5. FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH – A COMPARATIVE ANALYSIS –

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Abstract

This paper investigates the relationship between financial development and economic growth for developed and developing countries comparatively. The impacts of both stock markets and banks on economic growth are examined by using a panel data set of 21 developing and 16 developed economies for the period 1975-2006. Generalized method of moments technique developed for dynamic panel is applied. While the results of the econometric evidence relevant to developing economies indicate that both stock markets and banks positively influence the economic growth, the results of econometric evidence relevant to developed economies indicate that only stock markets positively influences the economic growth.

Keywords: economic growth, stock markets, banks, financial markets, dynamic panel
JEL Classification: E44, G15, O16

1. Introduction

Many interconnected changes that have occurred in national and international economic environment since 1980s initiated a rapid change and development process in the financial area, as in the other various areas of life. In a broad sense, financial development involves all arrangements aimed to stimulate national and international savings in financial area. In a narrow sense, it can be described as efficiency growth of the operation of financial intermediation sector that intermediates and that provides fond transfer between the sides. While financial development (and deepening) reflects growth in the variety of institutions, intermediations, and tools, it also indicates the depth, width, velocity and sophistication as well. The most important factors that influence financial development gaining acceleration starting from mid 1970's can be

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listed as follows: i- the risks that are introduced by the fluctuations of inflation, exchange rate and interest rate, ii- the change in economic environment by economic liberalization and globalization of capital, iii- the rapid changes in technology, and finally, iv- the financial innovation, which is triggered by the compound of all stated factors above. In order to avoid risks and to avoid restrictive legal arrangements (i.e. taxes and regulations), to reduce costs, to induce profitability and to create new resources by benefiting from technological advances, financial actors made financial innovations and compete severely with each other. Financial innovations that arise in the form of a new product or a new process have the functions of completing incomplete markets, reducing costs, and lessening asymmetric information. As long as profitability, demand of customer, and credibility continue, financial innovations occur.

The aim of this study is to detect the relationship between the financial development and economic growth in developing/emerging and developed countries comparatively. After surveying the theoretical foundations of the finance-growth relationship briefly in the second part of the study, we glance at empirical literature in the third part. In the fourth part, we specify the empirical technique that we use in order to investigate the finance-growth relationship. Having been explained our data in the fifth part, we finally present the empirical results in the last part of the study.

2. Financial Development/Depth and Economic Growth Relationship

The first issue is through which channels the financial development/deepening phenomenon that is triggered by the financial liberalization, globalization, financial innovations, and technology for the last 20 years affects economic growth and development? Second issue is how do endogenous growth models explain financial development and economic growth relationship?

Every kind of factor that leads to financial development affects the real sector. The issue of what these affecting channels (transmission channels) are carries weight in exploring the finance-growth relationship. Estrella (2001) assesses these transmission mechanisms in terms of deregulation, securitization, derivative instruments, and financial risk management. He indicates that each category of innovation may affect more than one channel of monetary transmission, which are interest rate channel, asset valuation channel/exchange rate channel, and credit channel. Financial deregulation's effects can be observed especially on interest rate and credit channels. Pricing restrictions may provide the monetary authority a greater degree of control over credit flows, which can affect the ability of private sector to adjust to new interest rates. Therefore, financial deregulation can affect interest rate channel through both the cost of capital effect and liquidity effect. Deregulation's effect on the credit channel arises through the bank lending effect. In the event of eliminating the restrictions on the funding of depositary institutions, the capacity of banks to fund themselves by offering competitive rates on deposits can significantly decrease the impact of the bank-lending channel.

The effect of securitization on the monetary transmission mechanism is observed the most in the interest rate and credit channels. The increase in securitization has made available for banks and for other issuers to offer alternative means of funding that were not available before. Therefore, in the event of securitization monetary authority's impact on market liquidity is bound to be dampened by the availability of these alternative sources of funding. Securitization is expected to affect the credit channel considerably as well. Because, the ability to securitize assets makes it harder for the central bank to influence credit flows, which may be funded in various new ways.

Although derivative instruments influence all monetary transmission mechanisms, their most noticeable effect is especially on asset valuation channel. Derivatives may be used to hedge assets of corporate equity, which produce effects on both wealth and capital valuation. Furthermore, the huge foreign exchange derivatives markets can influence the size of the exchange rate effect.

Besides the effects of new financial instruments on financial markets mentioned above, Prasad *et al*. (2003) state that financial globalization and integration may affect growth through direct and indirect channels. Direct channels can be listed as the augmentation of domestic savings, lower cost of capital due to better risk allocation, technology transfer and the development of financial sector. Indirect channels are promotion of specialization, encouraging better policies and enhancement of capital inflows by signaling better policies.

Many studies have investigated the relationship between financial development and economic growth. In the theoretical and empirical literature there have been studies asserting a one-way causality (towards financial development from economic growth or from financial development towards economic growth) or a two-way causality or lack of any causality between these two variables. The theoretical models explaining economic growth with endogenous dynamics produce noteworthy results/outcomes. Most of these theories emphasize well functioning and developed financial markets and institutions accelerate economic growth in the long run for the following reasons. First, in an economy where the banking sector is not developed the savings are hold as unproductive liquid assets. By developing this sector, savings in the economy is transmitted to illiquid but productive assets through the banking system; by rising of new financial instruments or by developing of stock markets since liquidity risk is eliminated, investors undertake long-run investment projects. Second, decreasing costs of information and transaction, bring about more efficient resource allocation (Bencivenga, Smith, 1991; Bencivenga, Smith, Starr, 1995). Third, the existence of financial markets speeds up the application of new technologies, specialization in entrepreneurship in order to benefit from the new technologies and the development of entrepreneurship. Finally, growing competition increase efficiency and growing diversity (new kinds of financial instruments, financial organizations etc.) decrease risk (Greenwood, Smith 1997; Greenwood, Jovanovic, 1990; King, Levine, 1993). The theories pointing out the advantages of financial markets, however, emphasize a possible disadvantage of it. This disadvantage is that because of improving resource allocation and higher returns of savings as a consequence of financial development, the saving rates in economies may decrease. If there are strong externalities relating to investments and savings, financial development may decelerate economic growth.

The theory produces contrastive estimations about whether the banks and stock markets are complementary or substitute and which effects economic growth more.

3. Empirical Literature in Brief

Many of the empirical studies in growth literature investigate whether the GDP per capita converges to steady state and, if it converges, the speed of the convergence. Barro and Sala-i Martin (1995) show that the average GDP per capita growth depends on the initial GDP per capita. From hence, the following finance-growth model is followed in this study:

$$\Delta Y = \alpha Y_0 + \eta H + \lambda F + \beta X + U$$

where ΔY is real GDP per capita growth, Y_0 is initial per capita outcome level, *H* is human capital variable, F is financial variables, *X* is political variables and finally U is the error term.

There are many studies investigating the relationship between financial development/deepening and economic growth. In the overwhelming majority of these studies, however, the relationship between banking sector, which is many countries' the most important part of financial markets, and growth is examined. These studies generally do not simultaneously examine the stock market development.

In their study, Levine and Zervos (1998) investigate the relationship between stock markets and banking sector development and economic growth empirically. With the dataset of 47 countries over the period of 1976-1993, they apply ordinary least squares (OLS) method. In order to measure the development of the banking sector Levine and Zervos (1998) use bank credit to the private sector as a share of GDP and to measure the stock market development they use the market capitalization as a share of GDP, value of trade as a share of GDP and turnover ratio with initial values. Levine and Zervos's (1998) findings show that the initial values of the variables related to the stock markets and banking sector are strong predictors of economic growth over the next 18 years. However, the weakness of this study is that while theory asserts a relationship between contemporaneous level of financial development and economic growth, Levine and Zervos (1998) use initial measures.

The study in which Rousseau and Wachtel (2000) investigate the effects of stock markets and banking sector development on economic growth is an important contribution to the literature for containing panel techniques. In their empirical study in which the difference panel estimator developed by Arellano and Bond (1991) is used, Rousseau and Wachtel (2000) use the dataset of 47 countries over the period of 1980–1995 with the explanatory variables market capitalization/GDP, the value of trades/GDP, per capita trade value, per capita market capitalization, real per capita M3; and with the independent variable real per capita GDP. Their study shows that both banking and stock market sectors support growth markedly.

Using quarterly data Arestis, Demetriades and Luintel (2001) apply time series methods for five developed countries which are Germany, USA, Japan, UK and France. While the explanatory variables like stock market capitalization/GDP, domestic bank credits/GDP, stock market volatility are used for all countries in the

model, the other explanatory variables such as value traded/GDP and turnover ratio are used only for USA and UK, which have quite developed stock markets. The authors find that although the banking sector and stock market development make significant contribution to growth in Germany, Japan and France, the effect of banking sector development to growth is greater than the stock markets. They report that finance-growth nexus is weak in USA and UK and this weak causality runs from growth to finance.

4. The Methodology

In this study, we use one of the panel data techniques - difference panel estimator - developed by Arellano and Bond (1991). Dynamic panel is an advantageous method of examining the economic relationships that are intrinsically dynamic. We investigate the financial determinants of economic growth, which is our fundamental research subject, with the other determinants of it. One of the most important elements that affects economic growth is its previous value. Therefore, we think the dynamic model is an advantageous method for our research area.

The dynamic panel method can be expressed as:

$$y_{it} = \delta y_{i,t-1} + x'_{it}\beta + u_{it} \qquad i = 1,...,N\ ;\ t = 1,...,T$$

δ, is a scalar, x'_{it} $1\times K$ and β is $K\times 1$ dimensional matrix. *y*, is per capita economic growth ratio in t; y_{t-1} is per capita economic growth ratio in t-1; x_t explanatory variables and time dummies and u_t the error term.

Arellano and Bond (1991) suggest differencing the growth regression equation to remove any bias created by unobserved country specific effects:

$$y_{it} - y_{i,t-1} = \delta(y_{i,t-1} - y_{i,t-2}) + (v_{it} - v_{i,t-1}) \tag{1}$$

$(v_{it} - v_{i,t-1})$, is MA (1) with unit root. For the first period we observe this relationship, i.e. for t =3 we observe

$$y_{i3} - y_{i2} = \delta(y_{i2} - y_{i1}) + (v_{i3} - v_{i2}) \tag{2}$$

In this case, y_{i1} is a valid instrument for Δy_{i2}, since it is highly correlated with $(y_{i2} - y_{i1})$ and not correlated with $(v_{i3} - v_{i2})$ as long as the v_{it} are not serially correlated. But for t=4 we observe,

$$y_{i4} - y_{i3} = \delta(y_{i3} - y_{i2}) + (v_{i4} - v_{i3}) \tag{3}$$

In this case, y_{i2} and y_{i1} are valid instruments for $(y_{i3} - y_{i2})$, since both y_{i2} and y_{i1} are not correlated with $(v_{i4} - v_{i3})$. Thus for period *T*, the set of valid instruments becomes $(y_{i1}, y_{i2}, ..., y_{i,T-2})$.

Arellano-Bond estimators have one-step and two-step variants. Preliminary one-step consistent estimator is given as follows:

$$\hat{\delta}_1 = \left[(\Delta y_{-1})'W(W'(I_N \otimes G)W)^{-1}W'(\Delta y_{-1})\right]^{-1}\left[(\Delta y_{-1})'W(W'(I_N \otimes G)W)^{-1}W'(\Delta y)\right] \quad (4)$$

In addition to one-step GMM estimator, Arellano and Bond (1991) present two-step consistent GMM estimator:

$$\hat{\delta}_2 = \left[\left(\Delta y_{-1}\right)' W V_N^{-1} W'(\Delta y_{-1})\right]^{-1}\left[\left(\Delta y_{-1}\right)' W V_N^{-1} W'(\Delta y)\right] \quad (5)$$

where $V_N = \sum_{i=1}^{N} W_I'(\Delta v_i)(\Delta v_i)'W_i$'dir. This GMM estimator requires no knowledge concerning the initial conditions or the distributions of v_i and μ_i. To operationalize this estimator, Δv is replaced by differenced residuals obtained from the preliminary consistent estimator ($\hat{\delta}_1$).

The consistency of the GMM estimator depends on the validity of the instruments and on the validity of the assumption that the error terms do not exhibit serial correlation. Arellano and Bond (1991) suggest to test whether these conditions are ensured or not. They use two specification tests. The first one tests the hypothesis that the error term, ε_{it}, is not serially correlated. In order to test the validity of the instruments Sargan test of over-identifying restrictions is used. Sargan test examines the overall validity of the instruments by analyzing the sample analog of the moment conditions used in the estimation procedure. If the null hypotheses of both tests cannot be rejected our model is supported.

Arellano and Bond (1991) point out that the method depending on differencing can introduce problems when it is applied to samples with a small number of cross-sectional units. Arellano and Bond (1991) and Blundell and Bond (1998) show that the asymptotic standard errors for the two-step estimators are biased downwards. However, even in the case of homoskedastic error terms the one-step estimator is asymptotically inefficient relative to the two-step estimator. Therefore, the coefficient estimations of the two-step estimator are asymptotically more efficient, but the asymptotic inference from the one-step standard errors might be more dependable. When the number of instruments is equal to or larger than the number of cross-sectional units this problem get worse biasing both the standard errors and the Sargan test downwards and might result in biased asymptotic inference.

In order to overcome the aforecited issue we first deal with the first stage results. In this case, the coefficient estimations are less efficient but the asymptotic standard errors are unbiased. Second, we comprise a limited number of control variables (Model 2, Model 3, Model 4, and Model 5). Particularly, for the policy conditioning information set, we only include one extra policy variable, instead of including them all at once. In consequence of keeping the instrument set small, we minimize the over-fitting problem and maximize the confidence in the more efficient Arellano-Bond two-step system estimator. However, including all of the variables we use in the empirical analyses part of this study in the model, we try to assess the change in the result.

The bank credit variable we use in all our models has an endogenous structure and thus is serially correlated with the error term due to the reverse causality character

that it has. The variables that measures financial development are accepted in literature as potentially endogenous (Greenwood, Jovanovic, 1990; Bencivenga, Smith, 1991; Levine, 1991; Levine, 1992; De Gregorio, 1993; Greenwood, Smith, 1997; Saint-Paul, 1992). The financial development variables we use in this study have endogenous character as well. From hence and following the finance-growth literature, we use the bank credit for developing countries and two the stock market turnover ratio for the developed countries.

5. Data

In this study, we investigate the relationship between financial development and growth in two panels of 21 developing/emerging countries[1] and 16 developed countries[2]. We averaged the data over five year periods among 1975-2006[3]. One step system estimator and two-step system estimator of the Arellano-Bond dynamic panel technique are used[4].

Finance-growth literature emphasizes the role of lessening information asymmetries and reducing transaction costs of the banks and stock markets. However, we do not have a measure that shows to what extent banks and stock markets perform the function of improving the information and transaction costs in a broad cross section of countries. Because of having no direct link between the theory and measure, in order to estimate the differences between countries' stock markets and banking sector development, proxy measures of banking size and stock market activity are used (Beck, Levine, 2004).

In the empirical analyses of the study, in order to test the financial development and economic growth, we use the measure of **turnover ratio** to represent the development of stock markets, which indicates the liquidity of the market. Stock market turnover ratio (stock market transaction ratio) indicates the ratio of the value of trades of shares on domestic exchanges to total value of listed shares. In other words, it shows the ratio of trading amount of the stock market to its size. High turnover ratio is generally an indicator of low transaction cost. However, we should note that large stock markets do not necessarily imply high stock market liquidity. A developed but illiquid stock market has a high capitalization ratio but low turnover ratio (Levine, Zervos, 1998).

There are some studies asserting that countries with illiquid stock markets produce discouragement for entrepreneurs to undertake long run investments. Because it is relatively difficult to sell one's stake at an urgent liquidity need in an illiquid stock

[1] Brazil, Chile, Colombia, Egypt Arab Republic, Greece, India, Indonesia, Israel, Jordan, Korea Republic, Malaysia, Mexico, Pakistan, Peru, Philippines, Portugal, South Africa, Thailand, Turkey, Venezuela, Zimbabwe.

[2] Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Great Britain, Italy, Japan, Netherlands, New Zealand, Norway, Sweden, USA.

[3] Because of averaging the data of our observation period 1975-2006 over five years, we have 6 periods in our study. These 6 periods cover the years 1975-1979, 1980-1984, 1985-1989, 1990-1994, 1995-1999, and 2000-2006.

[4] Ordinary Least Squares results are given in Appendix in brief.

market, it is discouraging to attempt long-run investments. On the contrary, because investors have ready exit opportunity from the market in liquid stock markets, the discouraging factors that impede entrepreneurs to undertake long-run investments reduces (Levine, 1991; Bencivenga, Smith, Starr, 1995; Beck, Levine, 2004).

When analyzing the effects of financial markets on economic growth by using econometric techniques, we experimented some variables relevant to stock markets other than turnover ratio, which are value traded and stock market capitalization. However, Beck and Levine (2004) stresses on some drawbacks of these variables. First, stock market value traded which equals the value of the trades of domestic shares on domestic exchanges divided by GDP, does not measure the liquidity of the market; instead, it measures the ratio of trading to the size of the economy. Second, because markets are forward looking, in the case of a positive expectation that occurs in the economy, share prices rise. Stock market value traded equals the product of stock quantity and stock price. Thus without an increase in the number of transactions, value of traded may increase by the rise in stock prices. On the other hand, both numerator and denominator of the stock market turnover ratio include price, therefore it does not contain price effect and does not have the aforementioned weakness (Rousseau, Wachtel, 2000; Beck, Levine, 2004).

Stock market capitalization is the ratio of value of listed shares to GDP. The study of Levine and Zervos (1998) shows that the aforementioned variable is not a good predictor of growth. The weakness of this indicator is that the listed shares are not the only factor that specifies resource allocation and growth in an economy. Therefore, aforecited variable is not a very qualified one that measures the relationship between stock market development and economic growth. Furthermore, the drawback cited above for value traded is valid for stock market capitalization as well (Rousseau, Wachtel, 2000; Beck, Levine, 2004).

In the developing countries, specifically the banking sector constitutes a very important part of the financial markets. Following Levine and Zervos (1998), Rousseau and Wachtel (2000), Beck and Levine (2001), Beck and Levine (2004), the measure of banking sector development that we use in our study is **bank credit**, which equals the ratio of bank claims on the private sector by deposit money banks to GDP.

In the financial development-economic growth literature, most of the studies investigating this relationship use the ratio of M3 to GDP as the proxy measure of financial development (King, Levine, 1993; Coe *et al*., 1995; Rousseau, Wachtel, 2001; Rousseau, Wachtel, 2005; Ang, McKibbin, 2007). As an indicator of financial development however, it is more reliable to use bank credit instead of M3/GDP. Since excluding development bank credits and credits to government and public enterprises, bank credit includes credit only to private sector (Beck, Levine, 2001).

In order to assess the independent relationship between “the stock markets and growth” and “the banking sector and growth”; we add the other potential determinants of growth we use in our regression to the models one by one. We include **initial real GDP per capita** and **average years of schooling** variables in all our models to control for the effect of convergence of the economies and for the human capital, respectively. Other variables we add to the models one by one are **black market**

exchange premium[5]**, trade openness**[6]**, inflation rate,** and **government expenditures**7**,** which we call political variables.

In Table 1 and Table 2 descriptive statistics and correlations are presented for the developing countries. There is a wide difference between the maximum and minimum values of stock markets and banking sectors of 21 emerging economies that we include in our observation period. For instance, in 1985-1989 the bank credit was 0.05 in Peru, meaning that the ratio of credit to private sector by deposit money banks was 5% of GDP, whereas in 2000-2006 it was 135% of GDP in Portugal. On the other hand, turnover ratio was 0.0037 in Portugal in 1975-1979; however, it was 3.5859 in Pakistan in 2000-2006. As can be followed from Table 2, the correlation of economic growth with turnover ratio is higher than the correlation with bank credit. Turnover is not notably correlated with bank development.

Table 1

Summary Statistics: 1975-2006 (Developing countries)

	Growth	Turnover ratio	Bank credit
Mean	0.0215473	0.4190959	0.3591212
Standard deviation	0.0259414	0.5237016	0.2416169
Minimum	-0.0647756	0.0036627	0.05
Maximum	0.1104	3.585924	1.344878
Number of observation	126	117	122

Table 2

Correlations (Developing countries)

	Growth	Turnover ratio	Bank credit
Growth	1		
Turnover ratio	0.3047	1	
Bank credit	0.2327	0.1270	1

In Table 3 and Table 4, descriptive statistics and correlations for developed countries are presented. The difference between the maximum and minimum values of turnover ratio for developed countries is not as big as the difference for developing countries. While Denmark has the minimum value of turnover ratio with 0.01233 in 1975-1979, USA has the maximum value of turnover ratio with 1.6257 in 2000-2006. Then again, while in New Zealand bank credit to private sector is 15% of GDP in 1975-1979, this ratio is 207% of GDP for Netherlands in 1995-1999. In our analyses for the developed countries, the correlation of economic growth with both turnover ratio and bank credit is weaker than the correlations of emerging countries. On the contrary, the correlation between turnover ratio and bank credit for developed countries is stronger than emerging countries'.

[5] Black market exchange premium is formalized by [(parallel rate/official rate)-1]*100.
[6] Trade openness equals the ratio of the sum of export and import to the GDP.
[7] Government expenditures variable is defined as the ratio of government expenditures to the GDP.

Table 3

Summary Statistics: 1975-2006 (Developed countries)

	Economic growth	Turnover ratio	Bank credit
Mean	0.0193926	0.4640396	0.656476
Standard deviation	0.0105326	0.3303795	0.3305055
Minimum	-0.019438	0.012331	0.152319
Maximum	0.042464	1.625731	2.072126
Number of observation	96	92	96

Table 4

Correlations (Developed countries)

Değişken	Economic growth	Turnover ratio	Bank credit
Economic growth	1		
Turnover ratio	0.1146	1	
Bank credit	0.0074	0.2529	1

We test the relationship between financial development and economic growth for 21 emerging countries and 16 developed countries (composed of some OECD countries) by using dynamic panel developed by Arellano and Bond (1991). Data are averaged over 5 year periods between 1975-2006. Since the data relevant to variables we used are not complete throughout our observation period, this study is an unbalanced panel. In the regressions, we use the logarithm of real per capita GDP, logarithm of bank credit, logarithm of turnover ratio, logarithm of trade openness and logarithm of government expenditures. Average years of schooling, inflation rate and black market exchange premium are included as logarithm(1+variable) in the regressions.

The data we use in our empirical analyses are from various sources. Data related to real per capita GDP, government expenditures, trade openness and inflation rate are from the World Development Indicators of the World Bank. The required simple averages have been calculated by our own. Turnover ratio and bank credit data are from Beck, Demirgüç-Kunt and Levine (2000)'s updated dataset, average years of schooling data are from Barro and Lee (2000)'s dataset, and finally black market exchange premium data are from several issues of Pick's Currency Yearbook and World Currency Yearbook and from International Financial Statistics (IFS) of International Monetary Fund.

6. The Results

Before presenting the results, we should note an issue. When investigating the relationship between financial development and economic growth for developing/emerging countries and for developed countries separately, we also tried variables other than the ones we use in this study. The reason of diversifying our test by including new variables is, if any positive change in results occurs in the case of adding new variables. Since there are three petroleum exporter countries in our

emerging countries group - Egypt, Indonesia, Venezuela -, one of the variables we tried during our analysis process was petroleum exporter countries dummy. The test results with this dummy variable show no positive change relative to the previous results. The second variable we tried was the growth rate of USA as a representative for the world conjuncture. However, neither of the regressions that the growth rate of USA is included result in a better outcome. Finally, in order to take into account the gravity of agricultural sector in the economy, we gave place to the share of agricultural sector in GDP in our experimented variables. As in the case of other experimented variables, the results are not as expected either.

Under this title of our study, Arellano-Bond test results for emerging countries and for developed countries are given. Arellano-Bond test results for emerging countries are exhibited in Table 5, the same test results for developed countries are exhibited in Table 6.

Because of the diminishing returns of capital according to Solow neoclassical growth theory, in the countries where the capital stock level is low, the return of capital would be higher. Therefore, from two countries that have the same amount of saving, the country of which the capital stock level is low grows faster than the country of which the capital stock level is high. In other words capital moves to developing countries from developed countries. Thus, evidence indicating a negative relationship between countries' initial real per capita GDP and their growth rate is a sign of convergence between these economies. A negative relationship between these two variables can be interpreted as an evidence of convergence both in income level and in growth rate. According to this hypothesis (absolute convergence hypothesis), the countries of which the income level is low grow initially faster, so that they catch up with high-level income countries. In the long-run, growth rate (steady state growth rate) catches technological advance level and thus the convergence in growth rates occurs.

The results of the analyses belonging to developing countries in Table 5 show that in five of our models where policy variables were separately included and in the 6^{th} model where all variables were included and in the 7^{th} model there is a negative and significant relationship between initial real per capita GDP and per capita growth (from -0.0835 to -0.0549). As can be followed from Table 6, a negative and significant relationship between the stated variables is valid also for developed countries (from -0.0095 to -0.0001). In other words, for both our 21 emerging countries and 16 developed countries convergence hold.

The average years of schooling, which is one of the main variables of our regressions, is expected to affect growth positively. Since as the amount of better-educated labor source increase in a country, the ability to absorb and use new technologies, the ability to make innovations improve in this country as Abromovitz (1986) and Lucas'ın (1993) stated. Therefore, education has a significant role in growth.

While in all our regressions relating to developing countries, the sign of the coefficient of average years of schooling is negative, it enters significantly in just first, third, fourth and fifth regressions (from -0.0408 to -0.004). In literature, both in studies investigating the determinants of growth and in studies investigating human capital and growth, negative relationships are found. As this is the case for developing countries, it is different for developed countries. Table 6 shows that the sign of

average years of schooling is positive in all our regressions; however, it enters significantly in just first four regressions (from 0.0478 to 0.071).

Islam (1995) asserts that one reason for negative sign for human capital coefficient is the paradox between the theoretical human capital variable in production function and human capital variable in regressions. Enrolment ratio is just a partial indicator of human capital investment for example. Similarly, education duration may not represent human capital perfectly. Furthermore, average years of schooling do not account for the disparities in education quality. It might be due to misallocation of resources that diverts human capital from growth-enhancing activities to rent seeking strategies (see Pissarides (2000) for discussion). On the other hand, especially in the developing countries, when human capital is measured by using these indicators, even it seems to be made progress in human capital, the real progress in human capital may not be as high as thought. While all critiques are given though, average year of schooling is used to represent human capital in empirical studies extensively.

Bank credit that is one of our financial variables is expected to have a positive impact on growth, especially for the developing countries. The obtained findings verify our expectations for both developing (from 0.0025 to 0.0242) and developed countries (from 0.0005 to 0.0064). Nevertheless, while bank credit enters significantly in all six regressions (except Model 6 in Table 5) for developing countries, it enters insignificantly in all seven regressions for the developed countries.

Stock turnover ratio, which is used as an indicator of stock market liquidity and thus financial depth, is also expected to have a positive influence on economic growth as bank credit. Being consistent with our expectation, turnover ratio enters significantly with a positive sign in all regressions both in Table 5 (from 0.0038 to 0.0062) and in Table 6 (from 0.0008 to 0.0064).

As can be observed from Table 5 (indicating the findings of analyses for developing countries), coefficients of bank credit are higher than the turnover ratio's. These findings are consistent with the theory. Theory asserts that financial markets develop as economies grow. However, while in the early stages of growth banking sector is the key/dominant sector in financial markets, in the further stages of growth its weight in total reduces by the development of stock markets and other new and complex markets.

Yet, the effect of government consumption on economic growth is controversial in the growth literature, the influence changes according to the kind of the consumption. Barro and Sala-i Martin (1995) state that whereas productive investments (like education and infrastructure investments) support growth, unproductive investments impede it. Furthermore, crowding-out effect strengthens the probability of the sign of government expenditure to be negative.

Including the initial real per capita GDP, average years of schooling, bank credits and turnover ratio and controlling for government consumption in the second regression of both tables, the results indicate a significant and positive sign. Likewise, the results of the sixth and seventh regressions show that the coefficients of government consumption enter regressions significantly with a positive sign. These findings are parallel with the findings of the near past studies (see Barro, 1996; Barro, Sala-i Martin 2004).

Trade openness is asserted in endogenous growth literature to act as a channel in the transmission of knowledge throughout the countries by the ways of importing ecdemic machinery and equipment or new ideas. Specialization and the diffusion of knowledge have a positive effect on growth. Thereof the countries, which have greater trade openness, have a greater economic growth rate[8]. In the empirical and theoretical studies investigating the trade - growth relationship, however, there has not been a consensus on the direction of the relationship.

Table 5

GMM Difference Estimator (Developing Countries)†⊥

Independent V.	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model7
Growth_1	-0.1215 (0.010)	-0.1091 (0.046)	-0.1659 (0.000)	-0.1291 (0.043)	-0.0723 (0.090)	-0.2523 (0.084)	-0.2678 (0.012)
Constant	0.0137 (0.000)	0.0052 (0.002)	0.0059 (0.001)	0.0053 (0.007)	0.0173 (0.000)	0.0060 (0.081)	0.0145 (0.028)
Initial per capita GDP•	-0.0765 (0.000)	-0.0681 (0.000)	-0.0724 (0.000)	-0.0712 (0.000)	-0.0835 (0.000)	-0.0625 (0.000)	-0.0549 (0.000)
Average Years of Schooling••	-0.0408 (0.000)	-0.0073 (0.575)	-0.0279 (0.026)	-0.0297 (0.044)	-0.0218 (0.035)	-0.0104 (0.554)	-0.0040 (0.838)
Bank Credit*	0.0195[a] (0.001)	0.0146[b] (0.008)	0.0179[b] (0.005)	0.0242[a] (0.000)	0.0138 (0.039)	0.0025 (0.743)	0.0182[c] (0.001)
Turnover Ratio*	0.0049[a] (0.001)	0.0044[c] (0.010)	0.0043[a] (0.008)	0.0062[b] (0.000)	0.0038[a] (0.015)	0.0043 (0.029)	0.0049[c] (0.006)
Government Consumption*		0.0416 (0.000)				0.0485 (0.000)	0.0383 (0.000)
Trade Openness*			0.0184 (0.001)			0.0114 (0.102)	0.0127 (0.024)
Inflation Rate**				-0.0156 (0.083)		-0.0292 (0.009)	-0.0218 (0.033)
Black Market Premium**					-0.0001 (0.934)	-0.0010 (0.770)	
Time dummy variable (1985-1989)			0.0058 (0.088)				
Time dummy variable (1990-1994)	0.0078 (0.014)	0.0075 (0.002)	0.0071 (0.018)	0.0080 (0.020)	-0.0082 (0.040)		0.0094 (0.006)
Time dummy variable (1995-1999)					-0.0261 (0.001)		
Sargan Test*** (p value)	0.7358	0.8935	0.7005	0.8010	0.8486	0.9732	0.8549
1st Order Serial Correlation Test (p value)	0.0900	0.0931	0.0674	0.0721	0.0348	0.0557	0.0203
2nd Order Serial Correlation Test**** (p value)	0.9629	0.7352	0.8705	0.9545	0.1767	0.4431	0.4852
Wald Test	459.75	1220.16	331.74	271.04	750.14	784.57	489.44
Countries	21	21	21	21	21	21	21
Observations	83	83	83	83	76	76	83

[8] See Grossman and Helpman (1991a, 1991b, 1995) and Edwards (1993) for a detailed survey.

† P-values are given in parentheses.

⊥ The dependent variable in all regressions is real per capita GDP growth.

* This variable is included as log(variable) in the regression.

Table 6

GMM Difference Estimator (Developed Countries) †⊥

Independent V.	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model7
Growth_1	-0.0744	-0.1769	-0.0774	-0.0304	-0.2649	-0.2495	-0.2397
	(0.054)	(0.000)	(0.060)	(0.098)	(0.005)	(0.000)	(0.000)
Constant	0.0076	0.0045	0.0072	0.0064	0.0077	0.00003	0.0041
	(0.000)	(0.001)	(0.000)	(0.000)	(0.026)	(0.094)	(0.061)
Initial per capita GDP•	-0.0001	-0.0043	-0.0085	-0.007	-0.0030	-0.0055	-0.0095
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.026)	(0.038)
Average Years of Schooling••	0.0589	0.0710	0.0551	0.0573	0.0478	0.0486	0.0521
	(0.002)	(0.002)	(0.007)	(0.009)	(0.131)	(0.233)	(0.165)
Bank Credit*	0.0037	0.0005	0.0035	0.0036	0.0041	0.0064	0.0057
	(0.193)	(0.865)	(0.225)	(0.264)	(0.466)	(0.161)	(0.190)
Turnover Ratio*	0.0024[c]	0.0064[c]	0.0021[b]	0.0016[c]	0.0008	0.0041	0.0037[c]
	(0.075)	(0.000)	(0.027)	(0.096)	(0.051)	(0.125)	(0.045)
Government Consumption*		0.0670				0.0886	0.0787
		(0.000)				(0.001)	(0.000)
Trade Openness*			0.0093			0.0119	
			(0.178)			(0.389)	
Inflation Rate**				-0.0731		-0.1449	-0.1406
				(0.002)		(0.015)	(0.017)
Black Market Premium**					-0.0047	-0.0048	-0.0054
					(0.997)	(0.002)	(0.000)
Time dummy variable	-0.0229	-0.0160			-0.0259		
(1990-1994)	(0.000)	(0.000)			(0.000)		
Time dummy variable	-0.0215	-0.0140	-0.0031		-0.0292		-0.0355
(1995-1999)	(0.000)	(0.008)	(0.001)		(0.001)		(0.000)
Time dummy variable	-0.0350	-0.0238			-0.0473		-0.0582
(2000-2006)	(0.000)	(0.001)			(0.000)		(0.000)
Sargan Test***	0.7296	0.7514	0.7035	0.7200	0.4244	0.3733	0.3826
(p-value)							
Serial Correlation	0.0716	0.0968	0.0762	0.0624	0.0772	0.1604	0.0404
Test of 1st Order (p-value)							
Serial Correlation	0.2744	0.1315	0.2150	0.3951	0.5575	0.6975	0.8352
Test of 2nd Order **** (p-value)							
Wald Test	3916.06	31642.57	3239.59	7883.76	3027.67	8156.84	17921.67
Countries	16	16	16	16	16	16	16
Observations	75	75	75	75	55	53	53

** This variable is included as log(1+variable) in the regression.

*** The null hypothesis is that the instruments used are not correlated with the residuals.

****The null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

a, b, c show the significance at the %1, %5, and %10 level in the first stage regression.

† P-values are given in parentheses.

⊥ The dependent variable in all regressions is real per capita GDP growth.

* This variable is included as log(variable) in the regression.

** This variable is included as log(1+variable) in the regression.

*** The null hypothesis is that the instruments used are not correlated with the residuals.

Besides the studies stating that trade openness affects economic growth positively[9], there have been studies asserting an opposite relationship[10]. Nevertheless, the great majority of the studies affirm a positive relationship between these two variables. Thereof, we expect sign of the coefficient of trade openness to be positive.

As can be observed from Table 5 and Table 6 the coefficient of trade openness in the relevant regressions, which is one of our political variables, is positive in parallel with our expectations. However, it enters significantly only in the 3rd and 7th regressions of Table 5.

From the regressions (3rd, 6th and 7th regressions of both Table 5 and Table 6) in which inflation is included besides real per capita GDP, average years of schooling, bank credit and turnover ratio, we can observe that inflation enters significantly in the relevant regression with negative signs.

Black market exchange premium reflects the biases that occur in exchange rate, price and foreign trade collectively (Easterly, 1994; Levine, Zervos, 1998). Hence, it can be useful in assessing the independent relationship between the growth indicators and development measures. Because an increase in the value of black market premium is assessed as deterioration in stability of exchange markets and thus in prices and in foreign trade, the sign of the cited variable's coefficient is expected to be negative.

The last political variable we use in our empirical testing is black market exchange premium. Table 5 and Table 6 shows that the sign of the cited variable's coefficient is negative in all regressions which black market premium is included in as expected. However, it enters significantly to only the 6th and the 7th regressions of Table 6.

7. Conclusion

Our test results indicate a positive impact of financial development on economic growth especially for the developing countries. Stock market development and bank development jointly enter the entire difference panel regressions of both developed and developing economies significantly. The independent impact of stock market development and bank development on economic development does not produce the similar results however. While across different control variables both stock markets and banks enter the growth regressions significantly for developing countries, only stock markets enter the growth regressions significantly for developed countries by using the two-step difference estimator. We can interpret these results relating to developed and developing economies as supporting the studies asserting that as the economies grow, the weight of the banking sector in financial markets reduces that might result in an ambiguous effect.

**** The null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

a, b, c show the significance at the %1, %5, and %10 level in the first stage regression.

[9] See Dolar and Kraay (2004), Lee et all. (2004) and Edwards (1993) for a detailed survey.

[10] See Rodriguez and Rodrik (2000) for a detailed survey.

References

Abramovitz, M. (1986), "Catching Up, Forging Ahead and Falling Behind". *Journal of Economic History*, 46(2): 385-406.

Ang, James. B., Warwick J. McKibbin. (2007), "Financial Liberalization, Financial Sector Development and Growth: Evidence From Malaysia". *Journal of Development Economics*, 84(1): 215-233.

Arellano, M., Stephen Bond, (1991), "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations". *Review of Economic Studies*, 58: 277-297.

Arestis, Philip, Panicos O. Demetriades, Kul B. Luintel, (2001), "Financial Development and Economic Growth: The Role of Stock Markets", *Journal of Money, Credit and Banking*, 33(1): 16-41.

Atje, Raymond, Boyan Jovanovic, (1993), "Stock Markets and Development". *European Economic Review*, 37: 632-640.

Barro, Robert, (1996), Determinants of Economic Growth: A Cross-Country Empirical Study, *NBER Working Paper:* 5698. Cambridge: National Bureau of Economic Research.

Barro, Robert, Jong-Wha Lee, (2000), International Data on Educational Attainment: Updates and Implications, Center for International Development. *CID Working Paper*: 42.

Barro, Robert, Xavier Salai-Martin, (2004), *Economic Growth.* 2nd. ed. London: The Massachusetts Institute of Technology Press.

Beck, Thorsten, Aslı Demirgüç-Kunt, Ross Levine, (2000), "A New Database on Financial Development and Structure". *World Bank Economic Review* 14, WPS2146: 597-605.

Beck, Thorsten, Ross Levine, (2001), Stock Markets, Banks and Growth: Correlation or Causality. *Wordbank Policy Research Working Paper:* 2670.

Beck, Thorsten, Ross Levine, (2004), "Stock Markets, Banks and Growth: Panel Evidence", *Journal of Banking and Finance*, 28(3): 423-442.

Bencivenga, Valerie R., Bruce D. Smith, Ross M. Starr, (1995), "Transaction Costs, Technological Choice and Endogenous Growth", *Journal of Economic Theory*, 67(1): 153-177.

Bencivenga, Valerie R., Bruce D. Smith, (1991), "Financial Intermediation and Endogenous Growth". *The Review of Economic Studies*, 58(2): 195-209.

Blundell, Richard, Stephen Bond, (1998), "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models". *Journal of Econometrics*, 87:115-43.

Coe, David T, Elhanan Helpman, Alexander W. Hoffmaister, (1997), "North-South R&D Spillovers". *The Economic Journal,* 107(440): 134-149

De Gregorio, Jose, (1993), Savings, Growth and Capital Market Imperfections: the Case of Borrowing Constraints. *The International Monetary Fund Working Papers*: 93/31. Washington, DC.

Easterly, William, (1994), "Economic Stagnation, Fixed Factors and Policy Thresholds". *Journal of Monetary Economics*, 33(3): 525–557.

Edwards, Sebastian. 1993. Opennes, "Trade Liberalization and Growth in Developing Countries". *Journal of Economic Literature.* v. 31. i. 3: 1358–1393.

Estrella, Arturo, (2001), Financial Innovation and the Monetary Transmission Mechanism. *Focus on Austria*. Oesterreichische Nationalbank.

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

Greenwood, Jeremy, Bruce D. Smith, (1997), "Financial Markets in Development and the Development of Financial Markets". *Journal of Economic Dynamics and Control,* 21(1): 145-181.

Grossman, Gene M., Elhanan Helpman, (1991a), *Innovation and Growth in the Global Economy*. Cambridge MA: MIT Press.

Grossman, Gene M., Elhanan Helpman, (1991b), "Trade, Knowledge Spillovers and Growth". *European Economic Review*, 35(2-3): 517-526.

Grossman, Gene M., Elhanan Helpman, (1995), *Technology and Trade. Handbook of International Economics*. v. 3. Amsterdam.

International Monetary Fund. *International Financial Statistics*. http://www.imf.org/external/data.htm [05.09.2008].

Islam, Nazrul, (1995), "Growth Empirics: A Panel Data Approach". *Quarterly Journal of Economics,* 110(4): 1127-70.

King, Robert G, Ross Levine, (1993), "Finance and Growth: Schumpeter Might Be Right". *Quarterly Journal of Economics,* 108(3): 717-738.

Levine, Ross, Sara Zervos, (1998), "Stock Markets, Banks and Economic Growth". *American Economic Review,* 88(3): 537-558.

Levine, Ross, (1991), "Stock Markets, Growth and Tax Policy". *The Journal of Finance,* 46(4): 1445-1465.

Levine, Ross, (1992), Financial Structures and Economic Development. *The World Bank Policy Research Working Papers:* 849. Washington, DC.

Lucas, R. E. Jr. (1993), "Making a Miracle". *Econometrica.* 61(2): 251–272.

Pick, Franz. "Various Issues". *Pick's Currency Yearbook*. New York: Pick Publishing Corporation.

Pick, Franz. "Various Issues". *World Currency Yearbook*. New York: International Currency Analysis Inc.

Pissarides, C. A. (2000), Human Capital and Growth: A Synthesis Report. *OECD Development Centre Technical Paper:* 168.

Prasad, Eswar, Kenneth Rogoff, Shang-Jin Wei, Ayhan Köse, (2003), Effects of Financial Globalization on Developing Countries: Some Empirical Evidence. *IMF Occasional Paper:* 220.

Rodriguez, Francisco; Dani Rodrik, (2000), Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence**.** *NBER Macroeconomics Annual,* 15: 261-325.

Rousseau, Peter L., Paul Wachtel, (2000), "Equity Markets and Growth: Cross-Country Evidence on Timing and Outcomes, 1980-1995". *Journal of Banking and Finance*, 24(12): 1933-1957.

Rousseau, Peter L., Paul Wachtel, (2001), Inflation, Financial Development and Growth. *Economic Theory, Dynamics and Markets: Essays in Honor of Ryuzo Sato*. Deventer: Kluwer.

Rousseau, Peter L., Paul Wachtel, (2005), Economic Growth and Financial Depth: Is the Relationship Extinct Already?. *UNU-WIDER Discussion Paper*: 2005/10.

Saint-Paul, G. (1992), "Technological Choice, Financial Markets and Economic Development". *European Economic Review***,** 36(4): 763-781.

The World Bank. World Development Indicators. www.worldbank.com [07.09.2008]

Appendix

Pooled Ordinary Least Squares[†⊥]
(Developing Countries)

Independent V.	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	0.1608 (0.000)	0.1556 (0.000)	0.1585 (0.000)	0.1401 (0.000)	0.1607 (0.000)	0.1522 (0.000)
Bank Credit*	0.0158 (0.000)	0.0151 (0.001)	0.0155 (0.000)	0.0119 (0.002)	0.0137 (0.001)	0.0120 (0.012)
Turnover Ratio*	0.0068 (0.000)	0.0070 (0.000)	0.0069 (0.000)	0.0074 (0.000)	0.0064 (0.001)	0.0067 (0.002)
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.3686	0.3715	0.3687	0.3878	0.4116	0.4204
Observations	105	105	105	105	98	98

Pooled Ordinary Least Squares[†⊥]
(Developed Countries)

Independent V.	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	0.1864 (0.001)	0.1386 (0.009)	0.1157 (0.073)	0.1657 (0.014)	0.1234 (0.002)	0.1213 (0.083)
Bank Credit*	0.0165 (0.129)	0.0193 (0.565)	0.0151 (0.289)	0.0099 (0.790)	0.0113 (0.209)	0.0110 (0.658)
Turnover Ratio*	0.0168 (0.015)	0.0120 (0.105)	0.0089 (0.060)	0.0105 (0.120)	0.0101 (0.031)	0.0090 (0.097)
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0008
R^2	0.3625	0.3792	0.3689	0.3927	0.3765	0.3654
Observations	92	92	92	75	89	72

[†] P-values are given in parentheses.
[⊥] The dependent variable in all regressions is real per capita GDP growth.
* This variable is included as log(variable) in the regression.