

FINANCIAL DEVELOPMENT AND GROWTH IN DEVELOPING AND  
TRANSITION ECONOMIES

by

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**Abstract**

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In this paper I study the empirical link between financial development and growth in transitional and developing economies. The GLS and TSLS estimation techniques are used to find out the impact of financial development on GDP growth and its channels. The data used is a panel data for 82 developing and 20 transitional economies for the years 1994-2000. The estimated cross-sectional and pooled regressions show that financial development does spur growth in developing and transitional economies via higher investment and lower intermediation costs, while financial development does not have a definite impact on saving rates. The final finding is that financial development does not have a direct casual influence on efficiency, although some long-run association does exist.

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## GLOSSARY

**Central Bank** bank which acts as banker to the government and the banking sector.

**Claims on private sector** (IFS line 32d) credit from the financial system to individuals, enterprises, nonfinancial public entities not included under net domestic credit, and financial institutions not included elsewhere.

**Economic growth** an increase in the nation's capacity to produce goods and services

**Financial intermediaries** institutions which channel funds from people and institutions wishing to lend to those wishing to borrow

**GLS** generalized least squares

**Gross capital formation** (gross domestic investment) outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.

**Gross domestic savings** GDP less final consumption expenditure

**Liquid liabilities** (M3) the sum of currency and deposits in the central bank (M0), plus transferable deposits and electronic currency (M1), plus time and savings deposits, foreign currency transferable deposits, certificates of deposit, and securities repurchase agreements (M2), plus travelers checks, foreign currency time deposits, commercial paper, and shares of mutual funds or market funds held by residents.

**TSLS** two stage least squares

## *Chapter 1*

### INTRODUCTION

The financial system is an indispensable part of every economy. It performs several important functions, which are needed for the economy to function properly. But can financial development accelerate economic growth? The answer to this question is not so trivial. It is generally unclear whether the level of financial development is an exogenous process that influences economic growth as an independent factor or whether it is just a consequence of the general development with no significant backward influence.

Joseph Schumpeter stated that the services, which are provided by financial system – mobilizing savings, evaluating projects, managing risk, monitoring risk and facilitating transactions - are very important for technological innovation and economic development. At the other side, numerous influential economists believe, that finance is relatively unimportant factor in economic development. For example such views are expressed by Robinson [1952], who argues that finance simply follows economic growth, and Lucas [1988], who terms the relationship between financial and economic development “over-stressed”. In this paper I will investigate the link between financial development and economic growth in developing and transitional economies.

Investigating the link between the development of the financial system and economic growth is important as it is a well known fact, that Ukraine, as well some other transitional economies, experiences grave problems with the development of the financial sector and determining the way it influences economic growth may prove very useful. It should also be added, that there is rather large amount of literature on the link between financial development and

economic growth in the developed and developing economies<sup>1</sup>, while as far as I know there has not been done similar research on developing and transitional economies.

Another reason why I chose these two classes of economies is because significant structural differences, generally low level of economic development and significantly lower possibility to obtain investment funds from the international capital markets suggest, that in these economies financial development may impact growth differently, than in the developed economies. Researchers, who assume common relationship for developed and developing economies may obtain incorrect results. Moreover, when constructing their samples the researchers usually choose developing economies, the data on which is as rich as the data on developed ones. The richer data usually means more developed infrastructure, which itself is associated with higher level of economic development. Consequently, by implicitly choosing more developed representatives of the developing economies, the researchers obtain selection bias problem. So another goal of this paper is to investigate whether the impact of financial development on growth in the sample, constructed solely of transitional and developing economies, is different from the one, found out in one of the previous studies [Levine (1993)] on the basis of the sample, which is more heterogeneous and skewed towards more developed countries.

Concerning transitional economies, the issue of particular importance is the question of financial reform and interest rate liberalization. Most of the transitional economies are now in the midst of liberalization process and investigating this problem is important for these economies since liberalization is

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<sup>1</sup> Developed and developing economies are usually gathered in one sample, so an implicit assumption of similar impact of financial development on growth in both classes of these economies is made

considered to be rather bold step, associated with high jeopardy for the economy to suffer from the global financial shocks and capital outflows.

Some claim that financial liberalization attracts only speculative portfolio investment, which will turn into severe capital outflow once the economic situation becomes somewhat unstable. Under such circumstances it is important to know what costs and benefits are associated with the financial liberalization process.

## *Chapter 2*

### EXISTING WORK

#### **Theoretical Framework**

The theory suggests that financial instruments, markets and institutions arise to diminish transaction and information costs. In other words financial system arises to mitigate market frictions.

One of the classifications of the functions of the financial system was presented by Levine (1997). Levine (1997) outlined five basic functions:

These functions are:

facilitate the trading, hedging, diversifying, and pooling of risk;

allocate resources;

monitor managers and exert corporate control,

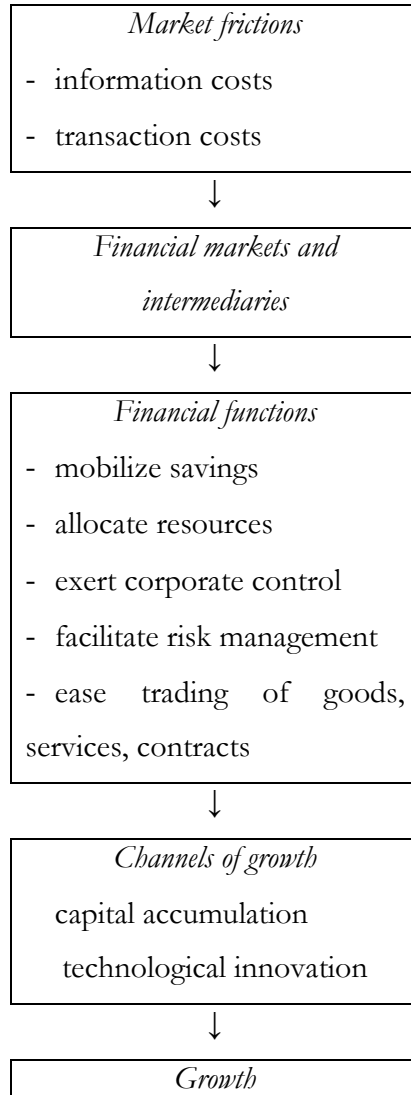
mobilize savings, and

facilitate the exchange of goods and services

Levine pointed out, that there are two basic channels through which each financial function may affect economic growth: capital accumulation and technological innovation.

The general theoretical approach to finance and growth, outlined by Levine is summarized in figure 1.

**Figure 1. A theoretical approach to finance and growth**



Source: Levine (1997)

By providing investors with more accurate information about production technologies and by exerting corporate control, more effective financial institutions can enhance resource allocation and accelerate growth. [Boyd and Prescott (1986); Greenwood and Jovanovic (1990); King and Levine (1993b)].

Similarly, by facilitating risk management, improving the liquidity of assets, available to savers, and reducing trading costs, banks can encourage investment in higher-return activities [Obstfeld (1994); Bencivenga and Smith (1991); Greenwood and Smith (1997)].

Barro and Sala-i-Martin (1995) develop a model of transferring funds from the savers to investors. The authors depict financial intermediation as a multistage process of transferring funds from the households, to investments in productive capital. They summarize the process in the equation (1.2), where each variable and its meaning are described below.

In the model by Barro and Sala-i-Martin the most inefficient system is the one where investors finance their projects from their own savings. This is not efficient, because it requires a “double coincidence” of intentions: even bright investment idea in the head of an economic agent, who lacks past savings, will not be realized. This situation is quite real and occurs, when people do not entrust their savings to the financial system, so only a small fraction of savings enters it. The other one is held under the mattress or is invested abroad. This is a very familiar situation for the transitional economies in general and for Ukraine in particular. So, let  $FS/S$  represent the fraction of aggregate savings ( $S$ ) being entrusted to the financial system ( $FS$ ).

There are also certain costs of transferring the funds from lenders to the borrowers. These costs may be expressed as administrative or as the ones, associated with the reserve requirements of banks. In this light let  $BOR/FS$  be the ratio of funds, transferred from the financial system to borrowers and entrepreneurs.

Borrowers in turn make different use of the borrowed funds. Some of them may need to borrow money to satisfy their liquidity needs; also the government may

borrow for consumption. So the impact of savings on growth depends on the fraction of the borrowing, which is transferred to productive investment. Let this variable be expressed as  $I/BOR$ .

And to conclude, the last (but not least) factor is the efficiency of the investment project. The economic performance of several countries and of the former Soviet Union in particular shows that it is not enough only to save; it is also important to invest these savings properly. The investment/GDP ratio has always been high in the Soviet Union. After 1989, however, experts realized that the value of the existing stock of capital was not consistent with the former levels of investment. “A great deal of investment have been effectively wasted, in other words, allocated to poor or even worthless projects” [Danathine & Donaldson p.6] So it can be seen, that the same saving rates could lead to different growth rates, given different profitability (effectiveness of investment) and financial system has some role to play in this process. To incorporate this fact into the model let  $EFF$  denote investment efficiency, normalized at unity i.e. the average investment project has  $EFF=1$  the below average project has  $EFF<1$  and a totally unproductive investment will have  $EFF=0$ .

The other variables are:  $K$  is aggregate capital stock,  $Y$  aggregate income and  $\Omega$  depreciation rate. All of the above give the basic equation for the capital growth:

$$\dot{K} = EFF \cdot I - \Omega K \quad (1.1)$$

By multiplying and dividing  $I$  with each of newly defined variables equation (1.2), is obtained:

$$\dot{K} = EFF \cdot (I/BOR) \cdot (BOR/FS) \cdot (FS/S) \cdot (S/Y) \cdot Y - \Omega K \quad (1.2)$$

where  $\dot{K} = dK / dt$

The authors assume that a financial system, performing its matching function efficiently, will positively affect the saving rate ( $S/Y$ ) and the fraction of savings, entrusted to financial institutions ( $FS/S$ ). This reflects the fact that savers can find the right instruments for their needs. In terms of overall investment net of inconvenience this should act like an increase in the fraction of savings finding its way into the financial system. This assumption, however, may not hold true as the effect of a better developed financial system on savings rate is theoretically ambiguous. Higher returns ambiguously affect saving rates due to well known income and substitution effects. [Beck and Levine (2002)]. Also, greater risk diversification opportunities have an ambiguous impact on saving rates [Levhari and Srinivasan (1969)]. So, while most theoretical frameworks point to the positive relationship between financial development and saving rates, there is also a theoretical explanation for the opposite relationship.

The matching function of the financial system is also important for the I/BOR ratio. With appropriate instruments the firm liquidity needs are reduced and a larger share of borrowed money can be directed in investment. Furthermore a more efficient financial system helps to eliminate unnecessary risks and, thus, gives entrepreneurs an ability to undertake riskier projects. If riskier projects are also on average more profitable, then the better functioning financial system will raise growth. The assumption of positive impact of riskier investment on growth, made by Barro and Sala-i-Martin is also quite ambiguous, which means that in reality the relationship may be negative. Given that more developed financial system leads to riskier investment this may mean, that financial development may have a negative impact on the productivity of capital.

Finally, a more efficient system may be expected to be more efficiently screen alternative investment projects and to better and more cost efficiently monitor investments.

The above model establishes a framework through which the financial system plays an important role in permitting and promoting the growth of capital stock. Moreover, the model incorporates the efficiency variable, which means that it operates not simply with a physical capital, but with effective capital units. So, if the efficiency of investment rises it leads to the growth in the efficient capital stock, even assuming constant stock of physical capital. This means that the Barro and Sala-i-Martin model also partly explains the impact of financial system on technological innovation (efficiency).

It should be noted, however, as was said above, there is still some ambiguity, concerning the impact of financial development on the saving rates and association between growth of capital stock and higher share of riskier investment.

To provide further evidence between finance and growth, economic theory presents a large number of models describing the impact of capital accumulation and technological innovation (which were shown above to be influenced by financial development) on growth.

The models, describing the influence of capital accumulation on growth, use either externalities of capital or capital goods produced using constant returns to scale technology (but without the use of non-reproducible factors) to generate steady-state per capita growth. In these models, the functions performed by the financial system influence the level of steady-state growth by altering the rate of capital formation. The models on technical innovation focus on the invention of new production technologies and goods.

So, modern economic theory describes how, other things being equal, countries with more developed financial intermediaries – financial intermediaries, that are better at gathering information, providing corporate control, controlling risk, and mobilizing savings – would have faster economic growth, than those, which financial systems are less developed.

Another theoretical model of financial intermediation is developed by Erosa (2000). The author develops the model of costly intermediation. It is based on the assumption, that at each instant the individuals, who possess a certain amount of savings, choose whether to start their own business or to invest their money in some “public enterprise”. Also, it is assumed, that entrepreneurs finance their business with their own savings and, if they face lack of personal funds, by borrowing from banks. Financial intermediation costs influence both fund-accumulation decisions of the individuals and their occupational choice. Although it is not a paper on the direct link between finance and growth, it nevertheless presents a certain mathematical framework that directly describes the functioning of the financial system. One of the conclusions, drawn from this model is that intermediation costs have important effects on per capita output and business size. The numerical experiment showed that the reduction of the interest rate spread (between marginal return on capital and interest rate paid to households) from 0.15 to 0.04 is associated with an increase in per capita output of 40 percent and with the twofold increase in the average size of businesses. This result is not directly applicable to transitional economies as all parameters except for the interest rate spread were taken from US economy, which is quite different from the typical economy in transition, but in spite of this the model presents serious evidence in favour of positive influence of financial development on growth.

## Empirical Studies

On the empirical side there is also a large amount of literature. For example a paper by King and Levine (1993) examines whether the level of financial development predicts long-run economic growth, capital accumulation, and productivity growth, using a data on 80 countries over the period 1960-1989. For their model the authors employ four measures of the level of financial development. These measures are, as given in the paper:

DEPTH, which measures the size of the financial intermediaries and equals liquid liabilities of the financial system divided by GDP;

BANK, which measures the degree to which the central bank versus commercial banks are allocating credit and equals the ratio of bank credit divided by bank credit plus central bank domestic assets.

PRIVATE, which concerns the allocation of credit and equals the ratio of credit allocated to private enterprises to total domestic credit (excluding credit to banks).

PRIVY, which also partially concerns the allocation of the credit and equals credit to private enterprises divided by GDP.

The authors also systematically control for other growth factors, which influence long-run growth (i.e. income per capita, education, political stability, indicators of exchange rate, trade, fiscal, and monetary policy).

The association between the level of financial development and growth is significant (there is a strong positive relationship between all four indicators of financial development and all three growth indicators). For example the authors calculated that if in 1960 Bolivia has increased its financial depth from 10 percent

of GDP to the mean value for developing countries in 1960 (23 percent), then their model suggests, that Bolivia would have grown about 0.4 percent faster per annum and by extrapolating growth for the following 30 years they state that by 1990 Bolivia's real per capita GDP would have been about 13 percent larger than it actually was. The authors conclude that finance does not merely follow economic activity. They state, that the strong link between the level of financial development and the rate of long-run economic growth does not simply reflect contemporaneous shocks that affect both financial development and economic performance. Furthermore, as the authors state: "insufficient financial development has sometimes created a "poverty trap" and thus become a severe obstacle to growth even when a country has established other conditions for sustained economic development" [King and Levine (1993)].

Over the decade, following the year (1993), Levine repeated the research several times, each having new co-authors and introducing some changes in the methodology. The changes mostly concerned the econometric estimation technique, the instruments used, and the degree of emphasis on the banking sector relative to the equity market (one such later attempts is discussed below). Each of these papers shows a significant impact of financial development on growth, thus with minor differences. For example, in one of the latest papers [Beck, Levine and Loyanza (2002)] the authors use system GMM dynamic panel estimation technique, legal origin as an instrument for financial development and three out of four financial development indicators, used in 1993 paper<sup>2</sup>, to assess the finance-growth relationship again. The results are strongly supportive of the hypothesis that financial development positively influences growth and the rate of technological innovation, but ambiguous as for the impact of financial development on savings and capital accumulation.

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<sup>2</sup> The authors excluded the PRIVATE variable

King and Levine (1993) did not concern the issue of financial liberalization. Bekaert et al. (2001) however, show that this is not the case. The paper is aimed at investigating the effect of financial liberalization on economic growth. Being more specific it should be said, that it is aimed at proving, that financial liberalization does improve the growth prospects, as well as the fact, that financial liberalization is an exogenous process, rather than an after-effect of economic growth or general financial development process. To test their hypothesis the authors estimate an extension of the classical growth model, which is based on the conception of the conditional convergence. The authors just add a dummy for the official financial liberalization (1-liberalized, 0-non-liberalized) to the classical growth regression. The idea to use a well established form of the general model looks logical as the authors are trying to investigate the effect of the financial liberalization, not to construct a novel growth model. To estimate the model the authors used panel data (95 countries for 17 years) and a GMM estimation method. The basic regression results are in line with the authors' hypothesis, that financial liberalization spurs growth. The effect of official financial liberalization on the growth rate of per capita GDP ranges from 0.95% to 1.13% depending on the group (the sample is divided into four groups according to data availability). The authors undertook several tests, To investigate the plausibility of the fact, that only financially developed markets liberalize, they estimated purely cross-sectional probit model, setting the probability of liberalization in a given year as a dependent variable and regressing it on the financial development indicators and GDP, all taken as averages for 5 preceding years. This regression was run for all 4 groups of the sample and four possible years of liberalization (1987, 1990, 1993, and 1996). A considerable variation in the signs of the coefficients and low t-values of the independent variables in this regression, reinforced by the results of the previous tests, led the authors to believe that: "...liberalization can be taken as an exogenous event that enhances financial development but is not a by-product of financial development".

So Bekaert et al (2001) showed that financial liberalization is an important exogenous factor influencing growth. However, the research has some drawbacks, most of which are connected with the fact that the introduction of the financial liberalization parameter into the model is not supported by any theoretical background and does not imply direct causality. Moreover, as the previous research paper did not concern the liberalization effect, this paper fails to grasp the impact of financial development.

There were also some attempts to assess the cost-side of financial liberalization (Bekaert et al (2001) assessed the benefits in terms of faster growth). One of the papers, which concern the cost side of the liberalization, is the one by Wyplosz (2001). The author uses the data for 8 developed and 19 developing countries for the year 1977-1999 to assess the impact of domestic and external financial restrictions on relative exchange rate volatility. In order to assess the degree of volatility a special index is constructed. This index, which is used as a dependent variable, measures relative exchange rate volatility and relative volatility of reserves in the particular country. Generally speaking the higher is the index, the more exchange rate depreciates, the more reserves are being expended or the combination of both. Several kinds of financial restrictions are adopted as explanatory variables. Domestic financial liberalization is represented by an index, ranging from 0 to 1, which is constructed by the author himself. International financial liberalization is represented by standard categories from the IMF's Annual Report of Exchange Arrangements and Exchange Restrictions, which are current account restrictions, capital account restrictions, export surrender requirements and multiple exchange rates. The list of regressors is confined to above mentioned indices and their lagged terms. By estimating this model and comparing it with autoregressive estimate of exchange market pressure the author reached several conclusions. First is that the model, which uses financial restrictions as regressors, describes volatility in exchange market pressure (or

strictly speaking the index, constructed by the author) in better way, than does simple autoregression. The estimated coefficients suggested that only domestic financial constraints and capital account restrictions have a sizable impact on exchange market pressure. Second, for these two main restrictions, the long-run effect of liberalization on exchange markets is positive (less pressure or a tendency to appreciate).

There was, however, considerable short run volatility as initial amelioration of exchange markets conditions after liberalization after a few years is followed by the reversal. The author concludes that the reversal is not powerful enough to trigger a crisis on its own, but the magnitude is such that it can make all the difference between moderate pressure and a full-blown crisis.

What's more, the effects of liberalization are systematically more sizable in developing, than in developed countries. As the author mentions, this can reflect the fact, that in developing countries the restrictions were initially more severe. This hypothesis, however, could not be tested because of the binary nature of the indices.

Generally, the binary nature of the indices is one of the drawbacks of the model. The second problem is that the model omits a large number of relevant variables, influencing foreign exchange fluctuations. As these variables are very likely to be highly correlated with variables, included in equation, the results are very likely to be biased.

All of the previously mentioned research papers considered only the impact of financial development or financial liberalization. Meanwhile one of these papers showed that these processes are relatively independent from one another. The issue of combining the impacts of both of these factors was tackled by Levine and Zervos (1996). These researchers used data on 49 countries from 1976 to

1993 to investigate whether measure of volatility, and integration in world capital markets predict future rates of economic growth, capital accumulation, productivity improvements, and private savings.

They find that stock market liquidity – as measured by stock trading relative to the size of the market and economy - is positively and significantly correlated with current and future of economic growth, capital accumulation, and productivity growth, even after controlling for economic and political factors. They also came to a conclusion that stock market size, volatility, and integration are not robustly linked with growth. Nor are financial indicators are closely associated with savings rates.

One of the most noticeable features of this paper is that the authors develop an interesting measure of domestic market integration (which includes liberalization). This measure is not based on subjective assessment and is not a dummy or a set of dummies. It is based on the CAPM and APM frameworks and is determined by the prices of the assets themselves. The integration parameter, used in their model, equals the intercept from the respective model multiplied by -1. The idea here is that in a perfectly integrated market the intercept should not be significantly different from zero. So the larger is the intercept, the lower is the degree of integration. As was shown by Korajczyk (1996) international integration measures will be negatively correlated with higher official barriers and taxes to international asset pricing. As a result this coefficient should be the integral measure of domestic market integration and liberalization. This measure has one major drawback, when speaking about transitional economies is that at the early years of transition the stock markets are not yet developed, so the deviations from the CAPM and APM model may be an after-effect of the lack of correct pricing mechanisms in the markets themselves, not only the lack of integration with the global markets.

To sum up the paper is quite complete in terms of methodology, thus it is limited geographically in the sense that it used the data for both developed and developing markets, but did not include transitional economies. Moreover, the sub sample, used for the model which included financial integration parameter, was much narrower, than the original one (24 out of 49 countries). This somewhat hinders the conclusions of the authors, concerning the impact of financial integration in the whole sample.

## Chapter 3

### METHODOLOGY

#### The Model

I use the extension of classical growth regression, which is based on the conception of the conditional convergence. The model looks like the following:

$$y_{i,t} = -\lambda Q_{i,t} + \phi' X_{it} + \varepsilon_{i,t+k,k} \quad (3.1)$$

$$\text{where } y_{i,t} = \left( \frac{GDP_{i,t}}{POP_{i,t}} \bigg/ \frac{GDP_{i,t-1}}{POP_{i,t-1}} \right) \quad Q_{i,t} = \ln(GDP_{i,t})$$

X - is a vector of variables, determining each country's growth potential or in other words its steady-state level of GDP;  $\lambda$  - is a convergence parameter;

The conditional convergence theory equation on which the model is based is:

$$y_{it} = -\lambda[Q_{it} - Q_i^*] \quad (3.2)$$

Note, that equation (1) is just a transformed version of equation (2) with  $Q^*$  substituted for the linear combination of its determinants. To estimate the impact of financial development I will use this model and add a proxy for the degree of financial development. I will also use additional dependent variables, which I will insert to explore the impact of financial development not only on the growth

itself, but also on its channels. Consequently the equation will have the following form:

$$Y_i = \alpha + \beta X + \gamma FINANCE + u \quad i=1-5 \quad (3.3)$$

where Y is one of growth indicators, FINANCE is one of indicators of financial development and X is the set of conditioning variables.<sup>3</sup>

### **Indicators of Economic Growth and its Channels**

The growth indicator Y is confined to several indicators of economic growth and proxies for its channels. The primary measure of economic growth is, obviously, per capita GDP growth rate (GYP). To investigate possible channels of impact I also include investment as a percentage of GDP, savings as a percentage of GDP, interest rate spread and the ratio of GDP growth to investment.

The investment rate, is used to proxy the impact of financial development on capital accumulation (INV).

I do not attempt to proxy the accumulation of capital by perpetual inventory method i.e. by assuming a certain capital stock in some date in the past and then, using investment data and assumed depreciation rate on several major groups of capital stock, calculate the needed estimations for the stock of capital in a given country. I had to deviate from this method because of several reasons. First, perpetual inventory method requires a substantial time span of adequate continuous investment data<sup>4</sup>. The data on developing and transitional

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<sup>3</sup> Please note, that in equation (3.3)  $Q_{i,t}$  is included in the conditioning information set  $X_{i,t}$  and is not shown separately

<sup>4</sup> For example Beck et al (2002) start with the year 1950 and go through to year 1995, what gives them 45 years of reasonably acceptable and continuous investment data.

economies, on which I concentrate, is rather poor and full of omitted observations. Only little more than a decade ago more or less constant series start to emerge for most of countries under study. Moreover, concerning transition economies, the situation is even worse: under socialist planning economy the methods of assessing the value of capital were much different from those, used under the market economy. Both investment and capital goods data from the Soviet period are not based on market prices and are inadequate for measuring capital accumulation in market economy. After the shift from planning economy to transition, much of the capital lost most of its price because distortionary price system was abandoned. Furthermore, the first years of transition brought even greater distortions to the valuation of capital which persist even today (although in a much softer form). Consequently, even if the researcher possesses investment data from that period, it will not provide him with reasonable flow for assessing capital accumulation. Second, perpetual inventory method requires a set of rather strong assumptions, which may not hold in practice<sup>5</sup>. The second issue is not decisive by itself, but it surely reinforces the first one.

Unfortunately, the impossibility to estimate capital stock leads to impossibility to estimate productivity as a residual, using aggregate production function. As another proxy for this channel I use the ratio of GDP growth to investment. In the long run higher ratio means that a unit of investment yields more value added i.e. is more productive.

Savings as a percentage of GDP (SAV) is employed to investigate the impact of financial development on saving, which is theoretically ambiguous due to well-known income and substitution effects.

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<sup>5</sup> This may concern the assumption of the common rate of depreciation

The next dependent variable emerged from the conclusions of the theoretical model by Andres Erosa (2001). His paper was mentioned in the extant work part, but I will remind that this model suggested that financial intermediation costs have a significant negative impact on growth. Also Erosa provided grounds for using interest rate spread (difference between deposit and lending interest rates) as a good proxy for intermediation costs on competitive market of financial services. So, following Erosa, I use interest rate spread (INTSPR) in the previously mentioned role to examine the relationship between financial development and intermediation costs.

### **Indicators of Financial Development**

A set of financial development indicators, FINANCE, is represented by liquid liabilities of the financial system as a percentage of GDP (LLY), claims on private sector to GDP and to domestic credit ratios (PRIVY, PRIVATE) and share of central bank assets in total domestic financial assets (BANK).

As was shown in the extant work part, financial intermediaries arise to mitigate the costs of acquiring information and conducting transactions. More specifically financial intermediaries are created to lower the costs of researching potential investments, exerting corporate control, managing risk, and mobilizing savings. By performing these functions financial system alters the growth rates.

To perform an empirical study I need to define indicators of financial development. Over the last years financial sector reform and development in development and particularly transitional has continued to advance primarily in the banking sector. However, as stated in the EBRD 2001 transition report, there were no significant advance in the reform and development of the securities markets and non-bank financial institutions. “With the globalization of the financial services the securities markets in the region face and increasingly

challenging environment. Many of the larger and more profitable firms from the region are gaining listings on west European stock exchanges, which are more liquid than those in the region. At the same time, medium-sized companies have been slow to embrace the financial transparency and corporate governance requirements associated with publicly listed and traded securities. This leaves the securities markets in the region relatively under-developed” [EBRD (2001)]. The underdeveloped nature of financial markets concerns developing economies as well.

As a result, transitional and developing economies are mainly bank-oriented, so an indicator of the banking sector development will be a good proxy for the general level of financial system development. For this purpose I will use the set of indicators, close to the one used by Levine et al (2002).

To evaluate the impact of banks on growth and sources of growth they tried to find an indicator of the ability of banks to research and identify profitable ventures, monitor and control managers, ease risk management, and facilitate resource mobilization. The primary measure of banking development in their study was the value of credits by financial intermediaries to the private sector divided by GDP. Private credit isolates credit issued to the private sector, as opposed to credit issued to governments, government agencies, and public enterprises. While private credit does not directly measure the amelioration of information and transaction costs, I interpret higher levels of private credit as indicating higher levels of financial services and therefore greater financial intermediary development.

Due to the certain data limitations I will not be able to exclude credits issued by the central banks, so I use credit to the private sector from the World Development Indicators Database, which is defined as financial resources provided to the private sector, such as through loans, purchases of nonequity

securities, and trade credits and other accounts receivable, that establish a claim for repayment. The indicator is initially given as share of GDP, so I do not face the problem of deflating the statistics. This indicator is termed PRIVY. I also measure the ratio of claims on the private sector to total domestic credit and term this variable PRIVATE. There are also some problematic issues, concerning these measures of financial sector development as stated by Levine [Levine, 1993]. PRIVATE and PRIVY may reflect the overall size of the public sector and the degree of public sector borrowing and therefore not accurately indicate the level of financial services. In spite of this fact, these financial indicators are included to maximize the information on financial development in the studies.

The third measure of banking sector development is liquid liabilities (LLY), which equals liquid liabilities of the financial system as a percentage of GDP. Liquid liabilities are also known as broad money, or M3. They are the sum of currency and deposits in the central bank (M0), plus transferable deposits and electronic currency (M1), plus time and savings deposits, foreign currency transferable deposits, certificates of deposit, and securities repurchase agreements (M2), plus travellers checks, foreign currency time deposits, commercial paper, and shares of mutual funds or market funds held by residents. Liquid liabilities are presumed to be just an indicator of size, while private credit is supposed to grasp also the degree of effectiveness of banking sector.

The fourth measure is the central bank domestic assets divided by commercial bank plus central bank domestic assets (BANK). The reason for using this indicator was that private commercial banks are perceived to be more effective than the state-owned central bank in allocating credit. This measure of financial development has its problems as well. One of the problems is that banks are not the only financial intermediaries that provide risk management, information acquisition, and monitoring services. However, because of the fact, that

developing and transitional economies are characterized by bank-oriented financial system, this drawback appears to be minor. Another problem is that governments strongly influence banks in many countries, so the difference between the commercial and central banks may be somewhat mitigated, especially in the developing and transitional economies, where the banking system is usually underdeveloped and the degree of financial liberalization is often rather low. Also, variable BANK does not measure to whom the financial system is allocating credit. However, the BANK should enrich the conclusions, drawn from the analysis, which is made using other indicators, by at least partially isolating financial intermediaries, which are better at providing the financial services emphasized in theoretical studies.

### **The Conditioning Information Set**

To control for other factors, that influence economic growth I use the conditioning information set, which includes the logarithm of initial real per capita GDP (GDPI) to control for convergence and the secondary school enrolment as indicator (SECI) of the human capital stock in the economy. In addition to these principal control variables the set also includes three additional policy variables that have been suggested by the empirical literature being correlated with economic growth across countries (Barro 1991; Easterly, Loayaza, and Montiel 1997). Inflation rate (P) and government expenditure to GDP (GOV) are used as indicators of macroeconomic stability, and foreign trade (the sum of exports and imports) as a share of GDP (TRD) is used to capture the degree of openness of an economy.

I also introduce dummies for Sub-Saharan Africa (SSA), Latin America (LA), South Asia (SA). There will also be a dummy for transitional economies (TRANS), which generally corresponds to the European and Central Asian regions in the sample of developing economies, but these two regions are united

under one dummy, following the assumption, that common Soviet past made these countries quite homogeneous in terms of structure of their economy.

## Chapter 4

### DATA DESCRIPTION AND ESTIMATION

#### Data Description

In my research I use panel data for 82 developing and 20 transitional economies for the years 1994-2000 to study the effect of financial development on economic growth. Formally all these countries have already abandoned planning economy principles in 1991 and shifted to transition path. The sources for my data are World Bank World Development Report Database, International Monetary Fund International Financial Statistics and EBRD transition report (data for transition economies). The data and data sources for the sample of developing countries are summarized in the table 1 below.

**Table 1. Data Details**

<b>Variable</b>	<b>Unit of Measurement</b>	<b>Source</b>
GDP per capita growth	%	WB WDI 2001
GDP per capita	constant 1995 US\$	WB WDI 2001
Gross capital formation	% of GDP	WB WDI 2001
School enrollment, secondary	% gross	WB WDI 2001
Gross Domestic Saving	% of GDP	WB WDI 2001
Inflation, consumer prices	annual %	WB WDI 2001
General government final consumption expenditure	% of GDP	WB WDI 2001
Claims on private sector	share of GDP	WB WDI 2001
Domestic credit provided by banking sector	% of GDP	WB WDI 2001
Imports of goods and services	% of GDP	WB WDI 2001
Exports of goods and services	% of GDP	WB WDI 2001
Liquid liabilities (M3) as	% of GDP	WB WDI 2001
Interest rate spread (lending rate minus deposit rate)	%	WB WDI 2001
Central bank domestic assets	LCU	IMF IFS
Deposit money bank domestic assets	LCU	IMF IFS

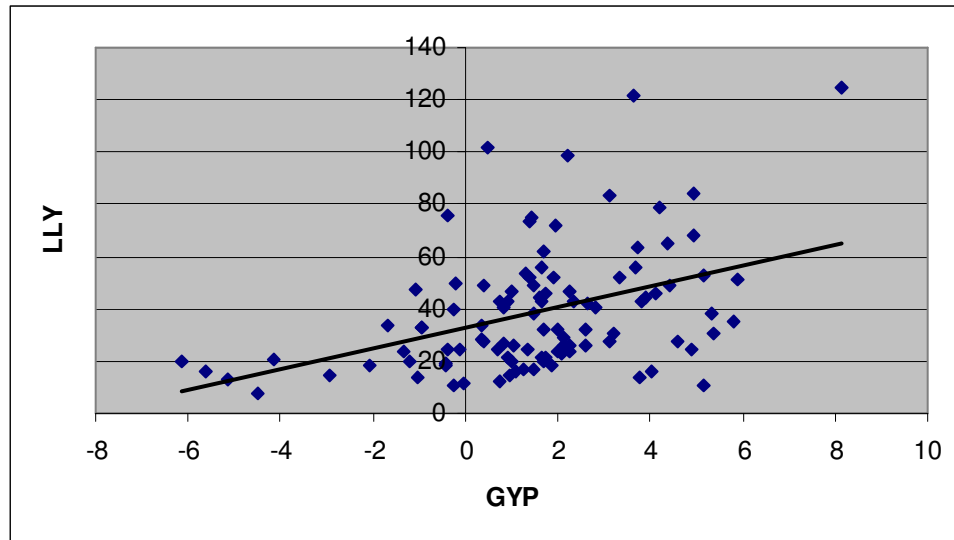
The data is taken for the period of 1994-2000. The year 1994 was chosen as a starting date for two reasons. The first reason is the data availability problem: extending the starting date further back would cut the sample dramatically. Second, the desire to obtain results that can be extrapolated to transitional economies. To achieve this goal I must have a sample, where transitional economies constitute a noticeable share, and the development of market-based financial intermediaries in transitional economies, which began in 1991, should reach some meaningful level. I consider year 1994 to be the earliest possible date for assessing the level of financial development in transitional economies.

### **Preliminary Data Analysis**

The graphical analysis of relationship between growth and levels of financial development indicators both taken as averages for the years 1994-2000 is given in figures 2-6.

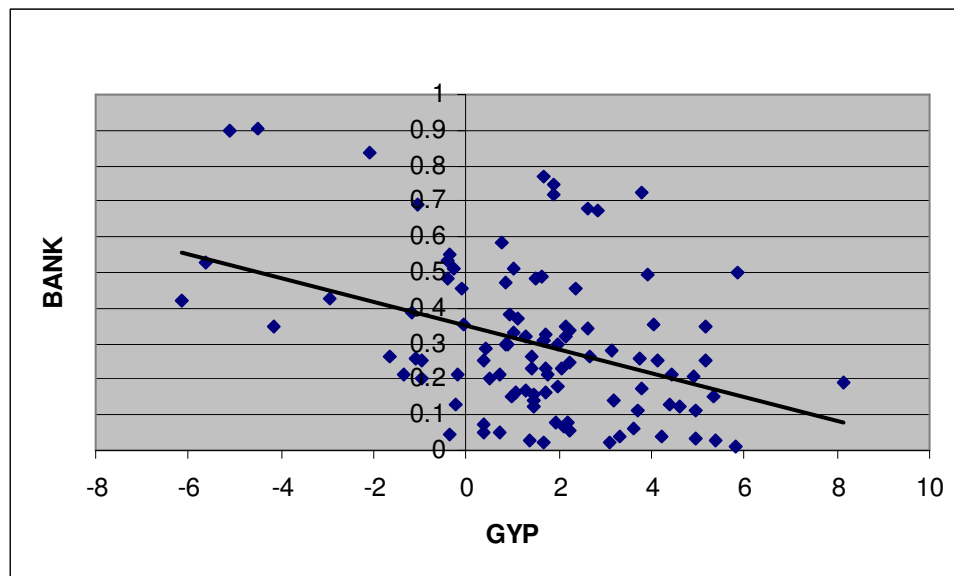
Each dot in figures 2-6 represents a country of the sample, where an average level of financial development is on the X axis, while Y axis is occupied by contemporaneous indicator of financial development. The black line represents the trend (OLS regression of economic growth on financial development indicator with no constant). It can be seen, that all of these tables suggest, that higher level of financial development is associated with faster economic growth. The apparent negative relationship between importance of central bank relative to commercial banks and growth in real GDP is due to the fact, that lower levels of BANK variable are associated with higher levels of financial development. The only relationship, which is not apparent graphically, is the one between GYP and PRIVATE. The picture in this case is hampered by outliers (Lesotho and Mauritania). However, when the outliers are removed the relationship becomes more pronounced.

**Figure 2. Graphical Relationship Between Average per Capita GDP Growth and Average Level of Liquid Liabilities as a Percentage of GDP (1994-2000)**



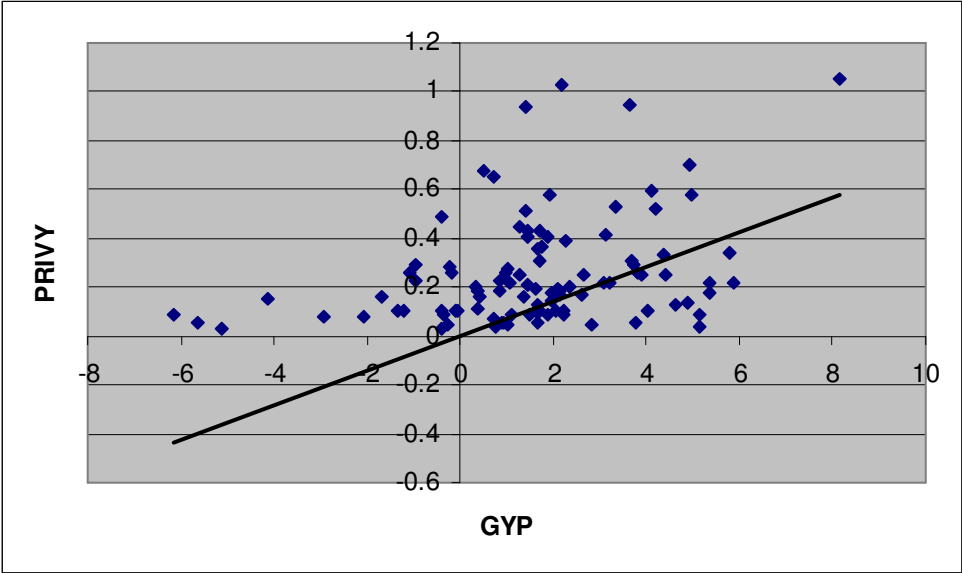
GYP- GDP per capita growth rate LLY-liquid liabilities as a percentage of GDP

**Figure 3. Graphical Relationship Between Average per Capita GDP Growth and Average Level of Central Bank Domestic Assets as a Share of Total Domestic Assets of Financial System (1994-2000)**



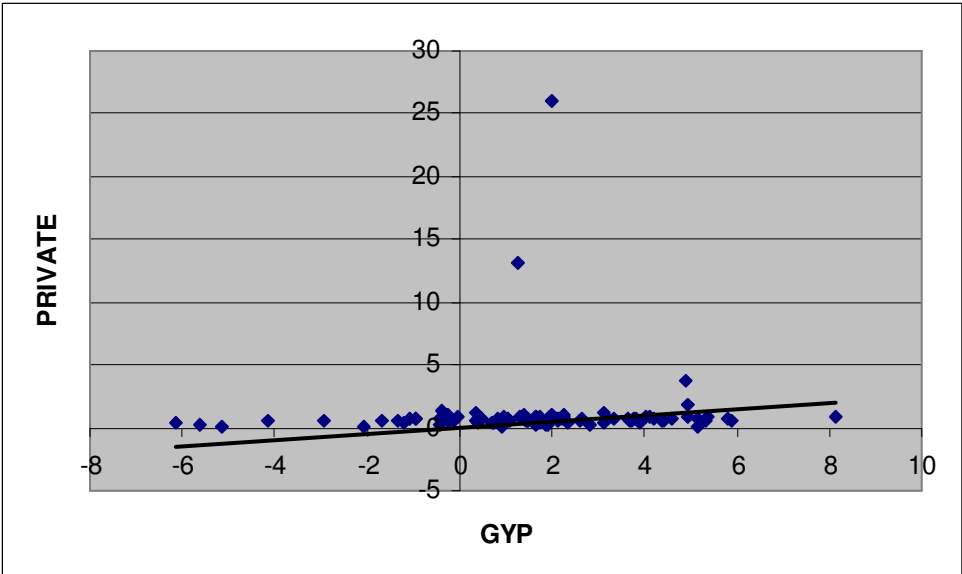
GYP- GDP per capita growth rate BANK- central bank domestic assets as a share of total domestic assets of financial system

**Figure 4. Graphical Relationship Between Average per Capita GDP Growth and Average Level of Claims on Private Sector as a Share of GDP (1994-2000)**



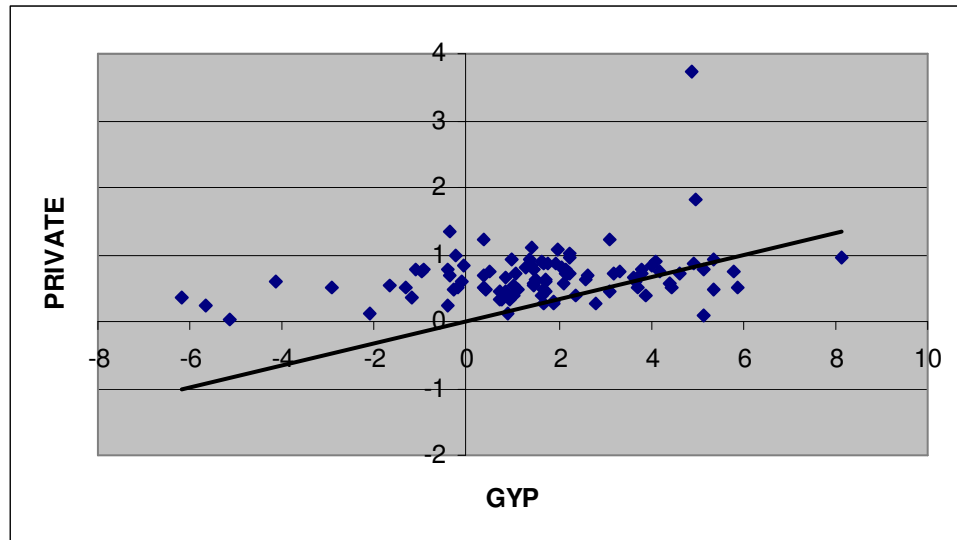
GYP- GDP per capita growth rate PRIVY-claims on private sector as a share of GDP

**Figure 5. Graphical Relationship Between Average per Capita GDP Growth and Average Level of Claims on Private Sector as a Share of Domestic Credit (1994-2000)**



GYP- GDP per capita growth rate PRIVATE-claims on private sector as a share of domestic credit

**Figure 6. Graphical Relationship Between Average per Capita GDP Growth and Average Level of Claims on Private Sector as a Share of Domestic Credit (Outliers Excluded) (1994-2000)**



GYP- GDP per capita growth rate PRIVATE-claims on private sector as a share of domestic credit

To complement the graphical analysis, I undertake a more formal (although preliminary) numerical analysis. For this purpose the countries are divided into four equally sized categories: from the highest to the lowest levels of dependent variable. There are five tables, each representing an analysis of association with a particular dependent variable. From Table 2 it can be seen, that faster growing groups on average have higher levels of financial development. However, there are some inconsistencies. For example, slow growing countries have higher share of private credit in GDP and lower importance of central bank in an economy, than do fast growing countries. Also, very fast growing countries have lower share of credit to private sector in domestic credit, than do fast growing countries. In total there are 4 anomalies of this nature in present in Table 2. Correlation analysis also suggests the presence of significant relationship. The only independent variable that appears not to be significantly correlated with growth is private credit as a percentage of total domestic credit. Thus, when the outliers, which were noted in the graphical analysis, are removed, the correlation

coefficient increases dramatically and reaches the magnitude, comparable to the size of other coefficients. In general the largest absolute size of the correlation coefficient is attributed to financial depth (LLY), while private credit as a share of domestic credit (PRIVATE) even after adjustment for outliers still has the lowest in absolute terms correlation with growth.

**Table 2. Average Level of Financial Development and Contemporaneous Growth Rate of Real Per Capita GDP**

	GYP	PRIVATE	PRIVY	LLY	BANK
Very Slow	-1.62256	0.597812	0.150649	26.06632	0.394955
Slow	1.031526	1.122915	0.27573	37.93566	0.269385
Fast	1.991521	1.713761	0.252849	37.68356	0.337553
Very Fast	4.362131	0.815991	0.33103	50.72037	0.202181
Correlation with growth		0.051014 (0.295048)*	0.335844	0.416438	-0.39181

\* -Correlation after the exclusion of outliers is given in parentheses

Table 3 continues the same analysis, but with investment rate in place of GDP growth rate and has similar structure as does Table 2, suggesting the presence of significant relationship. It also has some inconsistencies with the levels of financial development, attributed to the groups with different intensity of investment. There are in total 2 such cases in this table. The correlation coefficients are higher for both measures of private credit and financial depth and lower for the indicator of importance of central bank. However, after adjusting for the previously mentioned outliers the correlation between the fraction of credit allocated to private credit and investment rate falls sharply. In general financial depth (LLY) again has the highest coefficient and the fraction of credit allocated to private sector (PRIVATE) has the lowest.

**Table 3. Average Level of Financial Development and Contemporaneous Level of Investment**

	INV	PRIVATE	PRIVY	LLY	BANK
Very Low	14.53207	0.508941	0.173069	29.0814	0.397848
Low	19.37344	1.237347	0.198252	29.72255	0.275563
High	23.24374	0.781807	0.234058	39.00475	0.250704
Very High	30.02992	1.619649	0.401095	53.8885	0.258396
Correlation with investment		0.418846 (0.14639)*	0.41987	0.467003	-0.30802

\* -Correlation after the exclusion of outliers is given in parentheses

Table 4 continues with savings rate. The general structure is again generally supportive of the ties between economic growth and financial development. There is a problem, however, with one financial indicator, which is the share of credit, allocated to private sector (PRIVATE). The levels in deferent groups here seem to point out negative relationship, which is supported by correlation coefficient (it is negative initially and becomes insignificant after adjusting for outliers). The other correlations are as expected and of similar magnitude as their counterparts in previous tables.

**Table 4. Average Level of Financial Development and Contemporaneous Level of Domestic Savings**

	SAV	PRIVATE	PRIVY	LLY	BANK
Very Low	-1.15027	1.76428	0.149283	29.50404	0.437277
Low	11.12971	1.284744	0.230894	32.79406	0.277593
High	17.71355	0.613423	0.230831	37.413	0.238868
Very High	29.01889	0.646305	0.398353	52.29962	0.257818
Correlation with savings		-0.3535 (0.049)*	0.431991	0.420527	-0.24683

\* -Correlation after the exclusion of outliers is given in parentheses

I will not comment Tables 5 and 6 in detail as their results are largely the same. It should be noted however, that the share of credit, allocated to the private sector is not significantly correlated with interest rate spread even after controlling for the outliers.

**Table 5. Average Level of Financial Development and Contemporaneous Level of Interest Spread**

	INSPR	PRIVATE	PRIVY	LLY	BANK
Very Low	4.130884	0.721172	0.457915	60.88477	0.228011
Low	9.499489	1.844098	0.239581	39.91788	0.211503
High	19.82509	0.593676	0.159148	26.04121	0.388869
Very High	92.65731	1.082376	0.169318	28.32838	0.378451
Correlation with spread		-0.05877 (-0.07841)*	-0.31585	-0.30365	0.40217

\* -Correlation after the exclusion of outliers is given in parentheses

**Table 6. Average Level of Financial Development and Contemporaneous Level of Efficiency Proxy**

	GYP/INV	PRIVATE	PRIVY	LLY	BANK
Very Low	-0.08834	0.574866	0.153767	26.02992	0.373697
Low	0.052741	2.175492	0.291959	40.6728	0.256921
High	0.09641	0.665713	0.266343	39.22448	0.324458
Very High	0.183721	0.830958	0.302992	47.03092	0.228732
Correlation with efficiency measure		0.021917 (0.27592)*	0.217152	0.305483	-0.43155

\* -Correlation after the exclusion of outliers is given in parentheses

To summarize, it should be said, that average levels and correlation analysis gives considerable evidence connection between financial development and growth, however there is a number of inconsistencies and the association is not overwhelming. The most contradicting moment is the correlation between share of credit, allocated to the private sector (PRIVATE), and investment rate, which is negative initially and becomes insignificant after correction for the outliers.

Table 7 shows the correlations between exogenous parameters. It can be seen, that the financial development indicators are highly correlated between themselves. It should be noted, however, that financial depth indicator becomes significantly correlated with others only after the exclusion of the outliers. High correlation between these indicators supports the fact, that all of them are generally the proxies for one thing, which is financial development. However the fact, that each of these variables in addition to capturing the common principal component

also captures some specific aspects prevents them from being perfectly correlated.

**Table 7. Contemporaneous Correlations Among Financial Development Indicators**

	GYP	PRIVATE	PRIVY	LLY	BANK
GYP	1				
PRIVATE	0.051014 (0.295048)	1			
PRIVY	0.335844	-0.00542 (0.199467)	1		
LLY	0.416438	-0.06212 (0.054508)	0.859778	1	
BANK	-0.39181	-0.09652 (-0.37042)	-0.47471	-0.40536	1

\* -Correlation after the exclusion of outliers is given in parentheses

### Contemporaneous Regressions

To assess the strength of partial correlation between financial development, growth and its channels, I run cross sectional regressions, using average values of parameters for the years 1994-2000 (except GDPI and LSEC, for which initial values in 1994 are taken) and GLS estimation method. The model, which is used, is described above. The estimations are conducted, using Eviews 3.0 econometric package. The principal results of contemporaneous regressions are given in summary table 8 below. Please note, that there are two columns, devoted to PRIVATE variable. The second column represents the results after the exclusion of outliers (Lesotho, Mauritania) the presence of which was noted in preliminary analysis. The complete Eviews outputs for some regressions are given in the appendix.

**Table 8. Contemporaneous regressions**

Dep. Var	Indep Var	LLY	BANK	PRIVY	PRIVATE	PRIVATE <sup>6</sup>
GYP	Coeff	0.04346	-3.90655	3.602985	0.086517	2.021015
	st.dev	0.01433	1.6137	1.526442	0.044104	0.528363
	p-value	<b>0.0032</b>	<b>0.0175</b>	<b>0.0205</b>	<b>0.0530</b>	<b>0.0002</b>
	R <sup>2</sup>	0.246628	0.2236	0.185822	0.128204	0.229277
INV	Coeff	0.088772	-4.71764	8.864522	0.971904	3.000439
	St.dev	0.035231	3.410548	3.213269	0.223993	0.880167
	p-value	<b>0.0135</b>	<b>0.1700</b>	<b>0.0071</b>	<b>0.0000</b>	<b>0.0010</b>
	R <sup>2</sup>	0.450506	0.411933	0.432106	0.540706	0.474616
SAV	Coeff	0.055943	6.481486	7.250866	-1.39168	-0.55997
	St.dev	0.08675	6.601638	7.576196	0.417143	1.812353
	p-value	<b>0.5206</b>	<b>0.3288</b>	<b>0.3412</b>	<b>0.0012</b>	<b>0.7581</b>
	R <sup>2</sup>	0.397147	0.398538	0.436212	0.517735	0.468174
INTSPR	Coeff	-0.17907	10.71003	-13.3002	-0.06834	-0.93723
	St.dev	0.070042	7.229156	6.053251	0.143332	1.811475
	p-value	<b>0.0127</b>	<b>0.1430</b>	<b>0.0315</b>	<b>0.6350</b>	<b>0.6066</b>
	R <sup>2</sup>	0.895242	0.88608	0.322735	0.279476	0.27889
GYP/INV	Coeff	0.001275	-0.21166	0.096153	0.003291	0.097422
	st.dev	0.000528	0.110485	0.058746	0.002588	0.035044
	p-value	<b>0.0177</b>	<b>0.0585</b>	<b>0.1053</b>	<b>0.2068</b>	<b>0.0067</b>
	R <sup>2</sup>	0.26981	0.307733	0.103152	0.090473	0.180112

From Table 8 it can be seen, that all financial development indicators are significantly correlated with growth after controlling for its other determinants of economic growth. All parameters are significant and have the expected signs. It should be said that in the original sample the share of credit, allocated to private sector is marginally significant at roughly 5% level, but after the exclusion of outliers its significance rises sharply. Moreover, when outliers are not excluded from the previously mentioned regression, the F-statistic suggests joint insignificance of exogenous parameters (Table A1 (d) in the Appendix). When I exclude the outliers, this problem disappears.

The magnitudes of the coefficients suggest that the rise in the percentage share of liquid liabilities by 1 percent (unit increase of LLY variable) is associated with the rise in GDP growth by 0.04 percent. The rise in the share of central bank

<sup>6</sup> - outliers (Lesotho and Mauritania) excluded

assets by 1 percent (0.01 increase in BANK) is connected with the fall in growth by roughly 0.04 percent. The rise in a share of private credit to GDP by 1 percent (0.01 increase in PRIVY) is associated with the rise in growth by 0.04 percent, while the same change in the share of credit, allocated to private sector (0.01 increase in PRIVATE) is associated with 0.02 percent increase in growth. It can also be seen, that the regressions are characterized by rather low R-squared. This may be the result of the fact, that the time span under investigation is rather low for the typical cross country growth study, so the effect of given independent variables on growth is not captured completely. Another evidence of this is that most of the control variables have very high p-values. This can be seen from tables A1 (a-e) in the Appendix. Concerning this fact it is interesting to notice, that the significance of the control variables rises sharply in the regressions, where investment as a share of GDP appears as a dependent variable instead of GDP growth. The outputs for these regressions are given in the tables A2 (a-e) in the Appendix. The explanation, I see for this, is that investment has a significantly shorter lag of reaction on the changes in conditions, than does GDP growth.

In general the ‘investment’ regressions demonstrate, that all indicators of financial development except the share of central bank assets are statistically and economically significant and their association with investment is on average 1.5-2 times higher, than their association with growth. For example, a one percent rise in liquid liabilities as a percentage share of GDP (unit increase in LLY), is associated with 0.09 rise in investment share (compare it with 0.04 rise in GDP per capita growth), a one percent rise the share of claims of private sector in GDP (0.01 rise in PRIVY) is associated with 0.09 rise in investment (compare it with 0.04 rise in GDP per capita growth). The R-squared is also systematically higher for ‘investment’ regressions, than for ‘growth’ regressions.

On the contrary, none of the financial development variables looks to be associated with savings rate as none of them is even marginally significant.

“Interest rate spread” regressions offer mixed evidence. In these regressions the only significant variables are liquid liabilities and claims on private sector. In addition, the p-value of the share of central bank asset is 0.1430, which is not much higher, than the highest conventional significance level of 10%. On the contrary the share of credit, allocated to private sector is highly insignificant even after the exclusion of outliers. The signs of all the coefficients are as predicted by the theory i.e. financial development lowers interest rate spread, which in turn, as shown by Erosa (Erosa 2001), spurs economic growth.

Finally, “efficiency measure regressions” again show significance of all parameters and theoretically expected signs. However, PRIVATE is significant after adjusting for outliers and PRIVY is only marginally significant at around 10% significance level). The size of the impact is very small as might be predicted from the results of the “GDP growth” and “investment” regressions.

### **Initial Value Regressions**

One of the problems, associated with contemporaneous regressions is that they are not robust to simultaneity bias. To overcome this problem I estimate the initial value regressions. The initial value regressions were constructed, using initial (in year 1994) values of independent parameters average values of dependent parameters for the years 1994-2000 and GLS estimation technique. Under the hypothesis of no weakly exogenous regressors (i.e. regressors that are not correlated with future error terms) the initial value regression should provide some robustness to simultaneity bias. The principal results of contemporaneous regressions are given in summary table 9 below. Please, note, that here I did not execute the option of excluding outliers. The reason for this, is that the sharp

outlier cases, present in the average value statistics, were not present in the initial values of the parameters. Moreover, when I excluded Lesotho and Mauritania (average value outliers), the results of the initial value regressions did not change significantly.

**Table 9. Initial Value Regressions**

Dep. Var	Indep Var	LLY	BANK	PRIVY	PRIVATE
GYP	Coeff	0,034701	-2,43128	0,612553	3,290672
	St.dev	-0,01616	-1,61423	-0,29296	-1,69563
	p-value	<b>0.0347</b>	<b>0.1357</b>	<b>0.0395</b>	<b>0.0556</b>
	R <sup>2</sup>	0,212457	0,184366	0,157811	0,20116
INV	Coeff	0,080979	-1,99304	12,74928	11,43357
	St.dev	-0,0409	-3,27967	-0,62329	-3,42903
	p-value	<b>0.0509</b>	<b>0.5450</b>	<b>0.0000</b>	<b>0.0013</b>
	R <sup>2</sup>	0,395966	0,359239	0,538495	0,426766
SAV	Coeff	0,07805	-0,1664	-19,2251	10,13127
	St.dev	-0,08709	-5,09636	-1,56719	-8,23855
	p-value	<b>0.3727</b>	<b>0.9740</b>	<b>0.0000</b>	<b>0.2222</b>
	R <sup>2</sup>	0,426766	0,359456	0,486763	0,376388
SPREAD	Coeff	-0,13521	5,997047	-0,18953	-13,9984
	St.dev	-0,09039	-7,58156	-1,46453	-7,6299
	p-value	<b>0.1395</b>	<b>0.4318</b>	<b>0.8974</b>	<b>0.0711</b>
	R <sup>2</sup>	0,882409	0,877504	0,87642	0,882209
GYP/INV	Coeff	0,001035	-0,00033	0,010295	0,067746
	St.dev	0,00068	-0,1157	-0,0131	-0,06187
	p-value	<b>0.132</b>	<b>0.2591</b>	<b>0.4340</b>	<b>0.2766</b>
	R <sup>2</sup>	0,278597	0,288995	0,263929	0,269389

It can be seen, that all the proxies of financial development except the share of central bank assets have significant impact on GDP growth and investment share. The BANK variable loses its significance in the GDP growth equation, but the p-value is marginally higher, than 10%. This suggests, that the BANK's significance in the contemporaneous regressions was driven primarily by simultaneity bias, thus even in the initial value regressions some suggestion of

weak relationship remains. On the other hand the initial value regressions supported the suggestion of no significant relationship between share of central bank assets and Investment, drawn from the contemporaneous regressions. Furthermore, the initial value regressions reveal general insignificance of financial development in determining saving rate, interest rate spread and efficiency. Among other features worth noting is the change in coefficients. The impact of private credit as a share of GDP on GDP growth in the initial value regression was significantly lower, that in the contemporaneous regression (The coefficient fell from 3.6 to 0.61), while the impact of the share of credit allocated to private sector increased by roughly 150% in case of GDP growth (coefficient rose from 2.02 to 3.29) and by around 400% in case of investment (coefficient rose from 3 to 11.43). Other coefficients remained relatively stable. Note here that the coefficient accompanying LLY parameter did change significantly neither in GDP growth nor in investment regression. Generally initial value regressions suggest that the impact of financial development on GDP growth and investment is rather robust to simultaneity bias, while its impact on productivity growth is not. Moreover, the absence of well determined impact on savings and interest rate spread is also confirmed. In case of interest rate spread, where mixed evidence in the contemporaneous regressions changed in no impact in the initial value regressions may be explained by the fact, that the response of interest rate spread to the changes in financial development is a short term phenomenon, so seven year averages only roughly capture this relationship, while initial value regressions, which do not account for the short term fluctuations in financial development show no connection. In this light it is interesting to investigate the short term relationships between variables under study, in particular between financial development and interest rate spread.

### Pooled Regressions

To provide investigation of short-term relationships I estimate a pooled time series – cross section regression, using the data for two three-year periods: 1995-1997, 1998-2000. The dependent variables are taken as averages for this period and the independent are taken as initial values in the first year of the period to deal with the problem of simultaneity (at least partly). The outputs are given in a table 10 below.

**Table 10. Pooled Regressions**

Dep. Var	Indep Var	LLY	BANK	PRIVY	PRIVATE	PRIVATE <sup>7</sup>
GYP	Coeff	0,020167	-1,74194	0,272615	0,122841	0,806043
	st.dev	0,002422	0,282509	0,253493	0,082019	0,138319
	<b>p-value</b>	<b>0</b>	<b>0</b>	<b>0,2836</b>	<b>0,1359</b>	<b>0</b>
	R <sup>2</sup>	0,146519	0,147385	0,140121	0,143339	0,172493
INV	Coeff	0,070641	-2,85956	7,878108	0,360432	2,452897
	st.dev	0,006296	0,328353	0,865926	0,073036	0,2687
	p-value	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	R <sup>2</sup>	0,330871	0,293628	0,330624	0,291175	0,351644
SAV	Coeff	0,061179	5,704057	7,126931	0,162721	-0,18113
	st.dev	0,004898	0,194091	0,683634	0,224902	0,169723
	<b>p-value</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0,4703</b>	<b>0,2873</b>
	R <sup>2</sup>	0,400764	0,395743	0,404248	0,391676	0,412232
INTSPR	Coeff	-0,0585	3,461746	-6,53434	-0,23186	-0,2943
	st.dev	0,004528	0,36625	0,241725	0,018846	0,009376
	<b>p-value</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	R <sup>2</sup>	0,456143	0,4382	0,446597	0,430875	0,438746
GYP/INV	Coeff	6,19E-05	-0,10471	-0,04256	0,008174	0,043137
	st.dev	0,000127	0,00863	0,007043	0,002458	0,007474
	<b>p-value</b>	<b>0,6278</b>	<b>0</b>	<b>0</b>	<b>0,0011</b>	<b>0</b>
	R <sup>2</sup>	0,118756	0,131341	0,11885	0,743556	0,139179

Surprisingly, it can be seen that the panel data regressions present the high significance for most of the parameters, the exception being the PRIVY variable

<sup>7</sup> - outliers (Lesotho and Mauritania) excluded

in GDP growth regression and PRIVATE variable in the savings regression<sup>8</sup>. In two cases PRIVATE variable obtained significance after the exclusion of two previously mentioned outliers (Lesotho and Mauritania), as it did in the contemporaneous regressions. The appearance of significance in the interest rate spread equation may be explained by the short term response of the interest rate i.e. interest rates respond rather fast to the changes in financial conditions, so a 3 year period is more likely to reveal this response, than a 7 year period.

The emergence of significance in the savings regression may be explained simultaneity bias i.e. by the fact that in such a short time-span financial system is able to “forecast” the rise in savings, so it is not possible to say definitely, that the financial development raises savings and not vice-versa. The short-term significance in the efficiency equation, however, is not so easy to explain as the measure itself loses meaning as the time span increases because the time span is too short for the investment to become productive, so I will not draw any conclusions from the efficiency regressions. The magnitude of the coefficients in the GDP growth and investment regressions experienced some noticeable changes in both directions, thus no changes in the signs (which were as expected in the previous regressions) were noticed. Another aspect, worth mentioning is the considerable fall in R-squared of the pooled “GDP growth”, relative to both of its long-term counterparts in spite of joint significance of the coefficients. This supports the notion, that the impact of financial development on growth is a long-term process.

### **Pooled Regressions for Transitional Countries**

The sample of the previous regressions included both developing and transitional economies. These two classes of the economies, having a lot in common are

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<sup>8</sup> - insignificance of PRIVATE in the savings regression is observed in each of the three types of regressions, which were run (contemporaneous, initial value, pooled).

nevertheless quite different. Developing countries are building their economy from the level, which is close to zero and transitional countries are reorienting their economic system (and, consequently, financial system and capital stock) from the soviet-type planning economy to market-based alternative. Besides, all transitional economies have in total 13 years of market development, while most of the developing economies developed their market systems for a longer period. So in order to account for such differences, I estimate a separate regression for the transitional economies.

I use 20 economies, which are present in the overall sample. Due to the small number of sample elements I must estimate pooled regression in order to achieve the number of degrees of freedom which is larger, than 30 (rule of thumb for making inferences about the coefficient significance). The cross-section regressions do not satisfy this condition.

I also use two additional variables. The first one is the asset share of state-owned banks. The reason for introducing this variable is the fact, that in the transitional economies the government share in the domestic financial system is not confined to the central bank assets. In most of the economies there is a certain number of state-owned banks, which are mainly the ancestors of the former Soviet banks, that for various reasons have not been privatized. In Ukraine such banks are EXIM Bank of Ukraine or Oschadbank. So asset share of state-owned banks appears to be a better measure for the degree of government versus public credit allocation, than share of central bank assets. Consequently I employ it in the following regression under the name STSHARE. The source for this indicator is EBRD Transitional Report 2001. However, for the sake of comparison I also estimate the regressions with the share of central bank assets as an independent variable.

The second measure, which becomes available for the sample of transitional economies, is EBRD index of banking sector reform and interest rate liberalization. This index is a subjective measure, constructed by EBRD and published in the EBRD transition report.

As stated in EBRD Transition Report 2001: “The transition indicator scores, from 1 to 4 with 0.3 decimal points added or subtracted for + and – ratings, that were first introduced in 1997 and retroactively added to years 1989-1996 in EBRD Transition Report 2000” [EBRD (2001)].

The rating was awarded on the basis of the following basic guidelines (as defined in the EBRD Transition Report 2001):

- 1 Little progress beyond establishment of two-tier system.
- 2 Significant liberalization of interest rates and credit allocation; limited use of directed credit or interest rate ceilings.
- 3 Substantial progress in establishment and solvency of a framework for prudential supervision and regulation; full interest rate liberalization with little preferential access to cheap refinancing; significant lending to private enterprises and significant presence of private banks.
- 4 Significant movement of banking laws and regulations towards BIS standards; well-functioning banking competition and effective prudential supervision; significant term lending to private enterprises; substantial financial deepening;
- 4+ Standards and performance norms of advanced industrial economies: full convergence of banking laws and regulations with BIS standards; provision of full set of competitive banking services.

I use this indicator as an integral measure of banking sector reform in the transitional economies. This index is closely related to the concrete actions of the government as it is directly depends on the subsequent government actions, while the previous measures of financial development are more independent of its actions. Consequently treating government actions in the financial reform sphere as exogenous to growth, I use financial development indicator as an instrument for each other indicator of financial development. So, simply said, this index gives me an ability to investigate how the governments, that actively pursue financial liberalization and reform influence growth in the short-run.

Table 11 is a small supplement to Table 1 and summarizes the information about the newly introduced variables.

**Table 11. Additional Data Details**

<b>Variable</b>	<b>Unit of Measurement</b>	<b>Source</b>
Asset share of state-owned banks	As a share of total bank assets	EBRD Transition Report 2001
Index of banking sector reform and interest rate liberalization	Subjective measure: 1 to 4+	EBRD Transition Report 2001

I estimate a pooled time series – cross section regression, using the data for two three-year periods: 1995-1997, 1998-2000. The dependent variables are taken as averages for this period and the independent are taken as initial values in the first year of the period (in this sense the methodology is similar to the previous pooled regression). The core results are given in a table 12 below:

**Table 12. Pooled Regressions for Transitional Economies**

Dep. Var	Indep Var	LLY	BANK	STSHARE	PRIVY	PRIVATE
GYP	Coeff	-0.07794	-4.57783	1.5297	2.836945	-13.5054
	st.dev	0.037694	1.32615	0.6874	1.055948	1.788845
	<b>p-value</b>	<b>0.0468</b>	<b>0.0016</b>	<b>0.0346</b>	<b>0.0114</b>	<b>0</b>
	R <sup>2</sup>	0.262431	0.201441	0.127629	0.23205	0.255017
INV	Coeff	0.145409	3.377712	7.363	10.48976	-4.29442
	st.dev	0.015301	0.638753	1.4776	2.369356	0.26342
	<b>p-value</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.0001</b>	<b>0</b>
	R <sup>2</sup>	0.401062	0.342103	0.508615	0.389912	0.368594
SAV	Coeff	0.126033	23.17553	14.3967	11.85701	-8.23987
	st.dev	0.021976	5.661973	1.1235	1.776243	1.251995
	<b>p-value</b>	<b>0</b>	<b>0.0003</b>	<b>0</b>	<b>0</b>	<b>0</b>
	R <sup>2</sup>	0.561592	0.601916	0.634976	0.523833	0.616715
INTSPR	Coeff	-0.06918	11.75376	-5.0317	-1.95837	-3.62785
	st.dev	0.015621	3.570551	2.0827	1.879442	1.281634
	<b>p-value</b>	<b>0.0002</b>	<b>0.0029</b>	<b>0.0249</b>	<b>0.307</b>	<b>0.0088</b>
	R <sup>2</sup>	0.363553	0.386932	0.615016	0.362221	0.368195
GYP/INV	Coeff	-0.00404	-0.20256	-0.0282	-0.5854	0.15798
	st.dev	0.001534	0.066984	0.0438	0.053793	0.049903
	<b>p-value</b>	<b>0.0129</b>	<b>0.0049</b>	<b>0.5251</b>	<b>0</b>	<b>0.0034</b>
	R <sup>2</sup>	0.278841	0.116768	0.109023	0.211748	0.18092

The “GDP growth” regression gives an unexpected sign to the liquid liabilities and share of credit, allocated to private sector parameter parameters. This gives further evidence, that one should not expect a definite positive impact of financial development on growth in the short term. Going on to further regressions, it can be seen, that both “investment” and “savings” regressions exhibit significant impact of financial development indicators on the dependent variables. The coefficient of asset share of state-owned banks is roughly twice as large as the share of central bank assets coefficient in the investment regression and roughly twice as small in the savings regression. In addition both of these coefficients in both of the regressions are positive. This suggests that substantial government presence in the financial sector is with higher savings and investment in the beginning periods of the transition process. Going further, the coefficient

accompanying PRIVY variable is negative in both cases. Here it can be said, that there is no definite relationship between financial sector development and saving rates.

The “interest rate” spread regressions yield expected statistically and economically significant coefficients for all the indicators, except the STSHARE variable, which has a positive coefficient, which means, that relatively larger share of government-owned banks is associated with lower interest rates.

Next, to provide further elimination of simultaneity bias, I estimate the two stage least squares regression, using EBRD index of financial reform and interest rate liberalization as an instrument for each financial development indicator. The core outputs of the regressions are given in table 13 below.

**Table 13. TSLS Pooled Regressions on Transition Economies**

Dep. Var	ndep Var	LLY	BANK	STSHARE	PRIVY	PRIVATE
GYP	Coeff	0.012459	-0.94463	-0.01252	1.531428	0.684981
	St.dev	0.05751	4.360321	0.057787	7.068937	3.16181
	<b>p-value</b>	<b>0.8299</b>	<b>0.8299</b>	<b>0.8299</b>	<b>0.8299</b>	<b>0.8299</b>
	R <sup>2</sup>	0.209312	0.209312	0.209312	0.209312	0.209312
INV	Coeff	0.105033	-7.9634	-0.10554	12.91024	5.774522
	St.dev	0.022034	1.67059	0.02214	2.708355	1.211399
	<b>p-value</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	R <sup>2</sup>	0.367799	0.367799	0.367799	0.367799	0.367799
SAV	Coeff	-0.27137	20.57503	0.272679	-33.3562	-14.9196
	st.dev	0.013452	1.01988	0.013516	1.653425	0.739548
	<b>p-value</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	R <sup>2</sup>	0.563695	0.563695	0.563695	0.563695	0.563695
INTSPR	Coeff	-0.93993	71.26331	0.944445	-115.532	-51.6753
	st.dev	0.057323	4.346112	0.057599	7.045901	3.151506
	<b>p-value</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	R <sup>2</sup>	0.493734	0.493734	0.493734	0.493734	0.493734
GYP/INV	Coeff	0.000164	-0.0124	-0.00016	0.020097	0.008989
	st.dev	0.002627	0.199175	0.00264	0.322901	0.144428
	<b>p-value</b>	<b>0.9508</b>	<b>0.9508</b>	<b>0.9508</b>	<b>0.9508</b>	<b>0.9508</b>
	R <sup>2</sup>	0.158904	0.158904	0.158904	0.158904	0.158904

It can be seen that the result of instrumental variable regressions support the previous findings even in a more pronounced form. When instrumented by financial reform index the impact of the financial development variables on each dependent variable becomes more homogeneous. Briefly, the table demonstrates that all financial development variables are insignificant in the “GDP growth” and “efficiency” regressions, due to the previously mentioned problem of short time-span used. Meanwhile they are all highly significant in the “investment”, “savings” and “interest rate spread” regressions, although in the “savings” regression all the parameters have signs, which are opposite to expected. The findings, described in the previous sentence suggest significant positive impact on investment and interest rate spread reduction and ambiguous impact on saving rates as did previous regressions.

Another interesting point is that the size of those coefficients in the “savings” and “investment” regressions, which did not change signs and significance status between the last and the previous regressions, did not experience significant changes. This robustness of magnitude is another evidence of significant impact. The coefficients in the “interest rate spread” regression, however, did jump drastically. The nature of the jump is relatively unclear to me, thus, it may mean stronger impact of financial development on spread reduction, than was suggested by previous regressions. It should also be mentioned, that the inconsistencies with the signs of the STSHARE and BANK variables have disappeared in the 2SLS regression. This may mean that the relationships, observed between these two variables and the levels of saving, investment and interest rate spread were driven partly by simultaneity bias.

## *Chapter 5*

### CONCLUSIONS

In this paper I studied the empirical link between finance and growth in transitional and developing economies. The GLS and TSLS estimation techniques were used to find out the impact of financial development on GDP growth and its channels, using cross-section and pooled regressions. The level of financial development was proxied by several indicators: the size of formal financial intermediary sector relative to GDP, the importance of banks relative to central bank, the share of credit, allocated to private sector, and the ratio of credit to private sector to GDP, the spread between lending and deposit interest rates. I tackled the problem of simultaneity bias by using initial values of financial development indicators for the sample of developing and transition economies and by using the progress in financial reform and interest rate liberalization as an instrument for financial development in the sample of transitional economies.

The estimated regressions showed that financial development does spur growth in developing and transitional economies via higher investment and lower intermediation costs. The regressions revealed significant and robust impact of financial development on GDP growth, investment and interest rate spread (the last variable was significantly influenced in the short run). On the contrary, the same regressions suggested that financial development does not have a definite impact on saving rates. This may mean, that the saving rates are determined by some other factor and since financial system is only an instrument of transferring funds from lenders to borrowers, low saving rates may act as a bottleneck and lead to the lack of internal investment funds in the economy. Since most of developing and transitional economies have rather poor access to foreign credit

resources, the previously mentioned situation may curb growth even in the economy with relatively developed financial system. The final finding is that financial development does not have a direct casual influence on efficiency (at least as it is proxied in the paper), although some long-run association does exist.

My findings are somewhat different from the ones, obtained by Levine (Levine (2002)) for the sample of developed and some developing economies. Levine finds that financial development has a significant casual impact on growth and technological innovation and no significant impact on capital accumulation and saving rates. Meanwhile my study reveals no impact on technological innovation and significant impact on investment. It should be said, that this comparison should be taken with a bit of caution as the Levine's' estimation techniques and time-spans under study are somewhat different. However, it must be said that there are also significant differences between my results and the results of the earlier Levines' paper (Levine [1991]), where the author uses techniques, much closer to the ones, used here, and where he finds significant impact of financial development on GDP growth, investment and productivity growth.

So, the differences between my findings and the ones in both of the Levines papers may suggest the existence of the qualitative deviation in the impact of financial development on growth channels between developed industrial economies and the rest of the world. The other possible conclusion, however, is apparent similarity as for the absence of definite significant impact on saving rates.

My findings do not have direct policy implications for developing economies, since the model for their sample was not linked to any policy options. On the other hand, since financial development indicators for the sample of transitional economies were instrumented by the progress in financial reform and interest rate liberalization, it is possible to say that a close attention to these issues should be

paid in all transitional countries, including Ukraine. However, some caution should be present because excessive financial liberalization has its cost sides in the form of macroeconomic instability and this issue was not tackled in my paper. Investigating the impact of financial liberalization on macroeconomic stability may one of the possible topics for further research. Among other possibilities I want to mention the option of using alternative proxies for financial development, alternative ways to fight simultaneity bias or just repeating this research after the several years, when longer time-spans of data appear for transitional economies, so more meaningful results will be available.

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APPENDIX

**TableA1 (a-e). Eviews Outputs for Contemporaneous Regressions with  
GDP per Capita Growth as a Dependent Variable**

**a) Contemporaneous Regression of Real per Capita GDP Growth on  
Liquid Liabilities**

Dependent Variable: GYP

Method: Least Squares

Date: 04/18/03 Time: 10:43

Sample(adjusted): 1 102

Included observations: 102 after adjusting endpoints

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDPI)	0.277454	0.386565	0.717742	0.4748
LOG(SECI)	-0.416570	0.621463	-0.670306	0.5044
P	-0.000579	0.000219	-2.643105	0.0097
GOV	-0.035058	0.061691	-0.568279	0.5712
TRD	-0.001004	0.007724	-0.129944	0.8969
LLY	0.043460	0.014330	3.032706	0.0032
LA	-0.199345	0.612061	-0.325695	0.7454
SSA	0.055305	0.729967	0.075764	0.9398
SA	2.031839	0.929918	2.184965	0.0315
TRANS	0.932404	0.883637	1.055189	0.2941
C	-0.150464	1.982576	-0.075893	0.9397
R-squared	0.246628	Mean dependent var		1.530591
Adjusted R-squared	0.163840	S.D. dependent var		2.472223
S.E. of regression	2.260645	Akaike info criterion		4.570750
Sum squared resid	465.0568	Schwarz criterion		4.853835
Log likelihood	-222.1083	F-statistic		2.979033
Durbin-Watson stat	2.271970	Prob(F-statistic)		0.002735

**b) Contemporaneous regression of Real per Capita GDP Growth on Share  
of Central Bank Assets**

Dependent Variable: GYP

Method: Least Squares

Date: 04/18/03 Time: 10:42

Sample(adjusted): 1 52 54 60 62 102

Included observations: 100 after adjusting endpoints

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDPI)	0.059735	0.475869	0.125527	0.9004
LOG(SECI)	-0.034914	0.710868	-0.049114	0.9609
P	-0.000447	0.000254	-1.760033	0.0818
GOV	-0.042760	0.062746	-0.681476	0.4973
TRD	0.003519	0.007523	0.467694	0.6411
BANK	-3.895536	1.625103	-2.397100	0.0186
LA	-1.019144	0.676307	-1.506924	0.1354
SSA	-0.679945	0.748229	-0.908740	0.3659
SA	1.289583	1.060405	1.216123	0.2272
TRANS	-0.556979	0.848915	-0.656107	0.5134
C	3.258488	2.669123	1.220808	0.2254
R-squared	0.223299	Mean dependent var	1.528625	
Adjusted R-squared	0.136029	S.D. dependent var	2.496527	
S.E. of regression	2.320523	Akaike info criterion	4.624928	
Sum squared resid	479.2496	Schwarz criterion	4.911497	
Log likelihood	-220.2464	F-statistic	2.558721	
Durbin-Watson stat	2.328625	Prob(F-statistic)	0.009142	
Sum squared resid	479.2496	Schwarz criterion	4.911497	
Log likelihood	-220.2464	F-statistic	2.558721	
Durbin-Watson stat	2.328625	Prob(F-statistic)	0.009142	

c) Contemporaneous regression of Real per Capita GDP Growth on  
**Claims on Private Sector as a Share of GDP**

Dependent Variable: GYP

Method: Least Squares

Date: 04/18/03 Time: 10:50

Sample(adjusted): 1 102

Included observations: 99

Excluded observations: 3 after adjusting endpoints

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDPI)	0.172922	0.416361	0.415317	0.6789
LOG(SECI)	-0.101342	0.647052	-0.156621	0.8759
P	0.000103	0.003435	0.030062	0.9761
GOV	-0.070286	0.062037	-1.132969	0.2603
TRD	0.000196	0.007556	0.025978	0.9793
PRIVY	3.602985	1.526442	2.360381	0.0205
LA	-0.870045	0.592574	-1.468247	0.1456
SSA	-0.467056	0.719241	-0.649373	0.5178
SA	1.697538	0.981966	1.728714	0.0874
TRANS	0.343166	0.956879	0.358630	0.7207
C	0.988708	2.195594	0.450315	0.6536
R-squared	0.185822	Mean dependent var		1.606572
Adjusted R-squared	0.093301	S.D. dependent var		2.416828
S.E. of regression	2.301321	Akaike info criterion		4.609283
Sum squared resid	466.0550	Schwarz criterion		4.897630
Log likelihood	-217.1595	F-statistic		2.008443
Durbin-Watson stat	2.239882	Prob(F-statistic)		0.041683

d) Contemporaneous regression of Real per Capita GDP Growth on  
 Claims on Private Sector as a Share of Domestic Credit

Dependent Variable: GYP

Method: Least Squares

Date: 04/18/03 Time: 10:52

Sample(adjusted): 1 102

Included observations: 99

Excluded observations: 3 after adjusting endpoints

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDPI)	0.437435	0.453594	0.964377	0.3375
LOG(SECI)	0.101813	0.715747	0.142248	0.8872
P	-0.000870	0.003675	-0.236746	0.8134
GOV	-0.078563	0.063778	-1.231815	0.2213
TRD	0.001613	0.007412	0.217664	0.8282
PRIVATE	0.086517	0.044104	1.961677	0.0530
LA	-1.121594	0.633568	-1.770282	0.0801
SSA	-0.832660	0.743661	-1.119677	0.2659
SA	1.537507	0.959534	1.602347	0.1127
TRANS	-0.425822	0.974455	-0.436985	0.6632
C	-0.374424	2.151448	-0.174033	0.8622
R-squared	0.128204	Mean dependent var		1.606572
Adjusted R-squared	0.029136	S.D. dependent var		2.416828
S.E. of regression	2.381359	Akaike info criterion		4.677659
Sum squared resid	499.0368	Schwarz criterion		4.966006
Log likelihood	-220.5441	F-statistic		1.294105
Durbin-Watson stat	2.193676	Prob(F-statistic)		0.246293

e) Contemporaneous regression of Real per Capita GDP Growth on  
 Claims on Private Sector as a Share of Domestic Credit (outliers excluded)

Dependent Variable: INV

Method: Least Squares

Date: 04/18/03 Time: 10:53

Sample(adjusted): 1 102

Included observations: 102 after adjusting endpoints

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDPI)	-1.534208	0.907441	-1.690696	0.0943
LOG(SECI)	2.124733	1.260364	1.685809	0.0953
P	-0.001491	0.000366	-4.068012	0.0001
GOV	0.023821	0.091784	0.259537	0.7958
TRD	0.077757	0.021700	3.583217	0.0005
LLY	0.088772	0.035231	2.519738	0.0135
LA	1.876812	1.554089	1.207661	0.2303
SSA	-1.229019	1.525906	-0.805436	0.4227
SA	1.079123	1.267658	0.851273	0.3969
TRANS	-0.488370	2.063827	-0.236633	0.8135
C	15.30278	4.549722	3.363453	0.0011
R-squared	0.450506	Mean dependent var	22.06074	
Adjusted R-squared	0.390122	S.D. dependent var	6.645754	
S.E. of regression	5.189980	Akaike info criterion	6.232910	
Sum squared resid	2451.166	Schwarz criterion	6.515995	
Log likelihood	-306.8784	F-statistic	7.460694	
Durbin-Watson stat	2.336021	Prob(F-statistic)	0.000000	

**TableA2 (a-e). Eviews Outputs for Contemporaneous Regressions with  
Investment Share in GDP as a Dependent Variable**

**a) Contemporaneous Regression of Investment as a Share of GDP on  
Liquid Liabilities**

Dependent Variable: INV  
Method: Least Squares  
Date: 04/18/03 Time: 11:02  
Sample(adjusted): 1 102

Included observations: 102 after adjusting endpoints

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDPI)	-1.534208	0.907441	-1.690696	0.0943
LOG(SECI)	2.124733	1.260364	1.685809	0.0953
P	-0.001491	0.000366	-4.068012	0.0001
GOV	0.023821	0.091784	0.259537	0.7958
TRD	0.077757	0.021700	3.583217	0.0005
LLY	0.088772	0.035231	2.519738	0.0135
LA	1.876812	1.554089	1.207661	0.2303
SSA	-1.229019	1.525906	-0.805436	0.4227
SA	1.079123	1.267658	0.851273	0.3969
TRANS	-0.488370	2.063827	-0.236633	0.8135
C	15.30278	4.549722	3.363453	0.0011
R-squared	0.450506	Mean dependent var		22.06074
Adjusted R-squared	0.390122	S.D. dependent var		6.645754
S.E. of regression	5.189980	Akaike info criterion		6.232910
Sum squared resid	2451.166	Schwarz criterion		6.515995
Log likelihood	-306.8784	F-statistic		7.460694
Durbin-Watson stat	2.336021	Prob(F-statistic)		0.000000

**b) Contemporaneous regression of Real per Capita GDP Growth on Share  
of Central Bank Assets**

Dependent Variable: INV

Method: Least Squares

Date: 04/18/03 Time: 11:02

Sample(adjusted): 1 102

Included observations: 102 after adjusting endpoints

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDPI)	-1.594409	1.204864	-1.323310	0.1890
LOG(SECI)	2.760759	1.441968	1.914577	0.0587
P	-0.001438	0.000329	-4.374816	0.0000
GOV	0.007371	0.093834	0.078553	0.9376
TRD	0.088147	0.019436	4.535120	0.0000
BANK	-4.717643	3.410548	-1.383251	0.1700
LA	0.181800	1.633763	0.111277	0.9116
SSA	-2.839571	1.764501	-1.609277	0.1110
SA	-0.104261	1.660412	-0.062792	0.9501
TRANS	-3.591016	1.870945	-1.919360	0.0581
C	19.16497	6.269271	3.056969	0.0029
R-squared	0.411933	Mean dependent var		22.06074
Adjusted R-squared	0.347310	S.D. dependent var		6.645754
S.E. of regression	5.369053	Akaike info criterion		6.300753
Sum squared resid	2623.233	Schwarz criterion		6.583839
Log likelihood	-310.3384	F-statistic		6.374422
Durbin-Watson stat	2.361065	Prob(F-statistic)		0.000000

c) Contemporaneous regression of Real per Capita GDP Growth on  
**Claims on Private Sector as a Share of GDP**

Dependent Variable: INV

Method: Least Squares

Date: 04/18/03 Time: 11:05

Sample(adjusted): 1 102

Included observations: 99

Excluded observations: 3 after adjusting endpoints

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDPI)	-1.928236	0.934121	-2.064225	0.0419
LOG(SECI)	2.596193	1.306300	1.987440	0.0500
P	-0.002849	0.003640	-0.782866	0.4358
GOV	-0.011373	0.103397	-0.109990	0.9127
TRD	0.079642	0.021778	3.657066	0.0004
PRIVY	8.864522	3.213269	2.758724	0.0071
LA	0.732336	1.453050	0.503999	0.6155
SSA	-2.303161	1.607510	-1.432750	0.1555
SA	0.423884	1.276144	0.332160	0.7406
TRANS	-0.955418	1.901788	-0.502379	0.6167
C	18.61576	5.184810	3.590442	0.0005
R-squared	0.432106	Mean dependent var	22.20323	
Adjusted R-squared	0.367573	S.D. dependent var	6.561038	
S.E. of regression	5.217684	Akaike info criterion	6.246424	
Sum squared resid	2395.732	Schwarz criterion	6.534770	
Log likelihood	-298.1980	F-statistic	6.695858	
Durbin-Watson stat	2.318435	Prob(F-statistic)	0.000000	

**d) Contemporaneous regression of Real per Capita GDP Growth on  
Claims on Private Sector as a Share of Domestic Credit**

Dependent Variable: INV

Method: Least Squares

Date: 04/18/03 Time: 11:05

Sample(adjusted): 1 102

Included observations: 99

Excluded observations: 3 after adjusting endpoints

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDPI)	-1.232628	0.964619	-1.277839	0.2047
LOG(SECI)	3.297334	1.444102	2.283312	0.0248
P	-0.005390	0.003746	-1.439076	0.1537
GOV	-0.037628	0.098826	-0.380749	0.7043
TRD	0.069243	0.015503	4.466274	0.0000
PRIVATE	0.971904	0.223993	4.338985	0.0000
LA	-0.237185	1.594251	-0.148775	0.8821
SSA	-4.001022	1.424777	-2.808175	0.0061
SA	-0.032209	1.590152	-0.020255	0.9839
TRANS	-2.630827	1.764466	-1.491004	0.1395
C	14.86251	4.771824	3.114639	0.0025
R-squared	0.540706	Mean dependent var	22.20323	
Adjusted R-squared	0.488514	S.D. dependent var	6.561038	
S.E. of regression	4.692342	Akaike info criterion	6.034180	
Sum squared resid	1937.590	Schwarz criterion	6.322526	
Log likelihood	-287.6919	F-statistic	10.35984	
Durbin-Watson stat	2.436413	Prob(F-statistic)	0.000000	

e) Contemporaneous regression of Real per Capita GDP Growth on  
 Claims on Private Sector as a Share of Domestic Credit (outliers excluded)

Dependent Variable: INV

Method: Least Squares

Date: 04/18/03 Time: 11:08

Sample(adjusted): 1 52 54 60 62 102

Included observations: 97

Excluded observations: 3 after adjusting endpoints

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDPI)	-1.214899	0.977412	-1.242975	0.2173
LOG(SECI)	3.390514	1.433557	2.365106	0.0203
P	-0.005015	0.003909	-1.282996	0.2029
GOV	-0.007371	0.100617	-0.073254	0.9418
TRD	0.066540	0.016218	4.102765	0.0001
PRIVATE	3.000439	0.880167	3.408943	0.0010
LA	-0.650571	1.656054	-0.392844	0.6954
SSA	-3.876634	1.421122	-2.727868	0.0077
SA	0.067014	1.566452	0.042781	0.9660
TRANS	-2.752966	1.816652	-1.515406	0.1333
C	12.91891	4.717956	2.738243	0.0075
R-squared	0.474616	Mean dependent var		21.91344
Adjusted R-squared	0.413524	S.D. dependent var		5.875935
S.E. of regression	4.499891	Akaike info criterion		5.952424
Sum squared resid	1741.415	Schwarz criterion		6.244401
Log likelihood	-277.6925	F-statistic		7.768969
Durbin-Watson stat	2.354121	Prob(F-statistic)		0.000000