

Finance and Growth: A Synthesis of Trade and Investment Related Transmission Mechanisms[†]

Felix Eschenbach
Tinbergen Institute

Joseph F. Francois
Tinbergen Institute and CEPR

This draft November 2005

Abstract: We review the literature on the finance-growth nexus, replicate earlier findings, and extend and modify the existing econometric cross-country framework, distinguishing between trade- and investment-related aspects of financial openness. Using a new database for 130 countries (including 26 transition economies) for the 1990s, we offer evidence of links between financial development, banking sector competition and growth. Capital account openness is distinct from foreign institutional participation in the domestic sector, affecting growth in a different way. This is confirmed by our regressions. Institutional participation (i.e. services trade) is significantly associated with growth, but capital account openness is not.

Keywords: financial development, imperfect competition in banking sector, financial services trade, capital account liberalization

JEL codes: D 43, F 36, F43, G 28, O 16

[†]. This paper represents our opinions, and is not meant to represent the official position or view of any organization with which we may have ever been affiliated. All remaining errors are due to confusion on the part of the authors.

Finance and Growth: A Synthesis of Trade and Investment- Related Transmission Mechanisms

Summary:

In this paper we review the literature on the finance-growth nexus, replicate earlier empirical findings, and extend and modify the existing econometric cross-country framework to distinguish between trade- and investment-related aspects of financial sector openness. We first synthesize the relevant literature and classify the different mechanisms linking domestic and international finance with growth. Using a new database for 130 countries (including 26 transition economies) which covers the 1990s, we then provide evidence about the links between financial development, banking sector competition and growth. Previous studies have shown significant links between foreign institutional participation in the domestic financial system, banking sector concentration and competition. Using financial services markups as measures of competition in the domestic banking system, we indirectly put indicators of banking sector openness on top of the traditional financial development variables. The findings suggest the following: 1) Pro-competitive growth effects come on top of the impact of traditional domestic financial development variables. 2) There is evidence for a relatively direct (linear) relationship between indicators of efficiency of the financial sector (in terms of commercial vs. central bank activity and allocation of credit to private vs. public sector) and financial services markups on the one hand, and per-capita GDP growth on the other hand. 3) The stock market turnover ratio is found to be significantly positively associated with growth, value traded not. 4) We argue that indicators measuring the volume of financial intermediation (like M3 or credit to private sector scaled by GDP) are not robustly associated with growth in a direct (linear) fashion and offer explanations why not. Testing for non-linearity we find that these indicators have an inverse U-curve relationship with growth. 5) Capital account openness is distinct from foreign institutional participation in the domestic financial sector as it affects growth in a different way. This is confirmed by our regressions in which institutional participation (i.e. services trade) is significantly associated with growth, but capital account openness is not.

Keywords: financial development, imperfect competition in banking sector, financial services trade, capital account liberalization

JEL codes: D 43, F 36, F43, G 28, O 16

Joseph F. Francois
Faculty of Economics, H8-18
Erasmus University Rotterdam
Burg. Oudlaan 50
3062PA Rotterdam
NETHERLANDS
voice: +31 10 408 1256
fax: +31 10 408 9146
email: francois@few.eur.nl
www.intereconomics.com/francois

Felix Eschenbach
Tinbergen Institute
Erasmus University Rotterdam
Burg. Oudlaan 50-H16-10
3062PA Rotterdam
NETHERLANDS
Voice: +31 10 408 8924
Fax: +31 10 408 9146
Email: eschenbach@few.eur.nl
www.tinbergen.nl

I. Introduction

The existing literature on the savings-investment nexus provides a number of reasons why financial intermediaries emerge. Investment projects for instance have a different size than individuals' savings. So intermediaries pool funds. There are information asymmetries and monitoring costs between savers and investors. Accordingly financial institutions screen and evaluate entrepreneurs and investment opportunities. They eventually allocate resources, monitor management and exert corporate control. Increasing sophistication of financial systems allows to trade, hedge, diversify and pool risk. Financial intermediaries provide trade financing. They insure depositors against idiosyncratic risk. Given the fact that financial institutions exist and understanding the functions they assume, we explain the different mechanisms that link both domestic and international finance with growth. We also put these approaches into a historical perspective of three decades of literature on finance and growth.

In the 1970s McKinnon and Shaw were the first major advocates of domestic financial liberalization in a period of extensive government interference in financial sectors. After empirical evidence from the 1980s turned out to give only partial support for the McKinnon-Shaw hypothesis, economists started to look for more promising avenues to explain the finance-growth nexus. The abolition of interest controls and other interventions in the financial sector alone was insufficient and did not yield the expected results. The focus therefore shifted toward market failures and appropriate government intervention. The 1990s in turn witnessed a surge in the literature on financial systems and endogenous growth. By assuming its role the financial system generates technological progress which offsets the impact of decreasing returns to physical capital and ultimately leads to sustained economic growth.

Two different strands of the theory are looking at issues linking international finance and growth. One is connecting foreign institutional participation in the domestic financial system with market structure and competition. By opening a country's financial sector to foreign intermediaries, competition and market size increase, which drives the price of financial services down. This reduces the share of investible funds consumed by the financial system and narrows the wedge between the gross return to physical capital and the net return to financial savings. Besides competition enforces improved capital allocation, thus generating efficiency gains. This literature looks primarily at measures of banking sector profitability as explanatory variables for growth. The second strand of this literature, which is related but sufficiently distinct, examines the impact of capital account liberalization on economic activity. It is one of the main intentions of this paper to explain why there are different mechanisms linking international financial integration and growth.

The motivation of our empirical exercise is threefold: First we want to replicate the existing regressions on domestic financial development and economic growth. For this purpose we use a new database of 130 countries, including 26 transition economies. Transition economies may well have additional scope for improvements in both financial development and banking sector competition, which gives further rationale for the use of our expanded dataset. The period covers the 1990s and the regression approach is cross-section. We also look at the role of stock markets in explaining growth. In order to test the robustness of earlier findings we put the indicators of banking sector competition (=financial services markups and profit margins), on top of the traditional banking sector development variables and examine their impact on the regression results. By doing so we integrate two above mentioned strands of the theory into a common framework. Secondly our intention is to look at non-linearities between finance and growth, using squared and cubed terms of independent variables. We do this because we develop specific hypotheses as to why certain financial indicators may be related with growth in a non-linear way. Thirdly we show empirically why capital account liberalization is distinct from foreign institutional participation in the domestic financial system.

The paper is structured as follows. In part II we review the above mentioned theoretical approaches at linking finance and growth. We discuss if and why there may be scope for non-linearity between financial indicators and growth. As for the empirics, part III proceeds as sketched out, providing information on data and estimation techniques. In part IV we then present our regression results and discuss the findings. Part V is a summary of our conclusions.

II. A. Financial Development and Economic Growth

The role of the financial system in the process of generating wealth has been subject to controversy for a long time¹. However, it was the negative experiences with government intervention in credit markets led to a surge in the literature on the crucial functions of financial intermediaries. The first wave of literature was triggered by the advocates of financial liberalization (McKinnon, Shaw [1973]). They argue that instruments of financial repression like interest rate ceilings and high reserve requirements, combined with accelerating inflation, inhibit capital accumulation by reducing incentives to save. Furthermore financial repression reduces the efficiency of investment, causes adverse selection in the credit market, and exerts a negative impact on the risk taking behaviour of banks. As a result of the new paradigm financial liberalization policies were conducted in Latin American countries which yielded mixed results at best. In the

¹ For a comprehensive discussion of this see Galetovic [1996], or Levine [1997]

early 1980s it turned out that financial liberalization needed to be embedded in a framework of macroeconomic and institutional stability as well as sound prudential regulation and supervision of the banking sector².

As a result of the shortcomings of financial liberalization policies, the focus of the discussion shifted toward market failures. Stiglitz and Weiss [1981], for instance, show that disequilibrium in the credit market may have causes other than government intervention. The authors show that the price of credit may affect the nature of the transaction, and may thus not clear the market. The result is derived from an adverse selection effect and an incentive effect. High and market clearing interest rates may attract bad borrowers or induce borrowers to undertake more risky investment projects. Consequently borrowers are more likely to default. This may lead banks not to raise the interest rate to its market clearing level. As a result credit rationing may occur where only large size loans are allocated. Similarly excess supply equilibria are conceivable. If an excess demand or excess supply equilibrium is the outcome, two results are possible: either not all investment plans can be realized (excess demand equilibrium), or not all fundable loans can be allocated (excess supply equilibrium). These adverse outcomes are due to microeconomic shortcomings of a free credit market. Adverse selection may also be an issue in its own right. Mankiw [1986] discusses the problem of financial collapse in this context. He presents a model in which small changes in the interest rate may alter the riskiness of the pool of borrowers. This may lead to a collapse of the credit market if the pool of loan applicants is too risky to give the banks their required return. On top of that restrictive monetary policy may do more than move the economy along the marginal efficiency of capital schedule. It can also cause a financial crisis at the extreme. Principal-agent problems are examined by Shleifer and Vishny [1986] and Stiglitz [1985]. In the context of a corporation with many small owners they argue that it may not pay any of them to monitor the management. This free-rider problem arises from the public good character of the costly information acquisition of an individual stockholder who may easily liquidate his financial commitment. Yet another strand of the market failure related literature addresses the issue of asymmetric information in credit markets. Banks emerge as a result of information asymmetries between lenders and borrowers. In the costly state verification approach (e.g. Diamond [1984]) financial intermediaries can verify the success of investment only at a monitoring cost which they try to minimize. If banks perform their monitoring role well, this type of market failure is mitigated. Moral hazard is an issue often discussed with respect to deposit insurance schemes. Originally designed to correct market failure in terms

² For instance Diaz-Alejandro [1985] discusses Latin American experiences with financial liberalization within an inadequate policy environment. The Chilean experience showed that financial liberalization may lead to widespread bankruptcies, and could eventually pave the way back to massive government interventions and a de facto socialized banking system.

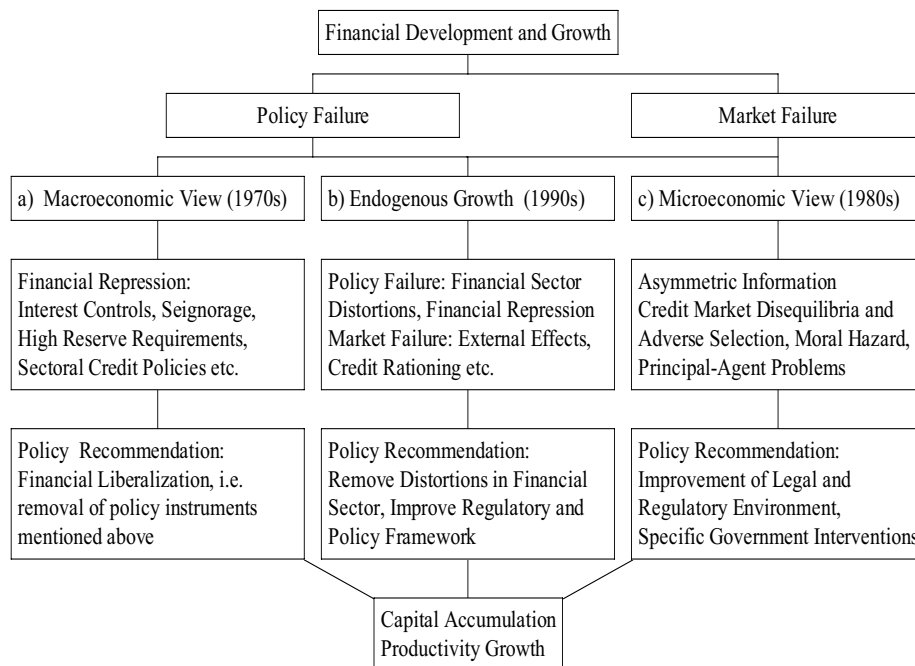
of negative externalities running from banks' business activities to their customers, deposit insurance may cause yet another type of market failure. It may encourage risk taking by bank managers. Gennotte and Pyle [1991], for instance, show that implementing more stringent capital requirements in the presence of deposit insurance may lead to an increase in asset risk. This must be countered by monitoring and control of asset risk through the regulation authorities. The policy recommendations related to market failure problems are to improve the legal and regulatory framework within which the financial intermediaries operate.

The last strand of the theory we want to discuss emerged in the 1990s and focussed on the role of financial intermediaries in generating endogenous growth. The models used are either of the AK (Romer [1986]) or the technological progress (Romer [1990]) type. The literature synthesizes arguments of policy and market failure into an approach in which permanent instead of temporary growth effects can be achieved by optimizing the financial framework of an economy. King and Levine [1993 b], for instance, describe financial intermediaries as promoters of technological progress in a Schumpeterian sense. They mobilize savings, evaluate entrepreneurs, diversify risk, and reveal expected profits of innovation. Consequently sophisticated financial systems increase the probability of successful innovation and spur technological progress. This external effect, running from financial intermediation to the level of generally available technology, offsets the impact of decreasing returns to physical capital and generates endogenous growth. In the AK model of Bencivenga and Smith [1991] banks face predictable withdrawal demand from their depositors. This reduces the economywide need for liquid assets relative to a situation of self-insurance. Banks also reduce the premature liquidation of productive capital by entrepreneurs requiring liquidity. Greenwood and Jovanovic [1990], Saint-Paul [1992], as well as Berthelemy and Varoudakis [1996] introduce two-way causality and the possibility of multiple equilibria. In their models there is a reciprocal externality between finance and growth. This allows for convergence clubs and poverty traps. In Bencivenga et al. [1995] financial institutions reduce liquidity risk to which savers are exposed by making financial assets tradable (stock markets) or by enabling depositors to withdraw cash before a project's maturity (banks). This reduces the disincentive to investing in long-run projects. The lowering of transaction costs in financial markets is crucial to their analysis. Roubini and Sala-I-Martin [1992] reexamine financial repression in an endogenous growth context. They argue that the financial system causes permanent growth effects as a result of non- or weakly diminishing returns to a broadly defined concept of capital. Governments choose financial repression to increase the demand for nominal money in order to broaden the inflation tax base. As a result the demand for illiquid assets decreases and the rate of capital accumulation shifts downward. Mattesini [1996] attempts to relate market failure with endogenous growth. Building on the costly state verification approach by Diamond [1984] and

others, he constructs an AK model where monitoring costs reflect the efficiency of intermediation. They inhibit capital accumulation so that differences in monitoring costs explain differences in long-run growth. Bencivenga and Smith [1993] present another market failure related endogenous growth model of the AK type. In this model credit rationing and growth are jointly determined with permanent adverse effects on economic development.

As far as policy conclusions are concerned, the endogenous growth literature recommends financial deepening instead of distortionary government intervention like taxation of capital or financial repression. But improvement of the regulatory and policy framework in order to correct market failures may also play a role. Figure 1 summarizes our discussion of the different theoretical and empirical schools of financial development.

Figure 1: Mechanisms Linking Domestic Financial Development and Growth



II. B. Financial Market Integration and Growth

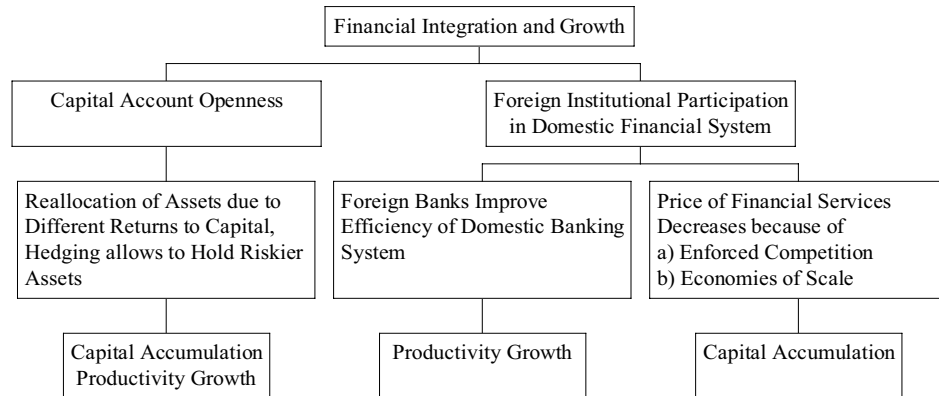
In contrast to the financial development literature, this approach emphasizes the difference between domestic and international finance. Conceptually the literature on international financial integration can be divided into two branches. To a large extent the existing literature looks at the first branch, which is capital market integration. It is concerned with capital account liberalization which leads to portfolio reallocation according to international differences in the marginal product of capital. According to neoclassical growth theory capital should move from capital abundant to capital scarce countries and boost the rates of capital accumulation of the latter. But theory also predicts that capital account liberalization may benefit total factor productivity growth. Obstfeld [1994] for instance emphasises that financial market integration may boost productivity growth through portfolio shifts toward more risky assets because a large world asset market allows risk hedging. In this context sustained growth depends on specialized and hence risky production inputs. There is, however, substantial criticism of this view. Eichengreen [2001], for instance, argues that capital account liberalization may hurt growth in the presence of pre-existing trade barriers. If capital is directed into sectors where the country has a comparative disadvantage it may actually have immiserizing effects. Edison, Levine, Ricci, and Slok [2002] discuss the importance of sound policies and institutions in this context, which may determine the direction of financial flows to a large extent.

Liberalization of trade in financial services, the second branch, may boost growth in different ways. Greater foreign presence in the domestic banking system, for instance, may enhance the efficiency of financial intermediation (Levine [2001]). Foreign banks may bring new and better skills, management techniques, training procedures, technology, and products to the domestic market. Liberalizing entry restrictions may also improve the soundness of supervisory and regulatory systems. This promotes growth mainly through accelerated productivity growth³. Pro-competitive effects of foreign institutional participation in the domestic financial system may also be a driving force of growth, in the sense that they operate primarily through capital accumulation (see Francois and Eschenbach [2002]). By institutionally integrating banking markets, for instance, two effects determine a reduction in the price of financial services as a physical resource cost. First market power in nationally segmented banking sectors erodes due to increased foreign presence. Secondly, the larger market provides scope for economies of scale in financial services. These two effects may significantly lower markups charged by financial institutions. The wedge between gross returns to physical capital and net returns to savings determines the profit share consumed by financial

³ See Levine [2001] pp. 697 for a description of direct and indirect effects related to foreign presence in the domestic banking system which eventually stimulate productivity growth.

intermediaries. The higher the banks' profits, the larger the share of financial savings not transformed into physical capital. The effects stemming from financial market structure (affecting both efficiency gains and capital accumulation) are distinct from and come on top of those caused by financial development. Even a highly developed banking system may have scope for pro-competitive growth effects if a) market power is significant and/or b) market integration leads to benefits from economies of scale. The causal chain runs from financial openness and market size to market concentration and from market concentration to pricing behaviour (for the last link in the chain see also Demirguc-Kunt/Huizinga [1999]⁴). The latter is crucial in terms of exerting an influence on the rate of capital accumulation in the economy. Figure 2 summarizes the mechanisms we presented.

Figure 2: Mechanisms Linking Financial Integration and Growth



II. C. Linearity vs. Nonlinearity in Finance and Growth

So far the literature about the finance-growth nexus has primarily reported a linear relationship between financial development and growth without giving a particular reason why this should be the case. The analysis of non-linearity, however, has so far been confined to working with subsamples. Using a threshold regression Deidda and Fattouh [2002], for instance, find that only in high income countries financial depth and economic development are significantly positively associated. This is consistent with their model, which predicts a negative growth impact of endogenously

⁴ See also Demirguc-Kunt/Huizinga [1998] for a direct “foreign presence – lower profit margin” link.

emerging financial intermediaries in low income countries because of the associated fixed costs in terms of absorption of physical resources. In sharp contrast to that De Gregorio and Guidotti [1995] find that the impact of financial development increases significantly from high to low income countries. Odedokun [1996] also reports that financial development is particularly crucial to economic development in low income LDCs. The results are very heterogeneous and do not imply a global hypothesis about the curvature of the finance-growth relation which is what we are trying to assess. First of all it should be said that not only financial indicators need not be correlated with growth in a linear fashion. The assumption of linearity stems from steady-state macroeconomics and ignores the fact that off steady-state economies may benefit or suffer more from right or wrong policies. We do not focus on this general type of non-linearity in this study. As far as certain financial indicators are concerned there may be scope for assuming very specific non-linearity. Especially unbounded indicators of financial development, that measure rather the size than the efficiency of the financial sector may be suspicious in this context. Increasing financial intermediation to infinity may yield decreasing returns for various reasons. Intuitively it seems unlikely that raising financial depth or credit to private sector to several hundred percent of GDP should have the same impact on growth as increases in lower ranges. But we want to specify arguments why this may indeed not be the case. There may for instance be a causal chain that runs from banking regulation and supervision to financial development and from financial development to growth. There may thus be arguments that justify the inverse U-curve relation between financial development and growth. Barth, Caprio, and Levine [2000] find that the regulatory process determines to a large extent the degree of financial development. On a scale starting from government ownership of banks and ending with regulation and supervision practices based on private sector incentives, the authors find that financial development (in terms of credit to private sector scaled by GDP) increases along that scale. If our assumption is correct that in the lower range of the scale (where government ownership and intervention prevail) financial development is particularly growth-enhancing, the so-called “grabbing-hand”⁵ approach to regulation and supervision dominates. This applies particularly to many transition economies, where governments still own a lot of banks, interfere in the financial sector and raise market entry barriers. Relaxing government intervention is growth-promoting up to an optimal point where regulation and supervision only correct market failures (i.e. where the “helping-hand” approach prevails). Afterwards government interference becomes too lax such that moral hazard, asymmetric information and other market failures dominate. The example of the South East Asian financial crisis has shown that the shortcomings of banking

⁵ According to the “grabbing hand” approach strict regulation of the financial sector is more harmful than useful, whereas the “helping hand” approach emphasizes its benefits, like correction of market failures

regulation have led to excessive risk-taking in the credit market⁶ and eventually to banking crises. This was exacerbated by corruption and almost unlimited bailout guarantees to banks that were “too big to fail”. Inflows of short-term capital may have made the banking sectors more vulnerable to external shocks and financial crises. On top of that in a bubble economy correct information about investment opportunities is scarce. Excessive financial intermediation may then lead to overinvestment and overheating of the asset market, which may in turn stimulate credit expansion. This may lead to even more misallocation of capital. If a highly financialized economy experiences a sudden asset price collapse credit may start becoming scarce after a long period of expansion. New credit may then become subject to rationing in spite of expansionary monetary policies. Low interest rates attract a lot of low-return investors and adverse selection becomes an issue. Growth in excessively financialized economies may also be adversely affected by not enough high return investment opportunities as the economy is too concentrated in the financial sector. Yet another reason for observed non-linearity could be offshore banking where the extent of financial depth does not properly reflect domestic credit allocation.

The main argument here is that, instead of measuring policy or market failure directly, the extent of financial development may be seen as an indirect measure of both. Extreme values of assets or liabilities of the financial system may be associated with policy failure (very low values) or market failure (very high values), with a gradual shift of emphasis from one to the other.

III.A. The Data

The Countries

We put together a dataset that covers the period 1990-1999. This allows us to include transition economies in the sample. There are 130 countries, 26 of which are transition economies. Apart from that the sample is based on the King/Levine database (OECD and developing countries), from which we omitted some countries that were subject to heavy external shocks. It can be argued that transition economies also suffered external shocks not incorporated in standard regression variables. We take account of this by using a dummy for transition economies in some cases. But a dummy may also bias results in terms of taking away significance from other variables instead of just filtering noise. So we consider also the simple regression results without transition dummy in the non-linear specifications.

Dependent and Independent Control Variables

⁶ See Sinn (2001) for an analysis of the causal links between banking regulation and risk-taking, especially in Asia.

Our dependent variable is real per-capita GDP growth (PCGDPGR). Our dataset comprises the following control variables used in most conditional convergence growth regressions: Initial per-capita GDP (PCGDP90) proxies beginning of period capital stock to account for differences in the marginal product of capital. Initial secondary school enrollment (SEC90) is a standard variable measuring human capital. Average period inflation (INFLATE) takes account of macroeconomic instability. Average imports and exports as a share of GDP (TRADE) is used as a general openness index for the respective economies. Average population growth (POPGR) is used because the dependent variables are all per-capita values. Another variable often used in growth regressions is government consumption scaled by GDP (GOV) to proxy the size and efficiency of political institutions. GASTIL is the average of Freedom House's civil liberties and political rights indicators, used to assess the extent of political freedom.

The Independent Financial Sector Variables

To test the literature on government interventions in the financial sector (financial repression) we follow Roubini / Sala-I-Martin [1992] and use three related proxies of distortions: FINREP 1 is a dummy that takes the value of one if the period average of the real interest rate is negative and zero if it is positive. FINREP takes the value three if real interest rates are below minus 5 %, two when real interest rates are negative but higher than minus 5 %, and one when real interest rates are positive. Finrep 2 takes the value one when real interest rates are below minus 5 % and zero otherwise. These indicators measure different degrees of financial repression, which affects both inflation and nominal interest rate distortions. By using the variable SPREAD we follow Mattesini [1996], who interprets the lending-deposit interest rate spread as a proxy of monitoring costs which are in turn determined by information asymmetries. So we use this indicator in order to take account of the market failure related approach to finance and growth. Following the financial development literature (see for instance [King/Levine 1993 c]) we use four indicators of banking sector sophistication. Two of them imply a rather qualitative evaluation of the financial system. BANK measures the share of deposit money bank domestic assets in total domestic assets, including central bank domestic assets. It describes the share of commercial banks in credit allocation relative to central banks. The assumption is that commercial banks are more efficient in allocating credit to productive uses because their main tasks are to identify and evaluate investment opportunities and to provide risk management. PRIVATE is a similar indicator. Credit to the non-financial private sector is scaled by total domestic credit (excluding credit to deposit money banks). The intuition for this variable is that banks looking for most profitable investment opportunities tend not to channel credit to public entities. DEPTH and PRIVY tend to measure rather the size than qualitative factors of the financial system. The former (M3 as a share of GDP) is a purely quantitative indicator and measures size with

respect to the liabilities side of the bank balance sheet. The latter takes account of the asset side of the balance sheet and also gives some qualitative information about the direction of credit. These indicators may show that the size of the financial sector is associated with growth in the way described in section II. A. Stock market development is measured in terms of both liquidity and size. We use three indicators of stock market development: SMVT is value traded scaled by GDP, SMCAP is capitalization scaled by GDP, and SMTURN stands for turnover ratio, i.e. value traded scaled by average market capitalization.

Apart from these financial development variables we use profit margins and financial services markups to account for the degree of competition and/or economies of scale in the financial system. PROFIT is the share of the banking sector's pre-tax operating profits in total assets. The net interest margin NIM is the share of net interest income in total assets. Eventually our dataset includes an indicator of international financial integration in terms of capital account openness. The IMF restriction measure is one in years with restrictions on capital account transactions and zero in years without restrictions. We use the average of the respective period. For an overview of the dataset, see table 1 in the appendix.

Datasources and Calculation Methods

Data on per-capita GDP growth and consumer price inflation are taken from the IMF's World Economic Outlook database. Data about per-capita GDP, trade, secondary school enrollment, government consumption, lending deposit spreads, real interest rates and population growth stem from the World Bank's World Development Indicators database. The Gastil index is provided by Freedom House. The financial development indicators BANK, PRIVATE, PRIVY, and DEPTH are all based on data provided by the IMF's International Financial Statistics. Details about them can be found in the appendix. Net interest margins and banking profit shares are both from IBCA's Bankscope database. International Financial Integration IFI is taken from the IMF's Annual Report on Exchange Arrangements (line E.2).

III.B. Methodology

We start our empirical exercise with a replication of the standard finance-growth relationships. We use OLS as our cross-section estimation technique because we want to remain in line with the existing literature (see for instance Roubini/Sala-I-Martin [1992], Mattisini [1996], King/Levine [1993 a, b,c]) and initially assume the following linear relationships:

$$(1) \text{ Per-Capita GDP Growth}_i = \alpha \mathbf{A1}_i + \beta \mathbf{D1}_i + \delta \mathbf{C1}_i + \epsilon_i$$

The control variables **A1**, as explained above, are necessary to account for non-financial factors such as human capital, initial per-capita GDP, trade openness, macroeconomic stability, political freedom, population growth and government consumption. Because we want to isolate effects of exogenous shocks that are incorporated in the data of transition economies we include our transition dummy. Like in Sala-I-Martin [1992] we add indicators of distortions in the financial sector **D1**. **D1** refers to indicators of financial repression (FINREP, FINREP 1 and 2). On top of that we put the banking sector competition variables **C1** (NIM and PROFIT) as in Eschenbach and Francois [2002]. They reflect the physical resource cost which is largely determined by the extent of foreign institutional participation in the domestic banking system. The results are displayed in regressions (1) to (6) of table 2.

Secondly we want to approach the issue of market failure by again replicating previous findings. Like in Mattesini [1996] we interpret the spread between lending and deposit interest rates as a proxy of monitoring costs. Large spreads, or in other words high monitoring costs, are caused by a failure of the banking system to efficiently reduce information asymmetries. A high spread therefore means that banks do not significantly reduce the cost of monitoring the ex-post success of investment, i.e. do not cope with the information asymmetry at a reasonable price. Lending-deposit spreads, however, do not only represent market failure. They may also reflect general macroeconomic risk or government intervention like reserve requirements. General risk is taken into account by some of the control variables (GASTIL, INFLATE). An indicator of government intervention, however, will necessarily have to be included to test for the robustness of the result. So we specify the following equation:

$$(2) \text{ Per-Capita GDP Growth}_i = \alpha \mathbf{A2}_i + \beta \mathbf{D2}_i + \epsilon_i$$

We use the same set of control variables **A**, but **D** this time comprises Financial repression and the lending deposit spreads. The competition vector **C** is left out in this specification because of its high correlation with the lending-deposit spread. The results can be found in regressions (5) and (6) of table 2.

$$(3) \text{ Per-Capita GDP Growth}_i = \alpha \mathbf{A3}_i + \beta \mathbf{B3}_i + \delta \mathbf{C3}_i + \varepsilon_i$$

Equation (3) is a standard model used in empirical testing of endogenous growth models extended for the effects of competition in the financial sector. **A** is again the same set of control variables. **B** includes four variables extensively used in King/Levine [1993 a, b, and c]: BANK, PRIVATE, PRIVY and DEPTH. They reflect private sector involvement in both the credit business and on the debtor side, as well as financialization of savings. More financial sophistication is expected to spur technological progress by improving the efficiency of credit allocation. We add again the competition variables **C** as they reflect an extra linkage between the financial sector and growth.

Remaining in the empirical testing of endogenous growth models, we proceed to an inclusion of stock markets:

$$(4) \text{ Per-capita GDP growth}_i = \alpha \mathbf{A4}_i + \beta \mathbf{B4}_i + \delta \mathbf{S4}_i + \varepsilon_i$$

In equation (4) we use **A** and **B** as before, indicating that we do not drop banking development at the expense of stock market variables. This is hint at a potential complementarity of banks and stock markets. Here **S4** is a vector of stock market variables including the turnover ratio (SMTURN), value traded in percent of GDP (SMVT), and capitalization in percent of GDP (SMCAP). The regressions are specified like in Levine/Zervos [1996], except that we use contemporaneous and not initial values of the stock market indicators. On the one hand we may conjecture that stock market activity may boost growth by reducing disincentives to investing in long - duration projects because shares can be liquidated before investment projects mature. On the other hand free-rider problems may occur in the case of large listed companies with many small shareholders. This may jeopardize sound corporate control and could eventually impede efficient resource allocation. So we have no clear assumption with respect to the stock market indicators. Results can be found in table 4.

In the next stage we test for non-linearity between the volume of financial intermediation and growth using the full initial dataset including transition economies. The first crude test is carried out by running the regressions that include PRIVY and DEPTH using the full sample with and without transition dummy and the small sample without transition economies. Then we specify the following potentially non-linear relationship:

$$(5) \text{ Per-capita growth}_i = \alpha_1 \mathbf{A5}_i + \beta_1 \mathbf{B5}_i + \beta_2 \mathbf{B5}_i^2 \\ + \beta_3 \mathbf{B5}_i^3 + \delta_1 \mathbf{C5}_i + \varepsilon_i$$

This will hopefully allow us to draw conclusions about different degrees of usefulness of financial deepening for different countries and stages of financial development. Results can be found in table 5. We conclude the empirical methodology with a test of whether capital account liberalization is positively associated with growth. We do this in particular to point out that liberalization of capital flows exerts effects on growth quite distinct from those of institutional banking market integration. As discussed in the conceptual part we state that there may be two opposing causal chains, working both in favour and against a stimulation of economic activity. We roughly follow Edison, Levine, Ricci, and Slok [2002] and specify the following regression equation:

$$(6a) \text{ Per-capita growth}_i = \alpha_1 \mathbf{A6}_i + \beta_1 \mathbf{B6}_i / \mathbf{S6}_i + \delta_1 \mathbf{IFI6}_i + \varepsilon_i$$

$$(6b) \text{ Per-capita growth}_i = \alpha_1 \mathbf{A6}_i + \beta_1 \mathbf{B6}_i / \mathbf{S6}_i \\ + \delta_1 \mathbf{IFI6}_i + \delta_2 \mathbf{IFI6}_i * \mathbf{A6}_i + \varepsilon_i$$

In these equations **A** is our standard set of control variables. A banking sector variable (**PRIVY**) and a stock market development indicator (**SMTURN**) enter the regressions alternatively so that **B** and **S** are both represented, here indicated with a slash. As an indicator of international financial integration we use the period average of the IMF restriction dummy, dubbed **IFI**. It was discontinued in 1996 so that we have to use a slightly different period, 1986-1995. This indicator is a standard variable in the respective literature. Specifications (6a) and (6b) are different in that the latter includes multiplicative terms, where some of the control variables interact with financial integration. Edison et al. do not find hard evidence that IFI is robustly associated with growth, not even for interaction terms. The empirical findings are presented in table 6.

IV. Results and Interpretation

In the discussion of our empirical findings we will abstain from a presentation of the coefficients and significance levels of the control variables. It should be noted, however, that results do in general strongly comply with conditional convergence growth regressions that can be found in the literature. For the sake of simplicity and in order to keep the focus clear (on financial variables) we do not enter into a detailed discussion.

Starting with the simple linear growth regressions we first compare the coefficients on the government intervention variables with findings of the relevant literature (regression type (1), table 2, models (1)-(6)). As far as financial repression is concerned, our findings do not differ significantly from those of Roubini/Sala-I-Martin [1992]. The stricter the definition of financial repression is, the more pronounced is its association with growth. If it is defined as simply negative period average real interest rates there is no distinction between strong and weak repression (FINREP 1). In this case the coefficient is not significant, but has the expected negative sign (regressions (1) and (4)). It has the right sign and is weakly significant (in (2) and (5)) if we introduce a scale from not repressed to weakly and then to strongly repressed (FINREP). The significance is highest if we define repression with the help of a zero/one dummy for either free or strongly repressed, i.e. real interest rates are below minus 5 % on average (FINREP 2). So it seems that only strong interventions in the financial sector as described by Mckinnon, Shaw and others are significantly negatively associated with growth.

As far as market failure is concerned (regression type (2), table (2), models (7) and (8)), we can also confirm the findings of Mattesini [1996]. The spread is highly significant if entered on its own, and loses almost no significance if one of the financial repression indicators is added. We choose FINREP 2 because it turns out to perform most robustly in the regression, as seen in the previous section. As discussed earlier on, the lending-deposit spread (SPREAD) is a synthetic variable that reflects not only information asymmetries, but also general macroeconomic risk and government interventions. Therefore it is necessary to control for these factors by adding average inflation and political freedom (both included in the control variables) and financial repression. Model (6) shows that only the coefficient of FINREP 2 loses some significance, not the spread.

We shall now proceed to regression type (3), the King/Levine [1993 a, b, c] specification extended for market structure indicators. In table 3 the variable BANK is highly significant in these specifications. Our coefficients (see table 2 regressions (1) and (5)) are highly significant and the association is even stronger than in Levine [1993 c]. PRIVATE (regressions (2) and (6)) has a similar importance as found by King/Levine. The magnitude of the coefficients of DEPTH (regressions (3) and (7)) and

PRIVY (regressions (4) and (8)) , however, falls short of earlier findings. This is not in line with the existing literature, where significance doesn't vary that strongly across financial development indicators⁷. Apart from these uneven significance levels of the financial development indicators we observe strong significance of the two markup variables NIM and PROFIT. In six out of eight specifications they have the expected negative sign with a one percent significance level. In the other two cases the significance level is five percent. NIM and PROFIT have relatively robust coefficients in the magnitude of minus 0.02 and minus 0.038 respectively. We then proceed to the next stage of our analysis.

In table 4 we show the results for the growth regressions using three different stock market indicators as explanatory variables (regression type (4)): The turnover ratio is an indicator of liquidity and excludes price factors because it is scaled by average market capitalisation. It is not determined by market size either so that small markets can have high ratios. Value traded and capitalization include price factors because they are scaled by GDP. They are also determined by market size. We follow Levine and Zervos [1996] and enter value traded and capitalization together to eliminate unwanted price effects, but use contemporaneous instead of initial values of the stock market indicators in all regressions. In models (1) to (4) of table 4 SMTURN is highly significant. This seems to confirm the hypothesis that liquid markets are growth-promoting. SMVT, however, has the expected positive sign after controlling for capitalization, but, in contrast to Levine/Zervos [1996], is weakly significant at best. Apparently the sheer trading volume is not robustly linked with growth. This makes sense as it doesn't properly measure liquidity. There may be a large trading volume only because the financial system is stock market based, relative to its market capitalisation it may still be small. On top of that a small but liquid stock market may be a good complement for a large banking sector. The results are an indication that earlier findings may have overstated the importance of stock markets. It is also questionable that the use of market capitalization is appropriate as a filter for price effects, when entered jointly with value traded. In the next paragraph we will discuss why only the banking sector indicators BANK and PRIVATE perform well in the regressions, and not DEPTH and PRIVY.

The next issue of our paper is whether we can find non-linearity between the financial indicators PRIVY and DEPTH and growth. We first of all run the growth regressions again with and without the transition dummy as well as with a smaller sample excluding transition economies. Then we proceed with the use of squared and cubed terms of the independent variables in order to find the optimal non-linear fit

⁷ In King/Levine (1993 a) for instance the four financial development indicators are all significant at the one percent level and the coefficients vary from 0.024 (DEPTH) to 0.034 (PRIVATE).

(regression type (5)). The results can be found in table 5. Looking at the three linear specifications (1)-(3) and (5)-(7) we see that the magnitude of the coefficients goes down as we stepwise eliminate the influence of transition economies. This is a first indication of an inverse U-curve shape because many transition economies lie in the lower left-hand tail of the distribution. In the non-linear specifications (4) and (8) we find significant coefficients of the squared and cubed terms. The model fit is also very good. In order to confirm our hypothesis we have to look at the data. Charts 1 and 2 plot the raw data against each other. As a first impression we see that there is a slightly biased inverse U-curve relationship between PRIVY and DEPTH on the one, and per-capita growth on the other hand. Chart 3 refines this finding by using PRIVY and growth residuals from a conditional convergence regressions to exclude other factors. The result is even more striking. Chart 4 shows two fitted lines using squared and cubed polynomials as we don't know which specification is correct. Using a cubed term reflects our data most appropriately, but the inclusion of transition economies with very low average growth may distort the real pattern. We see that an optimal area of PRIVY lies between 70 and 100 percent of GDP. The patterns for DEPTH are similar but for reasons of space we abstain from including the charts. We have to be cautious interpreting the results in terms of causality. So we generally denote a causal chain from finance to growth as potential and sketch out arguments accordingly. It seems, however, that there are decreasing returns to credit expansion. On top of that excessive financialization of the economy seems to be harmful to growth. The two banking sector efficiency indicators PRIVATE and BANK perform very robustly in linear regressions. This can be seen as an indication that the importance of the sheer volume of financial intermediation declines relative to the efficiency of credit allocation as the financial sector expands and becomes more sophisticated.

Looking at the countries with excessive credit volume and/or financial depth the following pattern emerges: four out of six countries with PRIVY exceeding 120 percent are South East Asian countries (Japan, Hong Kong, Thailand, Malaysia). Factors like inappropriate regulation, excessive risk taking, volatile capital inflows, poor information disclosure, speculative overheating and adverse selection combined with expansionary monetary policies may apply to different extents to these countries. Malta has a DEPTH ratio of more than 120 percent, but PRIVY is lower. This may be an indication of offshore banking activities that do not contribute to domestic credit business. Some of the countries with high PRIVY have lower DEPTH, which may be attributed to capital inflows (e.g. Thailand).

In table 6 we eventually show the results of the international financial integration-growth regressions (type (6)). Both the IMF capital account openness variable alone as well as the interactive terms enter the regressions insignificantly (with one exception). Depending on the specification even a sign flip is possible, i.e. associating integration

adversely with growth. This replicates the findings of Edison et al. [2002]. It also documents that different mechanisms are at work when we consider the impact of foreign institutional participation in the domestic financial system as opposed to capital account openness. While the former is highly significantly associated with growth (tables 2 and 3) the latter does not even necessarily have the expected negative sign (table 6). Interestingly the variable PRIVY appears highly significant in all regressions ((4)-(8)). This underlines the fact that it is sensitive to both sample composition and sample period. In this case we use a different period (1986-95 instead of 1990-99) and find that a linear relationship seems to make sense. This is plausible because fewer countries feature excessively high or low values of PRIVY in this period.

V. Summary

In this paper we provide new empirical evidence on the finance-growth nexus. We first synthesize the relevant literature and classify the different mechanisms linking domestic and international finance with growth. Then, using data for 130 countries that include 26 transition economies and cover mainly the 1990s, we replicate previously published econometric exercises. As far as linear growth regressions are concerned, we find evidence for some indicators of financial development to be robustly linked with economic growth. Severe financial repression and information asymmetries are significantly negatively associated with growth. Some indicators of banking sector development confirm earlier empirical findings, which identify a close relationship between finance and growth. We also find evidence that banking sector competition matters on top of the traditional set of domestic financial development indicators. Competition exerts pressure on financial services markups and profit margins. As expected these indicators are significantly negatively associated with economic growth. We also use stock market development indicators in growth regressions, which are only partly significantly associated with growth: The turnover ratio is and value traded is not. It seems that earlier studies have overstated the impact of stock markets. Next we extend the existing econometric framework by looking at potential non-linearities between the volume of financial intermediation and growth. In contrast to previous findings the two indicators measuring the size of the banking sector's activities (credit to private sector and M3 scaled by GDP) are not robustly linked with growth in a linear way. Instead they display an inverse U-curve like association with growth. Eventually we find evidence that capital account openness, as opposed to foreign institutional participation in the domestic financial system, is not significantly associated with growth. This complies with earlier findings and highlights the difference between the liberalization of financial flows and the institutional opening of nationally segmented banking markets.

References:

Barth, James R., Caprio Jr., Gerard and Ross Levine (2002), "Bank Regulation and Supervision: What Works Best ?". World Bank.

Bencivenga, Valerie R., and Bruce D. Smith (1991), "Financial Intermediation and Endogenous Growth". *Review of Economic Studies*; V.58, pp. 195-209.

Bencivenga, Valerie R., Smith, Bruce D., and Ross M. Starr (1995), "Transaction Costs, Technological Choice, and Endogenous Growth". *Journal of Economic Theory*; V. 67-# 1, pp 53-77.

Bencivenga, Valerie R., and Bruce D. Smith (1993), "Some Consequences of Credit Rationing in an Endogenous Growth Model". *Journal of Economic Dynamics and Control*; V.17, pp. 97-122.

Berthelemy, Jean-Claude, Aristomene Varoudakis (1996). " Economic Growth, Convergence Clubs, and the Role of Financial Development". *Oxford Economic Papers*; V. 48, pp. 300-328.

De Gregorio, Jose, and Pablo E. Guidotti (1995). "Financial Development and Economic Growth". *World Development*; V. 23-#3, pp. 433-448.

Greenwood, Jeremy, and Boyan Jovanovic (1990). "Financial Development, Growth and the Distribution of Income". *Journal of Political Economy*; V.98-#5, pp.1076-1107

Deidda, Luca, and Bassam Fattouh (2002). "Non-linearity between Finance and Growth". *Economics Letters*; V. 74, pp. 339-345.

Demirguc-Kunt, Asli, and Harry Huizinga (1999). " Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence". *World Bank Economic Review*, V.13-#2, pp.379-408.

Demirguc-Kunt, Asli, and Harry Huizinga (1998). "How does Foreign Entry Affect the Domestic Banking Market ?". World Bank.

Devereux, Michael B., and Gregor W. Smith (1994). "International Risk Sharing and Economic Growth". *International Economic Review*; V. 35-#3, pp. 535-550.

Edison, Hali J., Levine, Ross, Ricci, Luca, and Torsten Slok (2002). "International Financial Integration and Economic Growth" *NBER Working Paper No. 9164*

Francois, Joseph F. , and Felix Eschenbach (2002). “ Financial Sector Competition, Services Trade, And Growth” *CEPR Discussion Paper*No. 3573

Diamond, Douglas W. (1984). “Financial Intermediation and Delegated Monitoring”. *The Review of Economic Studies*, V. 51-#3, pp. 393-414.

Diaz-Alejandro, Carlos (1985). “ Good-Bye Financial Repression, Hello Financier Crash” . *Journal of Development Economics*; V. 19, pp.1-24.

Galetovic, A. (1996). "Finance and Growth: A Synthesis and Interpretation of the Evidence". *Banca Nazionale del Lavoro Quarterly Review*; 49:196 , pp. 59- 82.

Eichengreen, Barry (2001). “ Capital Account Liberalization: What Do the Cross-Country Studies Tell Us ?”. University of Berkeley Mimeo

Genotte, Gerard, and David Pyle (1991). “ Capital Controls and Bank Risk”. *Journal of Banking and Finance*; V. 15, pp. 805-824.

King, Robert G., and Ross Levine (1993 a). " Finance and Growth: Schumpeter Might be Right”. *Quarterly Journal of Economics*; V.108-#3, pp. 717-737.

King, Robert G., and Ross Levine (1993 b). " Finance, Entrepreneurship, and Growth: Theory and Evidence". *Journal of Monetary Economics*; V.32-#3, pp. 513-542.

King, Robert G., and Ross Levine (1993 c). "Financial Intermediation and Economic Development". In C. Mayer and X. Vives, eds. *Capital Markets and Financial Intermediation*; Cambridge University Press, pp. 156-189.

Levine, Ross (1997). “Financial Development and Economic Growth:Views and Agenda”. *Journal of Economic Literature*; Vol 35, pp. 688-726.

Levine, Ross (2001). “ International Financial Liberalization and Economic Growth”. *Review of International Economics*; V.9-#4, pp. 688-702.

Levine, Ross, and Sara Zervos (1996). “Stock Markets, Banks and Economic Growth”. *American Economic Review*; V.88, pp. 537-558.

Mankiw, N. Gregory (1986). “ The Allocation of Credit and Financial Collapse”. *The Quarterly Journal of Economics*; V.101-#3, pp.455-470.

Mattesini, Fabrizio (1996). “ Interest Rate Spreads and Endogenous Growth”. *Economic Notes by Banca Monte Dei Paschi di Siena SpA*; V.25-#1, pp. 111-130.

Obstfeld, Maurice (1994). "Risk-Taking, Global Diversification, and Growth". *American Economic Review*; V. 84-#5, pp. 1310-1329.

Odedokun, M. O. (1996). "Alternative Econometric Approaches for Analysing the Role of the Financial Sector in Economic Growth: Time Series Evidence from LDCs". *Journal of Development Economics*; V.50-#1, pp.119-146.

Romer, Paul (1986). "Increasing Returns and Long-Run Growth". *Journal of Political Economy*; V. 94, pp. 1002-1037.

Romer, Paul (1990). "Endogenous Technological Change". *Journal of Political Economy*; V. 98, pp. 71-102.

Saint-Paul, Gilles (1992). "Technological Choice, Financial Markets and Economic Development". *European Economic Review*; V.36-#4, pp.763-781.

Sinn, Hans-Werner (2001) "Risk Taking, Limited Liability and Competition of Bank Regulators". *CES IFO Working Paper 603*.

Stiglitz, Joseph E. (1985). "Credit Markets and the Control of Capital". *Journal of Money, Credit and Banking*; V.17-#2, pp.133-152.

Stiglitz, Joseph E., and Andrew Weiss (1981). "Credit Rationing in Markets with Imperfect Information". *American Economic Review*; V.71-#3, pp. 393-410.

Table 1: Overview of dataset

1.A Dependent variable

PCGDPGR: The average of per-capita growth over the 1986-95 and 1990-99 periods.

1. B Independent control variables

PCGDP86, PCGDP90: Per-capita GDP in 1986 and 1990.

SEC86, SEC90: Secondary school enrollment ratio in 1986 and 1990.

INFLATE: The inflation rate, averaged over the 1986-95 and 1990-99 periods.

GASTIL: Average of Civil Liberties and Political Rights Indices published by Freedom House (ranges from 1 (most free) to 7), averaged over 1986-95 and 1990-99 periods.

POPGR: Average rate of population growth over the 1986-95 and 1990-99 periods.

GOV: Average government consumption in percent of GDP over the 1986-95 and 1990-99 periods.

TRADE: Exports and imports as a share of GDP in percent, averaged over the 1986-95 and 1990-99 periods.

TRANSEC: Transition economy (1=yes, 0=no).

1.C Financial sector variables

BANK: Commercial banks' domestic assets in percent of total domestic assets, averaged over the 1990-99 period (IFS lines 22 a-f, scaled by lines 12 a-f plus 22 a-f)

PRIVATE: Credit to the non-financial private sector in percent of total domestic credit, averaged over the 1990-99 period (IFS line 32 d scaled by lines 32 a through 32 f excluding 32 e)

PRIVY: Credit to the non-financial private sector in percent of GDP, averaged over the 1986-95 and 1990-99 periods (IFS line 32 d scaled by nominal GDP)

DEPTH: M₃ in percent of GDP, averaged over the 1990-99 period (IFS line 551 averaged over end of last and end of current period levels, scaled by GDP, where 551 not available, lines 34 plus 35).

NIM: Net interest income over total banking assets in percent, averaged over 1990-99 period

PROFIT: Banks' operating profits in percent of total assets, averaged over 1990-99 period.

FINREP: Financial repression (if average 1990-99 real interest rate $>0=1$, <0 but $>-5\%=2$, $<-5=3$)

FINREP1: Financial repression (if average 1990-99 real interest rate $<0=1$, $>0=0$)

FINREP2: Financial repression (if average 1990-99 real interest rate $< -5\%$ =1, $> -5\%$ = 0)

SMVT: Stock market value traded in percent of GDP, averaged over 1990-99 period.

SMTURN: Stock market turnover ratio (=value traded in percent of average market capitalization), averaged over the 1986-95 and 1990-99 periods.

SMCAP: Stock market capitalization in percent of GDP, averaged over 1990-1999 period.

IFI: International financial integration dummy, 1 with and 0 without restrictions on capital account transactions, averaged over 1986-95 period.

Table 2: Per-Capita GDP Growth, Financial Sector Distortions, and Competition 1990-99

Dependent variable: Per-capita GDP growth (PCGDPGR)								
Independent Variables 1/	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FINREP 1	-0.904 (0.649)			-0.824 (0.683)				
FINREP		-0.790 (0.405)*			-0.745 (0.430)*			
FINREP 2			-2.055 (0.878)**			-1.967 (0.930)**		-1.613 (0.889)*
SPREAD							-0.137 (0.033)***	-0.137 (0.034)***
NIM	-0.245 (0.103)**	-0.238 (0.102)**	-0.241 (0.100)**					
PROFIT				-0.406 (0.150)***	-0.384 (0.149)**	-0.382 (0.146)**		
Number of observations	109	109	109	108	108	108	104	100
R-squared adjusted	0.43	0.44	0.45	0.47	0.48	0.48	0.58	0.47

Other variables included: initial per-capita GDP (PCGDP90), initial secondary school enrollment (SEC90), average rate of inflation (INFLATE), average of Gastil-Index (GASTIL), average rate of population growth (POPGR), average government consumption in percent of GDP (GOV), average of imports and exports in percent of GDP (TRADE), Transition Dummy (TRANSEC)

1/ coefficients and standard errors in brackets, *, **, *** denotes significant at 10, 5, and 1 % level

Table 3: Per-Capita GDP Growth, Banking Sector Development and Competition 1990-99

Dependent variable: Per-capita GDP growth (PCGDPGR)								
Independent Variables 1/	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BANK	0.046 (0.012)***				0.041 (0.013)***			
PRIVATE		0.033 (0.009)***				0.026 (0.010)***		
DEPTH			0.018 (0.011)*				0.021 (0.010)**	
PRIVY				0.018 (0.009)**				0.017 (0.009)**
NIM	-0.229 (0.078)***	-0.282 (0.084)***	-0.184 (0.085)**	-0.190 (0.083)**				
PROFIT					-0.390 (0.131)***	-0.389 (0.134)***	-0.379 (0.130)***	-0.374 (0.130)***
Number of observations	116	111	119	119	114	110	117	117
R-squared adjusted	0.56	0.57	0.51	0.52	0.57	0.57	0.54	0.54

Other variables included: initial per-capita GDP (PCGDP90), initial secondary school enrollment (SEC90), average rate of inflation (INFLATE), average of Gastil-Index (GASTIL), average rate of population growth (POPGR), average government consumption in percent of GDP (GOV), average of imports and exports in percent of GDP (TRADE), Transition Dummy (TRANSEC)

1/ coefficients and standard errors in brackets, ***, **, * denotes significant at 10, 5, and 1 % level

Table 4: Per-Capita GDP Growth, Banks and Stock Markets 1990-99

Dependent variable: Per-capita GDP growth (PCGDPGR)								
Independent Variables 1/	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BANK	0.018 (0.010)*				0.024 (0.011)**			
PRIVATE		0.015 (0.007)**				0.018 (0.007)**		
DEPTH			0.011 (0.008)				0.012 (0.009)	
PRIVY				0.006 (0.007)				0.009 (0.009)
SMTURN	0.018 (0.006)***	0.020 (0.006)***	0.020 (0.006)***	0.020 (0.006)***				
SMVT					0.013 (0.012)	0.027 (0.014)*	0.013 (0.012)	0.013 (0.012)
SMCAP					-0.0009 (0.007)	-0.008 (0.008)	-0.001 (0.007)	-0.002 (0.008)
Number of observations	94	89	97	97	94	89	97	97
R-squared adjusted	0.54	0.61	0.55	0.54	0.50	0.57	0.50	0.49

Other variables included: initial per-capita GDP (PCGDP90), initial secondary school enrollment (SEC90), average rate of inflation (INFLATE), average of Gastil-Index (GASTIL), average rate of population growth (POPGR), average government consumption in percent of GDP (GOV), average of imports and exports in percent of GDP (TRADE)

1/ coefficients and standard errors in brackets, *, **, *** denotes significant at 10, 5, and 1 % level

Table 5: Non-Linear Growth Effects of Financial Development 1990-99

Dependent variable: Per-capita GDP growth (PCGDPGR)								
Independent Variables 1/	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DEPTH	0.029 (0.011)***	0.018 (0.011)*	0.006 (0.009)	0.198 (0.057)***				
DEPTH^2				-0.002 (0.0008)**				
DEPTH^3				5.79E-06 (3.03E-06)*				
PRIVY					0.027 (0.009)***	0.018 (0.009)**	0.009 (0.007)	0.185 (0.037)***
PRIVY^2								-0.002 (0.0005)***
PRIVY^3								5.77E-06 (1.98E-06)***
Number of observations	119	119	98	119	119	119	97	119
Remarks	full sample, no TRANSEC dummy	full sample with TRANSEC dummy	sample without transition economies	full sample, non-linear specification	full sample, no TRANSEC dummy	full sample with TRANSEC dummy	sample without transition economies	full sample, non-linear specification
R-squared adjusted	0.45	0.51	0.49	0.51	0.47	0.52	0.36	0.56
Other variables included: initial per-capita GDP (PCGDP90), initial secondary school enrollment (SEC90), average rate of inflation (INFLATE), average of Gastil-Index (GASTIL), average rate of population growth (POPGR), average government consumption in percent of GDP (GOV), average of imports and exports in percent of GDP (TRADE)								
1/ coefficients and standard errors in brackets, *, **, *** denotes significant at 10, 5, and 1 % level								

Table 6: Per-Capita GDP Growth, Domestic Financial Development, and Capital Account Openness 1986-95

Dependent variable: Per-capita GDP growth (PCGDPGR)								
Independent Variables 1/	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PRIVY					0.025 (0.009)***	0.027 (0.010)***	0.023 (0.009)**	0.025 (0.009)**
SMTURN	0.052 (0.010)***	0.052 (0.010)***	0.049 (0.010)***	0.050 (0.010)***				
IFI	-0.769 (0.661)	-0.717 (0.671)	0.060 (1.203)	-1.833 (1.661)	-0.170 (0.656)	-0.056 (0.675)	1.388 (1.128)	-1.422 (1.568)
IFI*INFLATE		-0.004 (0.007)				-0.006 (0.008)		
IFI*GASTIL			-0.249 (0.301)				-0.500 (0.296)*	
IFI*SEC86				0.016 (0.023)				0.019 (0.022)
Number of observations	90	90	90	90	97	97	97	97
R-squared adjusted	0.50	0.50	0.50	0.50	0.41	0.41	0.42	0.41

Other variables included: initial per-capita GDP (PCGDP86), initial secondary school enrollment (SEC86), average rate of inflation (INFLATE), average of Gastil-Index (GASTIL), average rate of population growth (POPGR), average government consumption in percent of GDP (GOV), average of imports and exports in percent of GDP (TRADE)

1/ coefficients and standard errors in brackets, *, **, *** denotes significant at 10, 5, and 1 % level

Chart 1: Per-capita growth and DEPTH

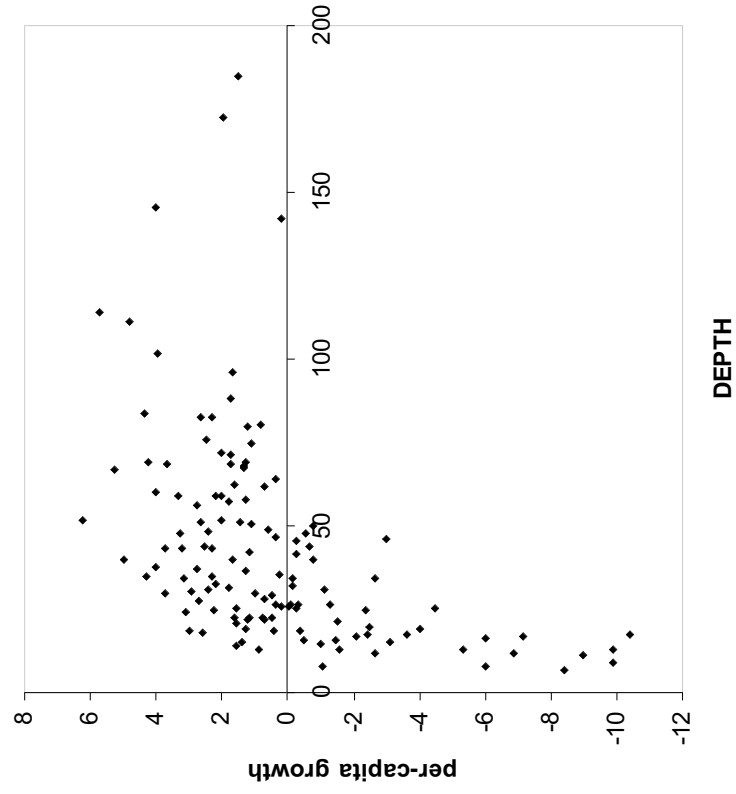


Chart 2: Per-capita growth and PRIVY

