaries. Recent empirical literature has identified these characteristics and demonstrated an empirical relationship to economic growth. For example, important elements of the financial sector environment include clear and universally applied accounting standards and auditing practices, and a legal framework for debtor–creditor relationships. These environmental characteristics provide more reliable information for decision making by intermediaries and bolster confidence in financial contracting. Further work has examined the structure (for example ownership patterns, concentration) of the financial industry, particularly the banking sector, which contributes to a better financial environment.

The effect of accounting, bankruptcy and governance standards and procedures on growth and on financial sector development has been recently examined in a cross-country framework by Levine et al. (2000). Among other things, they explore the influence of differences in creditor rights in bankruptcy procedures. There are wide differences in the rights of creditors to obtain and liquidate assets, in the rights of management to retain control in corporate reorganizations, in the enforcement of rules and the application of procedures and the transparency of accounting information. They find that countries with better creditor rights, more rigorous enforcement and better accounting information tend to have more highly developed financial intermediaries. Thus, growth prospects are enhanced because a sound legal environment encourages the development of financial intermediation.

Another avenue for further empirical research is the structure of the banking system. We have already established that 'more banking' – a larger ratio of bank liabilities to GDP – is an important correlate of economic growth. Further investigation examines the type of banking activity, the environment in which it is conducted and by whom it is conducted. A country may have a high ratio of bank liabilities to GDP because banks subject to government influence (whether they are state-owned or not) make loans to state-owned (or favoured) enterprises and accumulate large portfolios of bad loans and ultimately require government-sponsored recapitalization. Such activity presumably does not have the same effect on economic growth as an expanding market-oriented banking sector. The research literature has begun to look at the characteristics of the banking sector to see if they are associated with higher growth rates and greater economic stability. Clearly, better banking systems create a more stable environment by leading to a reduced likelihood of systemic banking crises and international currency crises.

Within the last year or so, a number of working papers that address some of these issues have begun to circulate. Results indicate that the following banking industry characteristics may be related to growth and stability:

- More competitive and less concentrated banking industry
- More private as opposed to government ownership or control
- More foreign participation in banking

There is, of course an enormous literature on bank competition but only Cetorelli and Gambera (2001) relate economic growth to concentration. They find that increased competition in banking has a depressing effect on economic growth. However, their industry analysis suggests that concentrated banking sectors may successfully target industries in need of external financing and promote the growth of new firms.

La Porta et al. (2002) examine the implications of government ownership of commercial banks. It is astounding that extensive government ownership of banks is quite common and not restricted to formerly planned economies. Government ownership of banks is more common in poorer countries and less common in democracies. La Porta et al. (2002) report that the median government ownership of the 10 largest banks in each of 92 countries in 1995 is 33.4% (and still 30% if the transition economies are excluded). Government ownership is quite large even though it has fallen since 1970, when the median government ownership of the 10 largest banks was 57% (and 53% without the transition economies). Government control (as the holder of a large or largest block of stock) is even stronger – almost half of all

bank assets. Recently, privatization efforts that have resulted in state divestiture have become common but not prevalent.[11]

Government ownership of banks can arise in three ways. First, it may be the result of political use of the financial system to the advantage of those in power. The ruling party might just want to use bank lending to shift resources to its supporters. Second, it may be the consequence of banking sector crises. Third, it may be a response to market failure as the government attempts to create institutions in an undeveloped financial system. Although, origins of state ownership may be significant, the literature simply looks at its overall extent.

La Porta et al. (2002) find that government ownership does not lead to rapid growth of financial intermediation. They examine the effect on economic growth with the standard panel framework introduced earlier. They consistently find that higher initial government bank ownership has a negative impact on real per capita growth rates. A 10 percentage point increase in the proportions of assets of the largest banks owned by the government is associated with a decline in the annual growth rate of about 0.2%. These preliminary regressions do not address all of the econometric problems but the overall thrust of these results will probably withstand a more careful empirical investigation.

Many governments have restricted foreign ownership of banks or foreign entry into the financial industry. Wachtel (2001) notes three reasons why foreign entry is beneficial. First, it leads to the rapid introduction of product and service innovations and the development of financial markets. Second, foreign banking results in economies of scale and scope. Finally, the presence of foreign banking attracts FDI. Nevertheless, there is a long history of resistance of foreign entry into banking based on political fears of foreign control and, more importantly, resistance to competition by entrenched and vulnerable local banks and their allies.

Foreign bank entry and cross-border banking began to increase rapidly in the 1990s. Foreign banking activity in the transition economies and the changes induced by currency union in Europe have started to affect the rest of the world. Bankers have become much bolder and cross-border bank mergers and acquisitions have mushroomed in the last few years. For example, in Venezuela, foreign control of bank assets went from virtually zero in 1994 to over 40% in 1999. In Poland, where there was initially considerable resistance to foreign entry, the corresponding figures are 2% in 1994 and 53% in 1999.[12] There are exceptions to the recent trend towards the internationalization of

[11]For example, recent privatizations reduced state ownership of bank assets from 100% to less than 20% in both Chile and Mexico. In India, it has barely changed and remains at 87% while, in Pakistan, it has fallen from 89% to 63% (Beim and Calomiris 2001).

[12]For a description of recent developments, see United Nations (1999) and IMF (2000).

banking such as Turkey and Korea, where there are still barriers to foreign entry. However, it is too early to judge the impact of these industry changes on economic performance.

There is one additional line of empirical research that relates economic growth to characteristics of the financial sector. A group of recent papers relate the legal environment for the financial sector to economic growth. Part of the motivation for these inquiries is econometric. The origins of the legal system (for example, English common law or French civil law) are a completely exogenous variable determined by accidents of history (and colonialism). However, the legal systems have different approaches to creditor–debtor relationships that could be relevant to the performance of the financial system. The line of inquiry started with La Porta et al. (1998); Levine (1999, 2000) relates it to economic growth. The exogenous characteristics can be used as instruments to improve econometric estimates of the basic growth–finance relationships. In addition, the results indicate that countries with better contract law, more informative accounting, and accurate financial reporting will have more developed financial systems and more growth.

A related issue, addressed by Levine (2000), is whether bank dominated (the German model) or market dominated (the Anglo-Saxon model) financial systems generate better growth performance. He finds that the quantity of financial services is more important than the structure of the industry that provides them. Convergence of financial systems around the world will probably make this specific question moot over time.

Most of the work so far on the characteristics of the financial sector has looked at banks and the environment in which they operate, although there have been some recent efforts to examine characteristics of equity markets. Bekaert et al. (2001) look at the effect of financial sector liberalization on equity markets. They examine a specific aspect of liberalization: the dates when domestic equity markets were opened up to foreign investors. They find that this liberalization move has a positive effect on growth.

V. Economic Crises and Financial Sector Development

Most of the literature reviewed so far discusses the extent of financial sector development and its implications for growth. However, there is another dimension of economic well-being that could be related to financial sector development: stability. This section examines the relationship between financial sector development and the ability of a country to avoid banking system failures or currency crises. Are countries with more developed financial structures better able to avoid such crises?

With regard to banking crises, it is not at all obvious that specific financial sector characteristics or developments can help a country to avoid crises. Systemic banking crises are often due to regulatory failure in the face of countrywide shocks. They occur in both large and small economies, including many with sophisticated (but albeit flawed) financial systems. The ongoing bank crises in Japan, the US Savings and Loan crisis in the 1980s and the bank failures in Scandinavia in the 1990s are all examples of well-developed financial systems that endured systemic crises.

Currency crises occur with some frequency around the world and are often related to financial sector crises (IMF 1998, ch. IV). The principal causes of currency crises are all interrelated; they are unsustainable current account deficits, exchange rate misalignments, financial sector weakness, political instability and global financial and economic conditions. Financial sector weakness can both contribute to a currency crisis and make it harder to cope with a currency crisis with some other cause.

It is difficult to untangle the relationship between crises and financial sector development. Take the case of a barter economy – it is immune from banking and currency crises and also has no financial sector. Once the country develops a fractional reserve banking system and a freely traded currency, it will be subject to crises. Thus, it can appear that financial sector development causes crises.

The increased concern in recent years with financial sector (banking or currency) crises has led to much interest in creating warning systems. There has been wide research interest in identifying crisis indicators. A good way to judge the empirical relationship between the occurrence of crises and financial sector development would be to see if characteristics of the financial sector are found to be crisis indicators or whether they are related to identified indicators. There have been several efforts to examine and evaluate crisis indicators and there has been particular interest since the Asian crisis in developing early warning systems.

Kaminsky and Reinhart (1999) develop a series of indicators of banking and currency crises. Their list indicates the difficulty in disentangling financial sector development and crisis vulnerability. Among their indicators of crisis are a number of measures that we would associate in the long run with beneficial financial sector development. A high ratio of credit to GDP or lending to deposits can signal a lending boom and declining loan quality, which are precursors of crisis. However, these indicators create crises when they develop in conjunction with other phenomena.

Some preliminary investigation of the relationship between the incidence of bank crises and the characteristics of the financial system is found in Barth et al. (2000). There are some broad indications that crises are more likely to occur in countries where the corporate ownership and governance activities

of banks are restricted. Discussions of bank crises focus on policy prescriptions to avoid their reoccurrence (Caprio et al. 1998). First, a strong bank regulatory structure is essential. This consists of both the legal framework and its application by experienced regulators with enforcement powers. Second, the structure of the financial system should provide managers and owners with the incentives to monitor risk taking. This requires standards for accounting and financial reporting and the dissemination of such information to the markets.

An interesting thing about the indicators of banking and currency crises is that they are often related to the banking and financial sector. Financial development can be associated with financial fragility and vulnerability to crisis, especially when the regulatory and legal environments are wanting. The implication is that financial liberalization and the development of sound financial institutions and regulatory structure should be carefully sequenced (Demirgüç-Kunt and Detragiache 1999).

One element of financial sector development that might reduce the likelihood of financial crises is foreign bank ownership. Indeed, it would have significantly reduced the seriousness of the financial crises in Asia in the late 1990s. If foreign investors are the owners of banks in emerging markets, then they are responsible for the consequences of bad local lending practices. Foreign ownership creates a disincentive for damaging speculative short-term financial flows and an incentive to encourage sound banking practices. Moreover, interest in bank ownership from abroad provides a market test of the value and soundness of domestic banks. It is a useful signal when local financial markets are too thin or too small to draw such attention. Hence, lending by foreign-owned banks can avoid the problems associated with cross-border lending by international banks to local banks (Radelet and Sachs 1998).

VI. Conclusions

There is no doubt in my mind that there is ample empirical evidence to make a convincing case that financial sector development promotes economic growth. Although the academic literature strongly supports this conclusion, it provides little in the way of rigorous guidance about how best to develop the financial sector. Although deeper financial intermediation may be a significant causal factor in economic growth, we cannot infer that every expansion of intermediary activity will be beneficial. Financial sector expansion that results from inflationary liquidity creation or deterioration in lending standards will not enhance long-run growth prospects. The observed association between financial sector deepening and growth does not,

therefore, translate into a simple prescription to encourage the unrestricted growth of financial intermediaries.

Another limitation of the research literature is that it has only identified relationships between growth and aggregate measures of financial sector development. The next step is to identify specific institutional characteristics that contribute to growth. The recent literature on the influence of legal and accounting standards on growth, for example, has begun to provide some specific answers. We now know some of the features of a legal system that improve the growth environment (such as shareholder rights). Less is known about the influence on growth of specific financial institutions and markets that tend to be country specific (such as commercial paper markets, venture capital firms, and mortgage institutions). Much can be learned from institutional analysis in these areas even when cross-country econometric studies may not be feasible.

Research on growth and finance provides policy makers with little guidance about the sequencing of financial sector developments. For example, we know that the expansion of bank credit is growth enhancing, but we do not know how to promote credit expansion without compromising credit standards. Private sector credit evaluation capabilities, public sector regulatory oversight and a sound legal and accounting infrastructure must all be in place as credit deepening occurs. Thus, the sequencing of financial sector developments is enormously important from a policy perspective. This is not a simple recipe, because the developments are likely to take place concurrently and mistakes are easy to make. Developing institutional capabilities and a legal tradition with enforcement standards is likely to be a slow process. It is easy to see how rapid credit expansion in a booming economy could wreak economic and political havoc even where a government is following a generally prudent prescription for financial sector development.

Recent history is full of examples of poor sequencing or a failure to have a robust institutional framework in place as financial deepening occurs. Bonin and Wachtel (2000) describe the problems that emerged in transition economies that opened equity markets before effective securities' regulation was in place. Although securities laws were on the books, regulators were inexperienced and unable to apply them effectively. Thus, abuses were common, and the ensuing problems set back the development of equity markets.

The IMF has only recently begun to evaluate financial sector developments in member countries. Previously, the Fund monitored macroeconomic developments and paid little attention to the financial sector. Perhaps as a result of some of the empirical research cited here, the Fund now understands that regulatory capabilities and the quality of institutions are as important as the growth of the money and credit aggregates. This would be a welcome

change, since recent empirical work suggests that the quality of institutions is as important as their size.

Fundamental research on the finance–growth relationship has mushroomed in just the last few years. The strong evidence that financial development causes growth has contributed to the increased interest of the economics profession in financial institutions. However, much more needs to be done to make the research agenda relevant to policy makers. The first challenge is to coordinate macroeconomic and financial sector policies in order to encourage the expansion of intermediation without creating inflation or excessive leverage. Second, researchers need to discover more about specific financial sector institutional developments that contribute to growth. Third, policy makers need to learn how to sequence institutional change, so that financial sector deepening does not occur before public sector regulatory and private sector risk management capabilities develop.

Paul Wachtel
Stern School of Business
New York University
44 West 4th Street, New York
NY 10012, USA
pwachtel@stern.nyu.edu

References

Arrellano, M., and S. Bond (1991), 'Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Fluctuations', *Review of Economics Studies*, 58, 277–97.

Atje, R., and B. Jovanovic (1993), 'Stock Market Development', *European Economic Review*, 37, 632–40.

Barro, Robert J. (1991), 'Economic Growth in a Cross Section of Countries', *Quarterly Journal of Economics*, 106, 407–41.

Barro, Robert J., and Xavier Sala-I-Martin (1995), *Economic Growth.* Boston, MA: McGraw-Hill, Inc.

Barth, James, Gerard Caprio and Ross Levine (2000), 'Banking Systems Around the Globe: Do Regulation and Ownership Affect Performance and Stability?', Milken Institute Policy Brief No. 15, July.

Beck, Thorsten, Ross Levine and Norman Loayza (2000), 'Finance and the Sources of Growth', *Journal of Financial Economics*, 58, 261–300.

Beim, David O., and Charles W. Calomiris (2001), *Emerging Financial Markets*. New York: McGraw-Hill Irwin.

Bekaert, Geert, Campbell Harvey and Christian Lundblad (2001), 'Does Financial Liberalization Spur Growth?', NBER Working Paper No. 8245, April.

Bonin, John, and Paul Wachtel (1999), 'Towards Market-oriented Banking in the Economies in Transition', in M. Blejer and M. Skreb, eds, *Financial Sector Transformation*. Cambridge University Press.

Bonin, John, and Paul Wachtel (2000), 'Financial Sector Development in Transition Economies: A Retrospective on the First Ten Years', paper presented at the Fifth Dubrovnik Conference on Transition Economics, Dubrovnik, Croatia, available at http://www.stern.nyu.edu/~pwachtel/DubrvnkVNov0.pdf.

Caprio, Jr., Gerard, William Hunter, George C. Kaufman and Danny Leipziger (eds) (1998), *Preventing Bank Crises: Lessons from Recent Global Bank Failures*. Washington, DC: World Bank, 3–11.

Cetorelli, Nicola, and Michele Gambera (2001), 'Banking Structure, Financial Dependence and Growth: International Evidence from Industry Data', *Journal of Finance*, 56(2), 617–48.

Demirgüç-Kunt, Asli, and Enrica Detragiache (1999) 'Financial Liberalization and Financial Fragility', in Boris Pleskovic and Joseph E. Stiglitz, eds, *Annual World Bank Conference on Development Economics 1998*. Washington, DC: World Bank, 303–31.

Demirgüç-Kunt, Asli, and R. Levine (1996) 'Stock Market Development and Financial Intermediaries: Stylized Facts', *World Bank Economic Review*, 10, 291–321.

EBRD (2000), *Transition Report.* European Bank for Reconstruction and Development.

Goldsmith, Raymond (1969), *Financial Structure and Development*. New Haven, CT: Yale University Press.

Herring, Richard J., and Nathporn Chatusripitak (2000), 'The Case of the Missing Market: The Bond Market and Why it Matters for Financial Development', Asian Development Bank ADB Institute Working Paper 11, July.

Holtz-Eakin, D., W. Newey and H. S. Rosen (1988), 'Estimating Vector Auto-regressions with Panel Data', *Econometrica*, 56, 1371–95.

International Monetary Fund (1998), *World Economic Outlook*, Washington, DC: IMF, May.

International Monetary Fund (1999), *Exchange Rate Arrangement and Currency Convertibility: Developments and Issues*. World Economic and Financial Surveys. Washington, DC: IMF.

International Monetary Fund (2000), *International Capital Markets*. Washington, DC: IMF, September.

Kaminsky, Graciela L., and Carmen M. Reinhart (1999), 'The Twin Crises: The Causes of Banking and Balance of Payments Problems', *American Economic Review*, 89, 473–500.

Kenny, Charles, and David Williams (2001), 'What Do We Know About Economic Growth? Or, Why Don't We Know Very Much?', *World Development*, 29, 1–22.

Khan, Aubhik (2000), 'The Finance and Growth Nexus', *Business Review*, Federal Reserve Bank of Philadelphia, January, 3–14.

King, Robert G., and Ross Levine (1993a), 'Finance, Entrepreneurship, and Growth: Theory and Evidence', *Journal of Monetary Economics*, 32, 513–42.

King, Robert G., and Ross Levine (1993b), 'Finance and Growth: Schumpeter Might Be Right', *Quarterly Journal of Economics*, 108, 717–37.

La Porta, Rafael, F. Lopez-de-Silanes and A. Shleifer (2002), 'Government Ownership of Banks', *Journal of Finance*, February, forthcoming.

La Porta, Rafael, F. Lopez-de-Silanes, A. Shleifer and R. Vishny (1998), 'Law and Finance', *Journal of Political Economy*, 106, 1133–55.

Leahy, Michael, Sebastian Schich, Gert Wehinger, Florian Pelgrin and Thorsteinn Thorgeirsson (2001), 'Contributions of Financial Systems to Growth in OECD Countries', OECD Economics Department Working Paper No. 280.

Lerner, Josh (2001), 'Venture Capital', in Benn Steil, David Victor and Richard Nelson, eds, *Technological Innovation and Economic Performance*. Princeton: Princeton University Press, 327–46.

Levine, Ross (1997), 'Financial Development and Economic Growth: Views and Agenda', *Journal of Economic Literature*, 35(2), 688–726.

Levine, Ross (1999), 'Law, Finance and Economic Growth', *Journal of Financial Intermediation*, 8, 8–35.

Levine, Ross (2000), 'Bank-based or Market-based Financial Systems: Which is Better?', conference paper, World Bank, February.

Levine, Ross, and Sara Zervos (1996), 'Stock Market Development and Long-run Growth', *The World Bank Economic Review*, 10, May, 323–40.

Levine, Ross, and Sara Zervos (1998), 'Stock Markets, Banks, and Economic Growth', *American Economic Review*, 88, June, 537–58.

Levine, Ross, Norman Loayza and Thorsten Beck (2000), 'Financial Intermediation and Growth: Causality and Causes', *Journal of Monetary Economics*, 46(1), 31–77.

Luintel, Kul, and Mosahid Khan (1999),'A Quantitative Reassessment of the Finance–Growth Nexus: Evidence from a Multivariate VAR', *Journal of Development Economics*, 60, 381–405.

Lum, Sharlene K. S., and Brian C. Moyer (2000),'Gross Domestic Product by Industry for 1997–1999', *Survey of Current Business*, December, 24–35.

McKinnon, Ronald I. (1973), *Money and Capital in Economic Development*. Washington, DC: The Brookings Institution.

Morck, Randall, Bernard Yeung and Wayne Yu (2000), 'The Information Content of Stock Markets: Why do Emerging Markets have Synchronous Stock Price Movements?', *Journal of Financial Economics*, 58, 215–60.

Pagano, Marco (1993), 'Financial Markets and Growth: An Overview', *European Economic Review*, 37, 613–22.

Radelet, Steven, and Jeffrey D. Sachs (1998), 'The East Asian Financial Crisis: Diagnosis, Remedies, Prospects', *Brookings Papers on Economic Activity*, 28(1), 1–74.

Rousseau, Peter L., and Paul Wachtel (1998), 'Financial Intermediation and Economic Performance: Historical Evidence from Five Industrialized Countries', *Journal of Money, Credit and Banking*, 30, 657–78.

Rousseau, Peter L., and Paul Wachtel (2000), 'Equity Markets and Growth: Cross Country Evidence on Timing and Outcomes, 1980–95', *Journal of Banking and Finance*, 24, 1933–57.

Rousseau, Peter L., and Paul Wachtel (2001), 'Inflation, Financial Development and Growth', in T. Negishi, R. Ramachandran and K. Mino, eds, *Economic Theory, Dynamics and Markets: Essays in Honor of Ryuzo Sato*. Boston: Kluwer, 309–24.

Steil, Benn (2001), 'Creating Securities Markets in Developing Countries: A New Approach for the Age of Automated Trading', *International Finance*, 4, 257–78.

Temple, Jonathan (1999), 'The New Growth Evidence', *Journal of Economic Literature*, 37, 112–56.

United Nations, Department of Economic and Social Affairs (1999), *World Economic and Social Survey, 1999*. New York: United Nations.

Wachtel, Paul (2001), 'Globalization of Banking: Why Does It Matter?', paper presented at Presente y Futuro del Sistema Financiero en Paises Emergentes, Caracas, Venezuela, available at http://www.stern.nyu.edu/~pwachtel/CaracasPresentation.pdf.

Wachtel, Paul, and Peter L. Rousseau (1995), 'Financial Intermediation and Economic Growth: A Historical Comparison of the U.S., U.K. and Canada', in M. Bordo and R. Sylla, eds, *Anglo-American Financial Systems*. New York: Irwin, 329–81.