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International Evidence on the Role of Financial Sector in Economic Growth with Less Volatile Business Cycles

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ABSTRACT

Since the days of Adam Smith, the question of what determines the long-term economic growth and the prosperity of nations has been at the core of economics. In the view of recent econometric research on the determinants of economic growth, this paper attempts to address very important question. Do better-developed financial systems cause faster economic development with less volatile economic fluctuations; i. e., is the component of financial depth defined by the legal environment of a country, positively associated with long-run rates of economic growth and gross capital formation and negatively related to the business cycle component of GDP and domestic investment?

On the basis of the correlation analysis and Granger causality test results, which state that there exist a significant and causal relationship between financial development indicators and economic growth, cross-country regression analysis is conducted applying GMM technique. Results show that the indicators of the level of financial development—the size of the formal financial intermediary sector relative to GDP, the importance of banks relative to the central bank, the ratio of credit issued to the private sector to GDP—are strongly and robustly correlated with growth and investment. Moreover, the analyses indicate that developed financial systems lead to less volatile business cycles.

I. INTRODUCTION

Researchers and policy makers have expanded enormous efforts examining various factors in the determination of economic growth. These include inequality in income, political instability, and financial market imperfections among others. A great majority of these analysts such as McKinnon (1973), Shaw (1973), King and Levine (1993 a, b) Levine and Zervos (1996), Benhabib and Spiegel (2000) believe that financial deepening is a catalyst for economic growth. Current study is an attempt to explore the role of financial development in accounting for differences in growth and investment rates across countries keeping into consideration their legal environments.

Although King and Levine (1993a) show that the level of financial development in 1960 is a good predictor of growth over the next thirty years. Ranjan and Zingales (1998) note, "Financial

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development may simply be a leading indicator rather than a causal factor". The reason of these contradictory results may be due to the absence of valid instrumental variables for extracting the exogenous component of financial indicators. Given the research by Laporta et al (1998), this paper examines whether exogenous component of financial development — the component defined by legal system — is positively associated with economic development in a cross-section of countries over the 1972–2001 period. Furthermore, quantitative information on the relationship between legal environment and financial indicators will improve our understanding of business cycles (according to Bernanke et al. 1998) and the process of economic development (emphasized by North 1981).

The business cycles characterized by recurring periods of economic expansion followed by periods of recession, is a common feature of most advanced economies. Economists have long been interested in measuring and explaining the volatility of business cycles. Existing literature (e.g., Bernanke et al. 1998) on credit markets has shown how financial systems play a role in destabilizing any economy. This study provides international evidence that economies with more developed financial systems along with better legal environment have less volatile economic fluctuations. Developed financial systems are considered to be more capable of screening potential borrowers, which should reduce the likelihood that projects with greater probability of failure are externally financed.[1]

By studying the financial development and long-run stable economic development while taking into consideration the legal environment of the economies, this paper fills some gaps in the literature.

1. It contributes to research on the causal relationship between financial sector development and long-run economic growth. This paper differs from the Levine (1998) in a way that he considers only one variable of financial indicators in his analysis i.e., the casual relationship between banking development and economic growth (Levine 1998: 597), while we incorporate three financial variables namely, financial depth, banking development and credit to the private sector, in this study. Besides examining the relationship between financial development and per capita real GDP growth, paper also analyzes the relationship between financial depth and domestic investment share in GDP.

2. As it is emphasized by Darrat (1999: 22), Levine and Zervos (1996: 4－5) that research on the role of financial deepening in the economic growth process should focus not only on the correlation but also on testing the direction of causality between two variables. Recognizing this very fact, before doing empirical analysis we conduct a Granger causality test to see a causal relationship between financial development and economic growth indicators for 61 countries, which is a very unique property of this paper.

3. The database is equally divided into three categories, representing the developed economies, emerging economies and developing economies. We think Silva (2002) might have shown biased

results due to less participation of developing countries in his research and we try to bridge this gap in the literature on stability issues.

4. Another property of this paper is that using the SAME data set and methodology and the SAME variables representing growth, financial development and legal environment, we prove that better financial systems lead to stable economic growth i.e., a development with less volatile business cycles.

5. To check the robustness of our results over time, we split the sample into two time periods, one based on 12 years period average (1990–2001) and the other based on 30 years period average (1972–2001). It will also help in observing the changes occur in the analysis in two time periods.

6. We introduce CRISIS dummy, so far neglected variable in earlier studies (e.g., Silva 2002), although it proves to be a very important exogenous factor to explain volatility of any country. Statistically speaking, it increases the goodness of fit of regression equations.

In sum, this paper addresses following questions. First, whether economic growth and financial development are highly and positively correlated or not and what is the direction of causality? Second, how significant is the impact of financial depth on economic growth and whether the financial depth causes to smoothen business cycles? Third, among various indicators of the financial system, whether credit provided to the private sector is more important relative to the public; whether the predominance of deposit money banks is important relative to the central bank; and whether they have significant impact on economic growth of less volatile business cycles or not?

Based on the evidence from simple correlation analysis and Granger causality test results, which states that there exist a significant and causal relationship between financial development indicators and economic growth, cross-country regression analysis is conducted using generalized methods of moments (GMM) techniques. In all the regression results of growth analysis, it is statistically proved that the indicators of the level of financial development—the size of the formal financial intermediary sector relative to GDP, the importance of banks relative to central bank, the ratio of credit issued to private sector to GDP—are strongly and robustly correlated with growth and investment.

Moreover, results show that with improved financial systems, business cycles can be smoothened. The signs of the coefficients of all control variables used in this study are in line with previous studies such as Barro (1997), King & Levine (1993), Silva (2002) etc.

The remainder of the paper is organized as follows. Section II highlights the variables along with a short note on the detrending technique (i.e., H-P filter) while estimation methods and the regression equations are compiled in the Section III. Empirical results are presented and analyzed in the Section IV, which is further divided into three sub-sections. The first two sub sections are devoted for correlation and causality test findings while the third presents the regression results for the economic

growth and business cycles volatility analysis. Last section concludes.

II. THE DATA

Our sample covers annual observations for sixty-one countries for the period of 1972－2002. The database is divided into three categories, representing the developed, emerging and developing economies. For equal representation of each category in the analysis, number of countries is almost the same (= 20) in each category. The emerging economies are categorized on the basis of their Capital Market Developments as per World Bank classification, specifically on the basis of their GDP growth, business environment ranking and share of foreign ownership (see Claessens et al. 2002). A list of countries as well as the definitions of all the variables used in the paper, is reported in the Appendix 1 and 2 respectively. With the exception of the Legal variables, all of our data come from the IMF and the World Bank databases.

The indicators of financial development[2] are obtained from King and Levine (1993). The first variable is FD1, a proxy for the financial depth, measured as the ratio of liquid liabilities[3] of the financial sector to GDP. The second indicator is FD2, the ratio of commercial banks' domestic assets to the summation of domestic assets of commercial banks and that of the central bank. King and Levine (1993) introduce this variable to emphasize the risk sharing and information services that commercial banks most likely to provide. The proportion of credit allocated to private enterprises is being computed by introducing two variables. First measures the ratio of claims on the nonfinancial private sector to GDP and termed as FD3 and the second is named as FD4, equals the ratio of claims on the nonfinancial private sector to total domestic credit. Although above stated variables have their own limitations, however, we include this broad array of financial indicators to maximize the information on financial development in this research as well as to compare our results with existing empirical literature on the development of financial system.

Regarding the growth indicators, two variables are included in this study. First is the average long run real per capita GDP growth (GYP), and the second is the ratio of gross domestic investment divided by output (INV), which is considered as one of the sources of economic growth in the literature.[4]

For the stability analysis, business cycle component of the real per capita GDP growth (GYP) and the investment share in GDP time series need to be estimated before running the econometric tests. There are various filters used in the literature to isolate the business cycle component of the series such as Linearly Detrended Method, creation of First Difference Series etc. However, the one, widely used in early 1990s is the Hodrick-Prescott (H-P) filter, which improves upon the first differencing filter because without reducing the importance of the cyclical component, it reduces the strength of high frequency noise.[5] Therefore, H-P filter is selected for current study to segregate various business

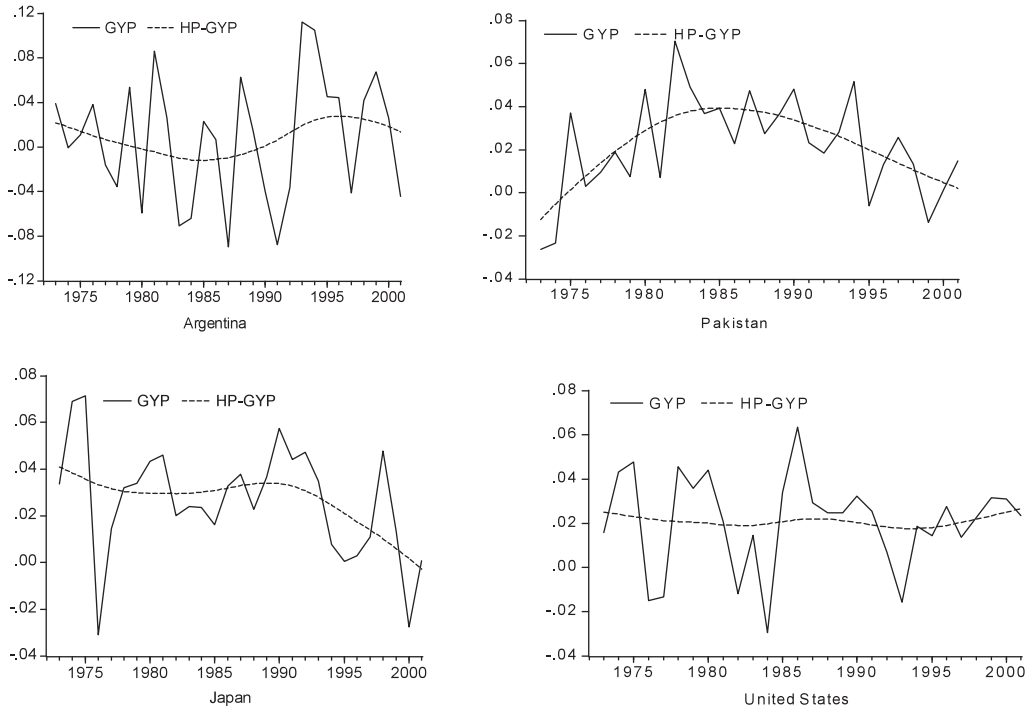

Figure 2.1 Original and Filtered Series (using H-P filter) of Real Per capita GDP Growth

cycle components of the series. The computed series of GYP are plotted along with the original series of GYP in figure 2.1 for a few countries, so that the concept of using a filter can be highlighted.

Further, to enhance our confidence in the analysis, it is important to control for 'other factors'.[6] Following the convention of empirical studies, four variables that control the effects of macroeconomic policies are included in this paper. A proxy of fiscal policy, GOVT is calculated as a ratio of government final consumption expenditure to GDP. Regarding the stance of monetary policy, the average inflation rate (INF) of each country during the relevant period is used, measured as a GDP deflator (annual %).[7] To measure the level of openness in a country, a variable (TRD) is included in the analysis, which is measured as the ratio of total trade[8] to GDP. Exchange rate flexibility is calculated as percentage change in the exchange rate[9] (EXCH), which is defined as number of US $ per unit of national currency.

To capture the convergence effect highlighted by Barro (1997), the natural logarithm[10] of initial real per capita GDP is used in the growth analysis. Moreover, in volatility analysis, a crisis dummy is introduced with the perception that a country hit by crisis would have more volatile business cycles.

A set of other variables (termed as instrumental variables[11]) is used to control for the possibility that the level of financial system development, the level of economic growth and the degree of business cycle volatility are being caused by a third variable, such as better policy management by the government, level of corruption etc. Based on previous studies such as Levine (1998), two variables[12]

related to each country's legal system are used as instruments for the indicators of financial system development: one representing the degree of creditors rights' protection (CREDRIGHT) and another representing each country's tradition for law and order (RULELAW). The data for these variables are obtained from Laporta et al (1998).[13]

III. MODEL SPECIFICATION

In this paper, correlation between economic growth and financial development indicators as well as correlation among financial development variables[14] are estimated.

Although regression analysis deals with the dependence of one variable on other variables, it does not necessarily imply causation. Therefore, to detect the direction of causality between any two variables, the Granger procedure[15] has gained a lot of popularity, partly due to its simplicity. In current study, Granger causality test[16] is conducted to measure causal relationship between financial development indicators and real per capita GDP growth (GYP).

Furthermore, empirical analysis is conducted to examine the interactions among legal environment, financial intermediaries and stable growth. Generalized method of moments (GMM) technique[17] is used in this study due to the robustness of results to changes in the instrumental variables. Moreover, in the presence of heteroscedasticity, GMM estimation is more efficient than two-stage least squares estimation. GMM estimation also allows testing for the validity of the instruments (Silva, 2002). J-Statistics along with χ^2-test of the overidentifiying restrictions is used to check the orthogonality conditions of the model.

We are interested in the following equations.

$$G_i = \alpha_{ij} + \beta_{ij} FD_j + \gamma_{1ij} GOVT + \gamma_{2ij} TRD + \gamma_{3ij} INF + \gamma_{4ij} EXCH + \gamma_{5ij} LY_0 + \varepsilon_{ij} \quad (1)$$

$$\sigma_i = \alpha_{ij} + \beta_{ij} FD_j + \gamma_{1ij} GOVT + \gamma_{2ij} TRD + \gamma_{3ij} INF + \gamma_{4ij} EXCH + \gamma_{5ij} CRISIS + \varepsilon_{ij} \quad (2)$$

INSTRUMENTS' LIST = Creditor rights (CREDRIGHT), rule of law (RULELAW)
and all regressors except FD.

where the dependent variable, 'G_i' is either real per capita GDP growth (GYP) or investment share to GDP (INV) where index 'i' distinguishes among these dependent variables; σ_i represents the business cycle component of GYP or of INV; FD_j stands for financial development indicators and represents either liquid liabilities to GDP (FD1), ratio of the assets of deposit money banks to the total assets of the financial system (FD2), on ratio of the claims to the non-financial private sector to the GDP (FD3) where index 'j' distinguishes among these financial variables; GOVT equals government expenditures as a ratio to GDP, TRD is total trade divided by GDP, INF equals GDP deflator, EXCH is growth rate of exchange rate, LY_0 is representing initial GDP level in each country and CRISIS is a dummy variable representing the crisis situation in each country.

IV. EMPIRICAL ANALYSIS

This section begins with correlation analysis followed by Granger causality test results and then the findings of the regression equations (1) and (2) are examined.

1 Simple Correlations

Table 4.1 presents summary statistics on the four financial development indicators and two growth indicators. The table shows that each financial indicator is positively and significantly correlated with the growth rate of real per capita GDP at 1% level of significance. Similarly, domestic investment is positively and significantly correlated to all financial indicators.

Table 4.1 also shows a "step"[18] relationship between financial development and economies of different level of growth. As data "steps" from economies that experienced slower growth over the 1990–2001 period to countries with faster growth, a corresponding increase in financial depth has been observed. Moreover, there is relatively more importance of commercial banks; the higher is the fraction of credit allocated to the non-financial private sector, and the ratio of private sector credit to GDP in developed economies. It is further realized that there is a huge discrepancy in financial depth among developed economies and developing economies. Surely, developing countries need to put

Table 4.1 Correlation Analysis 1990–2001

	Developed Economies	Emerging Economies	Developing conomies	Correlation between					
				GYP	INV	FD1	FD2	FD3	FD4
FD1	0.755	0.418	0.266	0.413 *	0.386 *	1	0.603 *	0.860 *	0.513 *
				(0.001)	(0.002)		(0.0001)	(0.0001)	(0.0001)
FD2	0.948	0.810	0.552	0.423 *	0.216 * * *			0.668 *	0.768 *
				(0.001)	(0.097)		1	(0.0001)	(0.0001)
FD3	0.816	0.407	0.180	0.425 *	0.383 *				0.645 *
				(0.001)	(0.002)			1	(0.000)
FD4	0.838	0.748	0.498	0.442 *	0.33 * *				
				(0.000)	(0.010)				1

Note: *, **, ***, Correlation is significant at the 1%, 5% & 10% levels respectively (2-tailed).
P-values are shown in parentheses.
Observations: Approximately 20 in each of the three categories.
Source: Basic data from IMF, WB.

more efforts to improve the financial depth, which is a key factor for faster economic growth.

The Pearson correlation coefficients are also calculated to observe the depth of relationship among financial indicators and results are tabulated in the Table 4.1. It is found that the financial

development indicators are highly and significantly correlated with each other. Due to the existence of high correlation among financial depth indicators, we will use them one at a time in our analysis.

2 Causality Test

As our main concern is not to analyze causal relationship for each country, we will present results of Granger causality test in more general terms, just to see the overall picture of causality between the variables. Therefore, total number of cases, in which two hypotheses have been rejected at 10% levels of significance, are reported in the Table 4.2. First hypothesis is that better financial development does not 'granger' cause economic growth while second hypothesis postulates that higher economic growth does not 'granger' cause more developed financial system in any economy.

Results show that causality runs from financial development to economic growth because 61 cases in total, report significantly that financial depth 'Granger' cause real per capita GDP growth. Liquid liabilities are proved to be the most effective financial development indicator for higher economic growth while FD4 is considered as relatively poor in explaining economic growth, in which more cases are in favor that higher economic growth would lead to more distribution of domestic assets to private sector. Therefore, this financial development indicator (FD4) is dropped in regression

Table 4.2 Granger Causality Test Results 1972–2001

	Real per capita GDP growth 'Granger' cause financial development indicators (FD). / Financial development indicators (FD) 'Granger' cause real per capita GDP growth.
FD = FD1	10 / 18
FD = FD2	6 / 15
FD = FD3	10 / 17
FD = FD4	12 / 11
TOTAL	**38** / **61**

analysis.

Bi-directional causality appears in some of the countries, for example Australia for FD1 and FD3, Hungary and Ireland for FD4, Thailand for FD3 and Uruguay for FD1.

3 Regression Results

The first step when running cross-section regressions is to calculate the arithmetic mean of the time series variables for each country. However, for the detrended variables (real GDP per capita (GYP) and investment share in GDP (INV)), the standard deviation of the business cycle component of these series is used instead of the mean, since we are concerned with the volatility of these variables, not their level. The regression analyses are segregated into two sub-sections; growth analysis is conducted in the sub-section 3.1 while volatility Analysis is taken place in the sub-section 3.2.

3.1 Economic Growth Analysis

Based on the evidence of last two sections that there exist a significant association and causal relationship between financial depth and growth, in this section, cross-country regressions are estimated to gauge the strength of these relationships.

3.1.1 Real Per Capita GDP Growth and Financial Depth

Regression results regarding the relationship between real per capita GDP and three financial development indicators; FD1, FD2 and FD3 using legal variables as instruments are summarized in the Table 4.3.

Section A of the table indicates that the coefficients of three financial development indicators appear positively significant when the dependent variable is real per capita GDP growth. Thus financial depth, the relative importance of banks vis-à-vis central banks and credit to the private sector divided by GDP are strongly associated with growth, after controlling for initial conditions and common economic factors. Not only are the coefficients significant, but also the sizes of the coefficients imply that the links between financial development and growth may be economically important. Take the example of Thailand, an emerging economy, whose per capita GDP equals to 0.053 -the sample mean -during the 1990–2001 periods. Holding other factors constant, a 10% increase in the ratio of the country's liquid liabilities relative to GDP would increase the output by 7.4%. If FD2 were 10% greater, real per capita GDP growth would increase by more than 10%. King and Levine (1993: 728) rightly pointed out that these types of examples are only illustrative. They neither address causality nor how to achieve these changes.

The comparison of two sections in the Table 4.3 shows that the coefficients appear more significantly for the data averaged over 12 years instead of the one averaged over 30 years. For example, in the regression analysis for the variables averaged over 30 years (1972–2001), the financial development indicator – FD3 – is no longer significant. Even the size of coefficients of financial depth indicators become smaller in the regression where 30 years period is used to take the arithmetic mean of the variables. This means that the impact of financial depth on economic growth is smaller over a 30 years period while this impact is quite strong in last 12 years period.

Table 4.3 Real Per Capita GDP Growth & Financial Development

	Section A: Data for 1990–2001			Section B: Data for 1972–2001		
	FD1	FD2	FD3	FD1	FD2	FD3
Constant	0.0201	-0.032	0.058 *	0.017	-0.012	0.058 **
	(1.107)	(-0.445)	(2.873)	(1.258)	(-0.658)	(2.163)
FD	0.044 **	0.285 ***	0.062 *	0.037 **	0.158 **	0.029
	(2.156)	(1.761)	(2.884)	(2.22)	(2.315)	(1.201)
GOVT	-0.036	-0.087	-0.051 ***	-0.045 ***	-0.023 ***	-0.008
	(-0.539)	(-0.276)	(-1.811)	(-1.901)	(-1.761)	(0.141)
INF	-0.0001 *	-0.000055	-0.0001 *	-0.000038 *	-0.00003 ***	-0.000066 *
	(-3.481)	(-0.155)	(-4.629)	(-3.331)	(-1.801)	(-3.089)
EXCH	0.011 *	0.0047	0.0099 *	0.002	0.0039	0.004
	(2.852)	(0.129)	(3.59)	(1.073)	(0.887)	(1.23)
TRD	0.006	0.008	0.0019	0.007 **	0.0004	0.014 ***
	(0.727)	(0.647)	(0.286)	(2.049)	(0.966)	(1.883)
LY_0	-0.003	-0.023	-0.0076 **	-0.002	-0.011 ***	-0.007 ***
	(-0.679)	(-0.567)	(-1.989)	(-0.601)	(-1.816)	(-1.765)
N	58	57	58	55	55	55
J-Stats	0.0142	0.0267	0.0212	0.0056	0.00000845	0.0073
N * J-stats	0.8236	1.5219	1.2296	0.308	0.00046	0.4015
$\chi^2_{0.05}$ (1)	3.841	3.841	3.841	3.841	3.841	3.841

Note: FD stands for FD1, FD2 and FD3 in various columns.
Numbers reported in parentheses are t-statistics.
*, **, *** denote significance levels of 1%, 5% and 10% respectively.
Weighting matrix: White Covariance
Instruments: CREDRIGHT, RULELAW and all regressors except the financial development indicators.

3.1.2 Investment Share in GDP and Financial Depth

Regression results, shown in the Table 4.4 are representing the relationship between investment share of GDP and financial development in a country.

The comparison of the two sections reveals that FD2 enters insignificantly in the regression for the data averaged over 12 years, while FD3 looses its significance in the section B, in which data is averaged over 30 years. Liquid liabilities as a ratio to GDP (FD1) remain significant at 10% level in both models. Moreover, the size of the coefficient of FD1 increased to more than double (from 0.009 to 0.022) in the regression in which data is averaged over last decade.

To see the economic importance of the difference in size of the coefficients of FD1 in the two tables, take the example of Sweden, whose investment share in GDP averaged over 1990–2001 period equals to 0.175. Holding other factors constant, a 10% increase in the ratio of the country's liquid liabilities relative to GDP would increase the investment share in GDP by 0.6%.

3.1.3 Behavior of Control Variables in Growth Analysis

The signs of the coefficients of all control variables used in this study are in line with previous studies (Barro (1997), King & Levine (1993) etc). For example, coefficient of GOVT enters negatively and significant in many of the cases, implying that big size of the government is not pro-development. Higher inflation is proven to be harmful for economic growth, as its coefficient remains significantly negative in most part of the analysis.The coefficient of EXCH appears positively and becomes significant in many of the regressions. This means that flexible exchange rate policies are in favor of economic growth. Openness, which is measured by the share of trade in GDP, enters positively in the analysis proving that reducing trade barriers foster growth. Moreover, regression results does not reject the Barro's convergence hypothesis and concludes that countries with lower income have more potential to grow faster than the countries having higher income to start with.

3.2 Business Cycle Volatility Analysis

This paper provides cross-country evidence that more developed financial systems have less volatile economic fluctuations.

3.2.1 Volatility of GYP and Financial Development

Table 4.5-A indicates that the two financial development indicators representing financial depth (FD1) and the relative importance of banks vis-à-vis central banks (FD2) enter with negative and significant coefficients when the dependent variable is business cycle component of GYP, at 10% level.

The comparison of both sections shows that contrary to the conclusion drawn from growth analysis, the coefficients appear more significantly for the data averaged over 30 years instead of the data averaged over 12 years. However, FD3 which represents the ratio of nonfinancial private sector claims to GDP does not appear as a good regressor for both data sets. It may be due to the reason that in 70's and 80's less credit was allocated to private sector, therefore, it is difficult to see its impact on the volatility of business cycles.

In the regression analysis for the variables averaged over 30 years (1972－2001), the significance level for financial development indicators FD1 and FD2 has been increased to 5% level. To see the economic importance of the analysis take the example of India, whose income volatility equaled to 0.014 averaged over the 1972–2001 period. Holding other factors constant, increase in the ratio of the country's liquid liabilities relative to GDP would reduce income volatility by approximately 3.9%. If FD2 were 10% greater, investment volatility would be decreased by 10.5%. Commercial banks seem more likely to provide risk sharing and information services than central banks.

3.2.2 Investment Volatility and Financial Development Indicators

Table 4.6-A indicates that the three financial development indicators got negative and significant

Table 4.4 Investment Share in GDP & Financial Development

	Section A: Data for 1990–2001			Section B: Data for 1972–2001		
	FD1	FD2	FD3	FD1	FD2	FD3
Constant	0.179 *	0.193	0.195 *	0.148 *	0.133 *	0.156 **
	(4.878)	(1.511)	(3.714)	(4.11)	(3.265)	(2.289)
FD	0.022 ***	0.234	0.028 ***	0.009 ***	0.251 ***	0.011
	(1.710)	(0.273)	(1.815)	(1.715)	(1.788)	(0.172)
GOVT	-0.259 **	-0.468	-0.283 *	-0.27 *	-0.215	-0.26 ***
	(-2.204)	(-0.709)	(-2.699)	(-2.848)	(-1.347)	(-1.88)
INF	-0.000031	-0.0002	-0.00003	-0.00007 **	-0.00008 ***	-0.000059
	(-0.594)	(-0.233)	(-0.5797)	(-2.176)	(-1.817)	(-1.036)
EXCH	0.0005	0.018	0.0006	0.0096 ***	0.005	0.0098 **
	(0.088)	(0.273)	(0.105)	(1.701)	(0.562)	(-2.075)
TRD	0.053 *	0.063 **	0.051 *	0.053 *	0.03	0.058 **
	(3.669)	(2.032)	(3.381)	(4.299)	(1.103)	(2.587)
LY_0	-0.004	-0.029	-0.0024	-0.012	-0.01	-0.0103
	(-0.566)	(-0.371)	(-0.279)	(-1.476)	(-0.651)	(-1.357)
N	58	57	58	55	55	55
J-Stats	0.00354	0.00417	0.0019	0.0217	0.00811	0.01948
N* J-stats	0.3793	0.2377	0.1102	1.1935	0.4460	1.0725
$\chi^2_{0.05}(1)$	3.841	3.841	3.841	3.841	3.841	3.841

Note: FD stands for FD1, FD2 and FD3 in various columns.
Numbers reported in parentheses are t-statistics.
*, **, *** denote significance levels of 1%, 5% and 10% respectively.
Weighting matrix: White Covariance
Instruments: CREDRIGHT, RULELAW and all regressors except the financial development indicators.

coefficients when the dependent variable is business cycle component of investment share in GDP at 5% level. Thus financial depth, the relative importance of banks vis-à-vis central banks and credit to the private sector divided by GDP are strongly associated with the reduction of investment volatility, after controlling for common economic factors.

The comparison of the two sections reveals that FD2 enters insignificantly in the regression for the data averaged over 12 years, while FD3 looses its significance in section B, in which data is averaged over 30 years. Liquid liabilities as a ratio to GDP (FD1) remain significant at 10% level in both models. Moreover, the size of the coefficient of FD1 increased to more than double (from 0.009 to 0.022) in the regression in which data is averaged over last decade.

To see the economic importance of the difference in size of the coefficients of FD1 in two tables, take the example of Sweden, whose investment share in GDP averaged over 1990–2001 period equals to 0.175. Holding other factors constant, a 10% increase in the ratio of the country's liquid liabilities relative to GDP would increase the investment share in GDP by 0.6%.

In the regression analysis for the variables averaged over 30 years (1972–2001), the significance

Table 4.5 Volatility of GYP & Financial Development

	Section A: Data for 1990–2001			Section B: Data for 1972–2001		
	FD1	FD2	FD3	FD1	FD2	FD3
Constant	0.012 *	0.0106 ***	0.012 *	0.026 *	0.039 *	0.020 *
	(4.091)	(1.936)	(4.766)	(6.025)	(4.155)	(7.258)
FD	-0.0004 ***	-0.0015 ***	0.0003	-0.016 **	-0.028 **	-0.0004
	(-1.891)	(-1.912)	(0.096)	(-2.029)	(-2.204)	(-0.037)
GOVT	-0.044 *	-0.0488 *	-0.045 *	-0.044 *	-0.037 **	-0.060 *
	(-3.425)	(-3.334)	(-3.164)	(-2.831)	(-2.179)	(-4.771)
INF	4.02E-05 *	3.97E-05 *	4.00E-05 *	2.20E-05 ***	1.62E-05	3.49E-05 *
	(3.869)	(3.501)	(3.896)	(1.801)	(1.276)	(2.944)
EXCH	-0.003 **	-0.0031 **	-0.0032 **	-0.002	-0.001	-0.0023
	(-2.207)	(-2.121)	(-2.025)	(-1.101)	(-0.641)	(-1.278)
TRD	0.004 **	0.0058 **	0.0036 **	0.0028	0.003	0.0008
	(2.004)	(2.182)	(2.025)	(1.607)	(1.03)	(0.173)
CRISIS	0.002 ***	0.0011 ***	0.0017	0.001	0.0001 ***	0.001 ***
	(1.898)	(1.876)	(0.889)	(0.304)	(1.801)	(1.791)
N	58	57	58	60	59	60
J-Statistics	0.000372	0.002121	0.000445	0.0088	0.0002230.0	0.0059
N* J-stats	0.02146	0.12084	0.02581	0.528	1316	0.354
$\chi^2_{0.05}$ (1)	3.841	3.841	3.841	3.841	3.841	3.841

Note: FD stands for FD1, FD2 and FD3 in various columns.
Numbers reported in parentheses are t-statistics.
*, **, *** denote significance levels of 1%, 5% and 10% respectively.
Weighting matrix: White Covariance
Instruments: Creditors' rights, rule of law and all regressors except the financial development indicators.

level for financial development indicators FD1 and FD2 has been increased to 1% level. However, FD3 lost its significance when analyzed over 30 years. Even it appears with positive sign in 30 years average period, showing that the more credit goes to private sector, the more volatile economy would be, which is a sharp contrast, when analyzed FD3 effect on volatility for last decade. In the data averaged over 1990–2001, FD3 appears significantly negative, proving that more credit to private sector lead to less volatile investment in a country. This result is in line with previous studies such as Silva (2002).

3.2.3 Behavior of Control Variables in Volatility Analysis

The massage extracted from the analysis of control variables is as follows. The coefficient of GOVT, representing fiscal policy remains negative in all regressions using both data sets. Therefore, it can be concluded that larger share of government and better fiscal policies help in smoothening business cycles. The variable 'trade' is significant at 1% level, although the size of the coefficient of

Table 4.6 Volatility of Investment & Financial Development

	Section A: Data for 1990–2001			Section B: Data for 1972–2001		
	FD1	FD2	FD3	FD1	FD2	FD3
Constant	0.039 *	0.062 *	0.029 *	0.054 *	0.074 *	0.040 *
	(4.531)	(3.858)	(3.734)	(7.264)	(6.256)	(5.539)
FD	-0.04 ***	-0.061 **	-0.036 **	-0.048 *	-0.062 *	0.014
	(-1.947)	(-2.462)	(-2.379)	(-2.727)	(-3.353)	(0.743)
GOVT	-0.082 ***	-0.062	-0.029	-0.043	-0.046	-0.104 *
	(-1.71)	(-1.412)	(-0.542)	(-1.012)	(-1.464)	(3.438)
INF	0.00004	0.00002	0.00005 ***	0.00003	0.00003 **	0.00007 *
	(1.1667)	(0.53)	(1.77)	(1.125)	(2.413)	(3.69)
EXCH	-0.005	-0.002	-0.005 ***	-0.002	-0.002	-0.002
	(-1.401)	(-0.473)	(-1.872)	(-0.478)	(-0.79)	(-0.642)
TRD	0.033 *	0.033 *	0.033 *	0.023 *	0.027 *	0.007
	(3.31)	(3.74)	(3.709)	(3.917)	(4.119)	(0.997)
CRISIS	0.012 **	0.017 *	0.011 ***	0.007 ***	0.011 *	0.005
	(2.213)	(3.029)	(0.041)	(1.681)	(2.73)	(0.612)
N	60	59	60	60	59	60
J-Statistics	0.014	0.0036	0.0035	0.001996	0.007920	0.01285
N* J-stats	0.84	0.2124	0.21	0.1198	0.4673	0.771
$\chi^2_{0.05}$ (1)	3.841	3.841	3.841	3.841	3.841	3.841

Note: FD stands for FD1, FD2 and FD3 in various columns.
Numbers reported in parentheses are t-statistics.
*, **, *** denote significance levels of 1%, 5% and 10% respectively.
Weighting matrix: White Covariance
Instruments: Creditors' rights, rule of law and all regressors except the financial development indicators.

TRD becomes smaller for the data based on 1972–2001 period average. Results show that openness destabilizes the economy because a country becomes more susceptible to shocks from the rest of the world.

Positive sign of inflation rate (INF) shows that higher inflation in any country would lead to higher investment volatility, which is even helpful if shock comes from wage settings (see Karras and Song (1996)). The coefficient of exchange rate appears negatively in the analysis. In case of Silva (2002) the EXCH does not show a consistent pattern, however its sign enters negatively, in most of the equations, which is in line with our study. According to Karras and Song (1996), the answer to the question whether output stability is better promoted by fixed or floating exchange rate, critically depends on the nature of shocks (goods or money market shocks) that hit the economy.

Crisis dummy appears positive for all cases and significant at 10% and 1% levels of confidence, showing that crisis leads to more volatile business cycles of investment. However, comparatively, the size of crisis dummy and even its significance has been reduced as we deal with a larger data set. Therefore, we conclude that crisis countries are more volatile in short run. But in the long run,

countries learn from crisis and improve their management so crises lead to less volatile economy in the long run.

V. CONCLUSION & POLICY IMPLICATIONS

Since the days of Adam Smith, the question of what determines the long-term economic growth rate and the prosperity of nations has been at the core of economics. In this tradition, however, the impact of financial institutions on the rate of growth has been relatively ignored until recently. In the view of recent econometric research on the determinants of economic growth, this paper attempts to address very important question. Do better-developed financial systems cause faster economic development with less volatile economic fluctuations; that is, is the component of financial depth defined by the legal environment of any country, positively associated with long-run rates of economic growth and gross capital formation and negatively related to the business cycle component of GDP and domestic investment?

Based on the evidence from simple correlation analysis and Granger causality test results, which states that there exist a significant and causal relationship between financial development indicators and economic growth, cross-country regression analysis is conducted. Results show that the indicators of the level of financial development—the size of the formal financial intermediary sector relative to GDP, the importance of banks relative to central bank, the ratio of credit issued to private sector to GDP—are strongly and robustly correlated with growth and investment. Moreover, this paper complements the study by Silva (2002), which shows that developed financial systems lead to less volatile business cycles. Although the participation of developing countries is limited in his data set, however, we don't see any biasedness in his research findings. The signs of the coefficients of all control variables used in this study are in line with previous studies (Barro, 1997; King & Levine, 1993; Silva, 2002 etc).

Policy measures that stimulate the development of the financial system may be consequently advised in order to achieve higher growth with smoother business cycles, since all financial depth indicators appear positively in growth analysis and are negative in volatility analysis. Moreover, data supports the hypotheses that the role of private sector as compared to the public sector and the predominance of deposit money banks relative to the central banks are likely to be more important. Therefore, government policies that alter the costliness and efficiency of financial intermediation exert a first-order influence on stable economic growth.

Legal reforms can stimulate economic development by improving the functioning of the financial system, since legal variables are closely related to the financial depth. Although changing legal codes and improving the efficiency with which legal systems enforce laws and contracts is difficult, the economic returns to improving the legal environment appear very large. For many countries, these

reforms could begin at the level of regulation and implementation. For example, it may be prohibitively difficult or undesirable to change a country's law that imposes an automatic stay on the assets of a firm upon filling a reorganization petition. Nevertheless, corporate reorganization procedures could be improved to reduce delays and uncertainty so that bankers feel greater confidence about receiving the full present value of their loans (Levine, 1998).

While comparing the two data sets, it is figured out that financial depth show stronger impact on economic growth in the short run while relationship between business cycles volatility and financial development is more like a long run phenomenon.

Notes

1 For a detailed description about the importance of relationship between financial development indicators and business cycles volatility, see Silva (2002)

2 For detailed theoretical debate and calculation methods see King and Levine (1993) and Silva (2002).

3 Liquid liabilities consist of currency held outside the banking system and demand and interest earning liabilities of banks and nonblank financial intermediaries called as M3 in finance literature.

4 Correlation and regression analyses can be provided on demand, which shows a strong relationship between domestic investment and economic growth.

5 For detailed discussion on this issue please see (Basu & Taylor (1999)).

6 For the detailed theoretical description of control variables, please see Barro (1997), Fischer (1993), Karras and Song (1996) and Silva (2002).

7 Many researchers such as Silva (2002), Karras (1996) have used central bank independence and money supply along with inflation rate as indicators of monetary policy. However, they found that financial development indicators signs and significance level remain largely unaltered.

8 Total trade equals the sum of exports and imports.

9 Silva (2002) used absolute value of the change in exchange rate in his paper. We tried both variables in our analysis and found no significant difference in the regression results. Moreover, exchange rate volatility is better measured as a percentage change in the exchange rate.

10 Log of the series of initial GDP is taken to see the relative effect of initial income level of any economy on its growth.

11 The idea behind instrumental variables is to find a set of variables, termed instruments that are both (1) correlated with the explanatory variables in the equation, and (2) uncorrelated with the disturbances. These instruments are used to eliminate the correlation between right-hand side variables and the disturbances.

12 For details on the measurement of these variables, please see Silva (2002: 238).

13 Some other variables such as corruption etc. are also included in the analysis. However, Legal variables (whose results are reported in this paper) proved to be good instrumental variables. Moreover, studies such as Levine (1998) find that countries with legal systems that give high priority to banks receiving the full present value of their claims against firms have better developed banks than countries where the legal codes do not emphasize the rights of creditors.

14 Before calculating a correlation coefficient, we screened the data for outliers. Ecuador shows an unusual observation for FD4, therefore, is dropped while measuring correlations among financial development indicators.

15 A time series X is said to Granger-cause another time series Y if the prediction error from regressing Y on X declines by using past values of X in addition to past values of Y.

16 Granger causality test is run in E-views and '2' is selected as a lag length (k).

17 This method is fully described in Hall (1993), Hanson (1982) etc.

18 Term imported from King and Levine (1993a: 724)

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APPENDIX-1
ECONOMY-WISE DISTRIBUTION OF DATA

Industrial economies	Emerging economies	Developing economies
Australia	Argentina	Bangladesh
Austria	Brazil	Bolivia
Belgium	Chile	Congo, Republic
Canada	China	Ecuador
Denmark	Colombia	Egypt
Finland	Hungary	Ghana
France	India	Greece
Germany	Indonesia	Kazakhstan
Ireland	Israel	Kenya
Italy	Korea, republic	Kyrgyz, Republic
Japan	Malaysia	Madagascar
Netherlands	Mexico	Nicaragua
Norway	Peru	Nigeria
Portugal	Philippines	Pakistan
Singapore	Poland	Sri Lanka
Spain	Russia	Sudan
Sweden	South Africa	Syria
Switzerland	Thailand	Tanzania
United Kingdom	Turkey	Uruguay
United States	Venezuela	Zambia
		Zimbabwe

APPENDIX-2
VARIABLES

GYP	Growth rate of real GDP per capita[1]
INV	Ratio of gross domestic investment to GDP[1]
σ_{gyp}	Business cycle component of the GYP series[2]
σ_{inv}	Business cycle component of the INV series[2]
FD	Financial Development Indicators: FD1, FD2, FD3, FD4
FD1	Liquid liabilities as a fraction of GDP[1]
FD2	Assets of deposit money banks as a fraction of the total assets of the financial system[1]
FD3	Claims to non-financial private sector as a fraction of the GDP[1]
FD4	Claims to non-financial private sector relative to the total domesticcredit[1]
CREDRIGHT	Creditor rights index (sum of four dummy variables: reorganization, automatic stay, secured creditors and management). It ranges from 0 (low protection) to 4 (high protection)
RULELAW	Tradition for law and order, it ranges from 1 (less tradition) to 10 (greatest tradition)
GOVT	The ratio of government expenditure to GDP[1]
TRD	The ratio of total trade (the sum of exports and imports) to GDP[1]
INF	Inflation rate measured by GDP deflator[1]
EXCH	The percentage change in exchange rate, which is defined as US$ per unit of national currency[1]
LY_0	Log of initial real per capita GDP, measured in US dollars.
CRISIS	Binary variable representing the existence of crisis in various countries

[1] Mean value over the relevant time period

[2] Standard deviation of the values over the relevant time period