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Financial Structure and Macroeconomic Performance

Over the Short and Long Run

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ABSTRACT:

We examine the relationship between indicators of financial development and economic performance for a cross-country panel over long and short periods. Our long-term results are consistent with much of the literature in that we find a positive relationship between financial development and economic growth. However, we fail to find a significant positive relationship after accounting for disparities in factor accumulation. These results therefore indicate that the primary channel for financial development to facilitate growth over the long run is through physical and human capital accumulation. We also identify a significant negative relationship between financial development and income volatility, suggesting that financial development does mitigate economic fluctuations in the long run.

We then turn to short-run analysis, concentrating on the period immediately surrounding the 1997 Asian financial crisis. Unlike our long-term results, our short-term panel analysis fails to find a significant relationship financial development and economic performance during this period, both for a broad sample of countries and for a small sample of developing Asian nations.

Taken as a whole, our analysis appears to support a relatively new idea in the literature that while financial development is beneficial over the long run, it may exacerbate short-term volatility in isolated episodes. One reason for this discrepancy may be that financial liberalizations are typically only partial, resulting in increased financial market distortions. We analyze the Korean experience in the period surrounding the Asian financial crisis and argue that this experience supports the idea of distortionary partial liberalization.

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I. Introduction

There is both a large theoretical and empirical literature concerning the relationship between a country's financial sector and its economic performance. The theory literature has concentrated on the positive impact a more developed financial system can have on a nation's ability to accumulate physical and human capital [e.g. Greenwood and Jovanovic (1990), Bencivenga and Smith (1991), Banerjee and Newman (1991), and King and Levine (1993b)]. In this literature, the absence of a developed financial sector may preclude agents in the economy from pursuing positive present value projects. This would be particularly true in the poorest world economies [e.g. Galor and Zeira (1993) and Benabou (1996)] where agents may be most dependent on external funds to undertake investment.

The empirical literature on financial development and long-term growth has primarily concentrated on identifying a relationship between indicators of the quality of the domestic financial market and subsequent economic performance. Financial market quality has been measured across a number of dimensions. A number of cross-country studies look at indicators of financial development, such as the ratio of domestic credit to GDP or the ratio of liquid liabilities to GDP in a nation; examples include King and Levine (1993a,b); Levine and Zervos (1993, 1998); Levine, Loayza and Beck (2000); Benhabib and Spiegel (2000); Beck, Levine, and Loayza (2000); and Spiegel (2001). Other studies, such as Jayaratne and Strahan (1996), examine the relationship between the financial regulatory regime and subsequent economic performance. Finally, some studies have tried to directly measure financial market quality. La Porta, Lopez de Silanes, and Shleifer (2002) directly examine indicators of the quality of a nation's

banking system, while Levine and Zervos (1993, 1998) and Bekaert, Harvey and Lundblad (2001) examine equity market development.

While the bulk of these studies have found a positive relationship between financial development and growth, there have been a number of exceptions. De Gregorio and Guidotti (1995) find a positive relationship between financial development for a large cross-section of nations, but find a negative relationship in a panel of Latin American countries. Benhabib and Spiegel (2000) do not find a positive relationship between financial development and growth in a panel study after accounting for rates of factor accumulation, although they do find a positive relationship between financial development and rates of physical capital accumulation.

In a recent paper, Loayza and Ranciere (2002) highlight an interesting dichotomy. While the empirical growth literature tends to find a positive relationship between financial aggregates and subsequent economic performance, the literature on the determinants of banking and currency crises, such as Demirgüç-Kunt and Detragiache (1998) and Kaminsky and Reinhart (1999), identifies the same aggregates as being associated with future banking crises. These crises are usually precursors to economic downturns. Indeed, these authors find that the indicators identifying financial development in the long-term growth literature are not positively correlated with economic growth in a panel of countries during banking crisis periods.

Similarly, Kaminsky and Schmuckler (2002) find some evidence that financial excesses over the business cycle may increase after financial liberalizations for a limited period of time. Their point estimate is that financial liberalizations tend to mitigate stock

market volatility after approximately four years, although it exacerbates volatility in the period immediately following the liberalization.

These contrasting sets of results suggest that while financial development may enhance economic development over long periods, they may actually exacerbate income volatility in the short-run. That is, countries with liberal financial markets may leave themselves more open to volatility during turbulent financial episodes. Consequently, financial development may enhance economic growth, but at a cost of increased volatility.

This paper examines the role that conditions in the financial sector play in the determination of economic performance both over the long run and during the short-term period immediately preceding and following the Asian financial crisis. We first look at the long run evidence. We follow Benhabib and Spiegel (2000) and Spiegel (2001) by reexamining the relationship between financial development and long-term growth using the panel GMM methodology associated with Arrelano and Bond (1991). As mentioned, Benhabib and Spiegel failed to find a positive relationship between financial development and growth after accounting for factor accumulation rates. Spiegel examined whether the finance and long-term growth relationship is unique for the APEC nations. He found that the relationship between certain indicators of financial development and growth is even stronger for the APEC countries than for the rest of the world, despite the large degree of heterogeneity in the characteristics of APEC member countries.

We extend these long-term results along two dimensions. First, we use the system-GMM methodology proposed by Blundell and Bond (1998). Several studies have

demonstrated that the Arellano-Bond GMM methodology performs poorly in Monte Carlo simulations relative to the system-GMM methodology for panels that are short in the time dimension. Second, we provide panel evidence on the relationship between financial development and output volatility using a panel sample of a cross-section of 101 countries over the period from 1960 through 1990. Ramey and Ramey (1995) have demonstrated that increased income volatility is associated with reductions in long-term economic growth. We also investigate the short-term relationship between financial system development and economic fluctuations by examining a cross-section of countries in the neighborhood of the 1997 Asian financial crisis.

Our results support the notion that the relationship between financial development and economic performance differ across time horizons. We obtain evidence of a positive relationship between indicators of financial development and economic growth over our long-term panel study, but we do not obtain such results over the short-term.

For our long-term study, we find that income growth per capita is positively correlated with indicators of financial development on their own, but this positive correlation is not robust after accounting for factor accumulation, either with a specification consistent with a neoclassical growth model or with an endogenous growth specification. This result implies that the channel through which financial development positively influences growth is factor accumulation, consistent with the results of Benhabib and Spiegel (2000).

We also find a robust negative relationship between financial development and economic fluctuations over the panel sample for the full 1960-1990 period, indicating

that another potential channel for financial development to positively impact growth is through reduced volatility over the long term

However, if we limit ourselves to the short-period immediately preceding and following the 1997 Asian financial crisis, we fail to find systematic evidence of a relationship between financial system development and economic performance. Our short-term results are therefore more consistent with recent findings in the literature, such as Loayza and Ranciere (2001) and Kaminsky and Schmukler (2002), that financial development benefits growth over the long run, while finding mixed impacts over short horizons.

The paper is divided into five sections. The following section examines the longer-term relationship between indicators of financial development and economic growth for a panel of countries. Section III examines the relationship between economic fluctuations and financial system development in the neighborhood of the Asian crisis. Section IV discusses the policy implications of our findings for Asian nations, and Section V concludes.

II. Financial Development and Long-Run Economic Growth

2.1 Literature Review

As discussed above, the early literature favored a robust relationship between financial development and economic growth. King and Levine (1993a,1993b) demonstrated that proxies for development of the banking sector, such as the ratio of domestic credit to GDP or the ratio of liquid liabilities to GDP, are good predictors of future growth rates. Similarly, Levine and Zervos (1993, 1998) demonstrate that stock

market liquidity and development of the banking sector both positively predict growth, due to improved capital accumulation and total factor productivity.

Nevertheless, there is a strong perception that endogeneity issues influence these results. Rajan and Zingales (1998) take issue with the King and Levine methodology, arguing that the possibility of reverse causality still exists, even though these studies use initial financial development as a predictor of future economic growth. They argue that a common omitted factor could influence the results. For example, since savings would lead to development of the financial sector as well as economic growth in general, disentangling the causality between the two would be difficult in the absence of a formal model. Moreover, they argue that some measures of financial development, such as the size of the stock market, may predict economic growth simply because stock market capitalization in part reflects expectations concerning a nation's future growth prospects. This argument places financial development as a leading indicator rather than a causal factor.

A number of recent investigations concerning the relationship between financial development and growth have concentrated on dealing with this causality issue. One general method is the use of micro-level data. Rajan and Zingales (1998) argued that financial development should disproportionately aid firms that are dependent on external finance and demonstrate that industries intensive in external finance grow more rapidly in countries with superior financial markets. This result suggests that causality truly does run from financial development to growth, rather than vice versa. Similarly, Demirgüç-Kunt and Maksimovic (1998) demonstrated that countries with active stock markets,

large banking sectors, and efficient legal systems have a greater proportion of firms that use external financing.

Other studies have turned to instrumenting techniques. Levine (1999) and Levine, Loayza and Beck (2000) used legal and regulatory characteristics as instruments for financial development. Both studies confirmed a positive empirical relationship between financial development and growth.

Finally, recent studies have utilized panel data to obtain instruments from lagged observations of explanatory variables. These have included studies based on the dynamic-panel GMM estimation methodology of Arellano and Bond (1991), as in Benhabib and Spiegel (2000), or the more recent system-GMM methodology of Blundell and Bond (1996), as in Levine, Loayza, and Beck (2000). Both of these studies also find a positive relationship between financial economic development and subsequent economic growth.

Spiegel (2001) also found a positive role for financial development in enhancing economic growth using the Arellano-Bond methodology. In addition, he found that the growth experiences of a sub-sample of APEC nations are more sensitive to financial development than the overall world sample of countries.[1] This additional sensitivity arose both in enhancing rates of physical capital accumulation and in enhancing total factor productivity growth.

Below, we re-examine the relationship between financial development and growth. Specifically, we extend the Benhabib and Spiegel (2000) study by using the Blundell-Bond system-GMM methodology. Our work extends their analysis by

[1] The APEC sub-sample examined in Spiegel (2001) included Australia, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, the Philippines, South Korea, Taiwan, Thailand, and the United States. The sub-sample included all APEC countries for which data was available.

embedding the financial development proxies within structural growth models, including a neoclassical specification and an endogenous growth specification. In addition, we re-examine the extra sensitivity of Asian nations to financial development. However, unlike Spiegel (2001), we limit our analysis to developing Asian APEC nations for which we have adequate financial data.[2]

2.2 Methodology

Our data set is grouped into an unbalanced panel of 101 countries over five year intervals from 1965 through 1990. Real income and population growth data was obtained from the Penn World Tables version 5.6 (1994). Human capital, which is proxied by average years of schooling in the population above 25 years of age, was obtained from the updated version of the Barro-Lee (1993) data set. Physical capital stocks were calculated according to the method used in Klenow and Rodriguez-Clare (1997). Initial capital stocks are calculated according to the following formula

$$\frac{K}{Y_{1960}} = \frac{I/Y}{g+\delta+n}, \qquad (1.1)$$

where I/Y is the average share of physical investment in output from 1960 through 1990, g represents the average rate of growth of output per capita over that period, n is the average rate of population growth over that period, and δ represents the rate of depreciation, which is set equal to 0.03. Given initial capital stock estimates, the capital stock of country i in period t satisfies

[2] The developing Asian subsample in this study includes Malaysia, the Philippines, South Korea, Taiwan, and Thailand.

$$K_{it} = \sum_{j=1960}^{t} (1-\delta)^{t-j} I_{ij} + (1-\delta)^{t} K_{1960}. \qquad (1.2)$$

We obtained long-run indicators of financial development from King and Levine (1993a, b). The first variable is *DEPTH*, a proxy for the overall size of the formal financial intermediary sector, measured as the ratio of liquid liabilities of the financial sector to GDP.[3] The second indicator is *BANK*, the ratio of deposit money bank assets to deposit money bank assets plus central bank domestic assets. King and Levine (1993a,b) introduce this variable to emphasize the risk-sharing and information they believe banks are most likely to provide. The third variable is *PRIV/Y*, the ratio of claims on the non-financial private sector to GDP, which indicates the share of credit funneled through the private sector. Note that financial development is likely to be endogenous with respect to current income levels and investment rates, as discussed by Greenwood and Jovanovic (1990). To address these endogeneity issues, we use beginning-of-period values of the indicators of financial development.

Nevertheless, to the extent that financial markets may develop in anticipation of future investment and growth, simultaneity issues may arise in the analysis. Moreover, the "base specification" of our panel study has been shown to suffer from simultaneity bias due to the influence of lagged endogenous variables. To address this possibility, we use the system-GMM methodology of Blundell and Bond (1998). This methodology builds upon the differenced-GMM estimation method of Holtz-Eakin, Newey and Rosen (1988) and Arellano and Bond (1991) that was used in several panel growth studies, such

[3] King and Levine (1993a) use M3 as a proxy for liquid liabilities when available, and M2 when M3 was unavailable. As in Benhabib and Spiegel (2000), we use M2 throughout, which is available for all countries.

as Caselli, Esquivel and Lefort (1996), Easterly, Loayza and Montiel (1997), and Benhabib and Spiegel (2000).

The Arellano-Bond methodology, also used by Beck, Levine, and Loayza (2000) and Loayza and Ranciere (2002), first differences the sample panel to remove country-specific fixed effects, which induces correlation between the differenced error term and the lagged dependent variable. To deal with this endogeneity problem, lagged explanatory variables are used as instruments. The validity of these lagged variables as instruments requires that they be "predetermined," in the sense that $E[X_{it}e_{is}] = 0$ for all $s \geq t$, where X_{it} represents the explanatory variables to be used as instruments. All of the variables used as instruments in the panel study below were shown to satisfy this restriction by either Benhabib and Spiegel (2000) or Spiegel (2001).

However, as shown by Alonso-Borego and Arellano (1999), the standard differenced GMM methodology suffers from large finite sample biases and poor precision in simulated dynamic panel data with a large autoregressive parameter and a small number of time series observations. Of course, this is precisely the situation faced in most panel growth studies, as five-year intervals are commonly used because of business cycle concerns. With the twenty to thirty years of data typically available in these studies, these samples are quite small in the time dimension.

The system-GMM approach uses lagged differences of the dependent variable as instruments for growth equations in levels and lagged levels of the dependent variable as instruments for the growth equations in differences. This requires the additional assumption that first differences of both the dependent and the independent variables in our specification are uncorrelated with the country-specific fixed effects; see Bond,

Hoeftler and Temple (2001). Using both Monte Carlo simulations and asymptotic variance calculations, Blundell and Bond (1998) demonstrated that the system-GMM estimator results in dramatic efficiency gains relative to the standard differenced-GMM estimator in these types of samples.

We first examine the simple correlation between long-term growth and financial development. However, we are also interested in the channels through which financial development may positively influence growth. To determine the answer to the latter question, some more structure is required. In particular, in order to ascertain whether financial development has a positive impact on total factor productivity growth, one needs a specification capable of conditioning for other determinants of income growth, such as rates of factor accumulation.

To examine the impact of financial development on total factor productivity growth, consider the following Cobb-Douglas specification,

$$Y_{it} = A_{it} K_{it}^{\alpha} L_{it}^{\beta} H_{it}^{\gamma} \varepsilon_{it}, \qquad (1.3)$$

where Y_{it} is the income in country i in period t, A_{it} is a measure of total factor productivity, L_{it} is a measure of labor input, K_{it} is a measure of capital, H_{it} is a measure of human capital and ε_{it} represents an independent and identically-distributed error term. Taking log differences and adding time and country fixed effects, the specification follows

$$\Delta y_{it} = \Delta a_{it} + \alpha \Delta k_{it} + \beta \Delta l_{it} + \gamma \Delta h_{it} + \phi_t + \theta_i + e_{it}, \qquad (1.4)$$

where lower case letters represent logged values, $\Delta x_{it} = x_{it} - x_{it-1}$, and ϕ_t and θ_i are time and country dummies respectively.

We consider two alternative specifications for Δa_{it}: a neoclassical specification in which technological progress is exogenous, and a Nelson-Phelps type model of technology diffusion dependent on human capital and technological backwardness. Following Benhabib and Spiegel (1994), we consider the following structural specification of technological progress under the diffusion model; i.e.,

$$\Delta a_{it} = c_0 h_{it} + c_1 h_{it} \left(\frac{TFP_{mt}}{TFP_{it}} \right), \qquad (1.5)$$

where TFP_{it} represents the level of total factor productivity of country i in period t, as estimated from a pooled, three-factor Cobb-Douglas production function with fixed effects included, and TFP_{mt} represents the level of total factor productivity of the "leader nation" at time t estimated in the same manner.[4] The parameter c_1 is expected to be positive, reflecting the positive interaction between the amount of technology a country can adopt from abroad, which is an increasing function of backwardness, and a country's capacity to learn from abroad, which is an increasing function of its human capital stock. However, the parameter c_0 is of ambiguous sign, depending on the relative importance of innovation and technology adoption.[5]

2.3 Results

The simple correlations between indicators of financial development and income growth are shown in Table 1. Because of collinearity issues, we first introduce these variables individually, and then all together. We expect a positive relationship between

[4] Based on our dataset, the coefficient estimates for this production function used in the construction of TFP are $\alpha = 0.52$, $\beta = 0.49$, and $\gamma = 0.006$.

[5] See Benhabib and Spiegel (1994) for details.

these variables; that is, as financial development improves, we expect growth to improve. There is a robust positive correlation between all three indicators of financial development and income growth. Even with all financial indicators introduced simultaneously, we obtain significant positive coefficient estimates on the *DEPTH* and *BANK* variables, although the *PRIV/Y* variable becomes significantly negative. Nevertheless, the latter sign change is likely due to collinearity between the three indicators.

While the correlations in Table 1 indicate a positive impact of financial development on growth, they provide little guidance as to whether that impact is felt through enhanced total factor productivity or through encouraging faster rates of factor accumulation. To address this question, we turn to our more structural growth specifications. The panel growth results displayed in Tables 2 and 3 are based on the neoclassical and endogenous growth base specifications, respectively. To save space, we concentrate on the performance of the financial development indicator variables.

The results in Table 2 indicate that the financial indicator variables fair very poorly as predictors of economic growth once the rates of factor accumulation are accounted for. The *DEPTH* and *BANK* variables enter significantly negative, while the *PRIV/Y* variable is insignificant. When all of the indicators are included in Model 5, the *DEPTH* and *BANK* variables retain their negative signs, but the coefficient on *PRIV/Y* is now significantly positive. The diagnostic result fails to indicate the presence of second-order serial correlation in the data.

The parameters corresponding to the standard variables of the neoclassical model are also interesting. While the coefficient on Δk_{it} enters significantly with reasonable

parameter values, the coefficient on Δl_{it} enters significantly with the incorrect sign for all of the models examined. This probably indicates that population growth is a poor proxy for growth of the labor force. The coefficient on Δh_{it} enters surprisingly positively. This finding is a surprise relative to the literature, such as Benhabib and Spiegel (1994) and Klenow and Rodriguez-Clare (1997) who robustly find the growth in human capital entering with either a negative or an insignificant sign. For our purposes, it may suggest that the sample for which both King-Levine and Barro-Lee data is available may be unrepresentative.

Table 3 repeats the exercise for the endogenous growth specification. Again, the *DEPTH* and *BANK* indicators of financial development perform poorly, with the *DEPTH* variable entering insignificantly, and the *BANK* variable entering significantly with the incorrect sign. In contrast, the *PRIV/Y* variable enters significantly positive, suggesting that the financial development that counts is that associated with the private sector. Model 5 here indicates that these results are basically robust to the inclusion of all of the financial development indicators simultaneously.

The other variables in the specification perform roughly as expected, with the exception of the surprising negative coefficient on the Δl_{it} variable. In particular, the catch-up term enters positively, indicating a role for human capital as a facilitator of technology adoption from abroad. The diagnostic test again fails to confirm the presence of second-order serial correlation in the data.

In summary, our results suggest that while the financial development indicators were positively correlated with income growth on their own, they fail to play a role in income growth after accounting for rates of factor accumulation. The possible exception

is the *PRIV/Y* variable under the endogenous growth specification. This result is consistent with financial development failing to enhance total factor productivity growth, which is consistent with the results of Benhabib and Spiegel (2000).

However, it should not be concluded that financial development fails to play a positive role in economic performance. As shown by Benhabib and Spiegel (2000), financial development appears to play a positive role in affecting rates of factor accumulation, particularly concerning rates of physical capital accumulation. Our long-term results therefore support a positive relationship between financial development and growth, albeit one that works through enhanced rates of factor accumulation.

2.4 Panel evidence on financial development and income volatility

One reason to believe that financial development enhances economic performance rests on the theory that developed financial markets to allow economic agents to better weather economic shocks. A large literature exists [e.g. Bernanke and Blinder (1999), Bernanke and Gertler (1995), and Kiyotaki and Moore (1997)] concerning the presence of a "credit channel" for macroeconomic instability. In this literature, the lack of developed financial markets may force agents into financing methods that exacerbate volatility in the wake of shocks. As an extreme example, if borrowing needs to be fully collateralized, then the impact of a decline in asset values can be multiplied by the financial sector as agents are forced to liquidate investments due to their inability to meet short-term financial obligations.

In this section, we examine the relationship between financial development and income volatility. Income volatility has been shown in the literature to have a negative

influence on long-term economic performance [e.g. Ramey and Ramey (1995)]. We measure volatility as simply the square of the change in income per capita, as per McConnell and Perez-Quiros (2000). Specifically, for each country, we average the squared annual changes within each five-year period from 1960 to 1990. We use again using system-GMM estimation with time and country fixed effects. Our specification is completely non-structural. We posit that income volatility is likely to be affected by initial total factor productivity and the financial variables we observe. In addition, we allow income volatility to follow an AR(1) process.[6]

Our results in Table 4a show that all of our proxies of financial development enter negatively and significantly. This negative coefficient is the expected sign as financial development should enhance the ability of agents to weather shocks and hence reduce volatility. The results when lagged volatilities are included are presented in Table 4b. Surprisingly, the coefficient is robustly negative. One might expect that relatively volatile episodes to be followed and preceded by relatively volatile episodes, but that result is not present in our data after accounting for country-specific fixed effects. It should be noted that our panel contains five-year time periods, so a "one-period" lag represents a relatively long time change.

Nevertheless, the financial development indicators are again robustly negative when the indicators are included individually. However, when all the financial development variables are included in Model 5, there is some heterogeneity. In particular, the *DEPTH* variable becomes insignificant while the *BANK* variable becomes

[6] TFP is introduced only as a nuisance parameter and need not enter for consistent estimation of the other variables in our specification. We introduce TFP to provide some conditioning for differences across countries and time. Benhabib and Spiegel (2000) find a significant relationship between the proxies for

positive and significant. The *PRIV/Y* variable remains negative and significant as expected. Because of the high correlation between these variables, however, we would place more emphasis on Models 2 through 4 that introduce the indicators individually with them entering significantly with their expected negative signs.

For a first pass at the data, it appears that one finds a robustly negative relationship between financial development and income volatility for the full sample of countries. To be more certain about this relationship, one would want to extend the analysis to account for trends in income volatility across countries. We intend to pursue this avenue in the future. For now, we note that in its simplest form there does indeed appear to be the negative relationship one would expect. Figure 5 shows this relationship for developing Asian economies in the neighborhood of the Asian crisis. As before, these data for these countries indicates only a weak correlation that is probably not statistically significant.

III. Financial Development and Short-term Fluctuations

3.1 Cross-Sectional Evidence

As presented above, the bulk of the literature on the relationship between financial development and economic growth is conducted over long periods of time. However, the short-term implications of differences in financial development are also of interest, as differences in financial development may influence the depth of cyclical fluctuations. In this section, we move towards examining this relationship for the short time period immediately preceding and following the 1997 Asian crisis. We examine the

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financial development above and growth in labor productivity. This suggests that our inclusion of TFP does not drive our results.

periods from 1990 to 1995 and from 1995 to 1999 for a sample of 63 countries. Our sample includes all of the countries that had the necessary data to construct the financial indicators and the economic indicators in our study. Our cross-sectional samples below always exceed 50 countries.

We use financial system development indicators from two sources. The first source is the study on the percentage of government ownership of banks within a country by La Porta, Lopez de Salines and Shleifer (2002). Specifically, we use their GB70 and GB95 variables, which represent the percentage of the equity of a country's ten largest banks owned by the government in 1970 and 1995, respectively.[7] We use both the GB95 and the change between GB70 and GB95, denoted ΔGB, as financial system development indicators.[8]

Our second source is the study on the regulation and supervision of banks around the world by Barth, Caprio and Levine (2001a). In this study, the authors quantify a 1998 World Bank survey on bank regulatory and supervisory practices, such as whether banks are permitted to engage in securities activities or insurance underwriting.[9] For a variety of such practices, the authors construct indices of how restrictive a domestic regulatory regime is. The indices range from a value of one for the least restricted practices to a value of four for the most restricted practices. We use the average of all the indices

[7] As noted by La Porta et al. (2002), the top ten banks within a country represent over 75 percent of the total claims on the private sector for most of the countries in the study. Notable exceptions are the United States and Hong Kong, where the top ten banks represent less than 50 percent of total claims on the private sector.

[8] The share of banks owned by the government is likely to respond to some extent to prevailing economic conditions, such as the presence of a financial crisis. However, these numbers change slowly over time and do not appear to present any simultaneity issues concerning the validity of our reported estimates.

[9] Further details on the survey and the actual database can be accessed at the following website: http://www.worldbank.org/research/interest/prr_stuff/bank_regulation_database.htm

related to bank activities (section 4 of the survey) to construct our indicator variable of interest, henceforth referred to as the BCL variable.[10]

Of course, these variables cannot provide a comprehensive summary of a country's financial system or its state of development. For example, these variables do not account for domestic equity and bond markets. Additionally, they do not explicitly capture the effects that financial crises have on various aspects of a nation's overall economic structure, as per Barro (2001). However, they should provide insight into the relative state of financial system development as compared to other countries. This information should permit an analysis of the impact of financial system development on countries' relative economic performance. Furthermore, since these variables were constructed using data from periods very close to the Asian crisis, they may shed light on our question of the short-term impacts of financial structure in during the crisis.

We chose three standard indicators of macroeconomic performance and financial development. The first variable is simply the log growth rate of real GDP per capital over the five-year sample periods, denoted as ΔGDP. The second variable is the change in the annual ratio of private credit extension to GDP from the beginning of the five-year sample period to the end, which is denoted as ΔPRIV/Y.[11] The third variable is the change in the annual ratio of the assets of depository financial institutions to those of depository institutions and central banks, denoted as ΔBANK.[12]

[10] For other empirical work using this survey, see Barth, Caprio and Levine (2002).
[11] For this analysis, the ΔPRIV/Y variable is constructed as the credit to the private sector by domestic depository financial intermediaries and other financial institutions (IFS lines 22d + 42d) divided by GDP (IFS, line 99b).
[12] For this study, the ΔBANK variable is constructed as the ratio of the assets of domestic depository institutions (IFS, lines 22a-d) to the sum of the assets of domestic depository institutions and assets of the central bank (IFS lines 12a-d).

The results of this analysis are presented in Figures 1 through 3, which show scatterplots of the financial system development indicators and economic performance measures, and Table 3, which summarizes the simple regression results. Overall, the regression results do not indicate a strong and consistent relationship between the chosen financial system indicators and the economic performance measures. The results suggest that differences in financial system development did not play an identifiable role during the Asian crisis. This conclusion is in line with the recent literature suggesting differing long-run and short-run relationships between financial development and output .

Turning to our empirical results, the first financial system indicator we examine is the GB95 variable, for which we hypothesize a negative relationship with economic development; that is, higher values (i.e., more government ownership of commercial banking assets) are more likely to cause slower economic development. Barth, Caprio and Levine (2001b) showed that greater state ownership of banking assets is associated with more poorly operating financial systems, and hence, by extension, poorer economic performance. With respect to ΔGDP from 1990 to 1995, a small, negative relationship is found, but this effect is not present in the second sample period. Similarly, the ΔPRIV/Y variable exhibited a weak, negative relationship with the GB95 variable in the first sample period, but no relationship in the second sample period. Finally, no relationship is found with respect to the ΔBANK variable.

Our second financial system indicator is ΔGB, and we hypothesize that this variable would have a negative relationship with economic development; that is, greater government privatization of commercial banking assets (i.e., more negative values of ΔGB) should have a positive effect on economic development. With respect to ΔGDP

from 1990 to 1995, no relationship is found, but a weak and small, positive relationship is found for the period from 1995 to 1999. Similarly, the ΔPRIV/Y variable exhibits no relationship with the ΔGB variable in the first sample period; however, it does have a small but positive relationship in the second sample period. This result suggests that a decline in government ownership of banks leads to a decline in private credit extension within a country, which goes against our prior hypothesis. Finally, no relationship is found with respect to the ΔBANK variable.

Our third financial development indicator is the BCL variable. We hypothesize that this variable should have a negative relationship with economic development; that is, more restrictive national banking policies (i.e., higher values of the BCL variable) should have a negative effect on economic development. This hypothesis is generally supported by the work of Claessens and Glaessner (1999). Unfortunately, this variable has no relationship with our three indicators of economic development over either sample periods. It would seem to be that this variable in general or in its construction is not correlated with economic development in the short run.

In conclusion, our analysis fails to find consistent evidence concerning the impact of financial system development indicators on short-term economic development. Although the Korean case discussed above seems to indicate otherwise, our cross-sectional results suggest that issues of financial system development did not play a role during the Asian crisis.

To ensure that our findings are not the result of an unrepresentative sample, we examined the developing Asian countries individually more closely. Figure 4 shows the five-year changes in real per capita GDP before and after the crisis. The six countries are

sorted by GB95, with Malaysia having just 10 percent government ownership of top ten banks and Indonesia having 43 percent. A quick analysis of this data suggests that less government ownership of banks is weakly correlated with higher growth in both periods. However, the statistical significance of this correlation is doubtful.

Further analysis of this question is clearly necessary. For example, study of the short-term effects of equity market development indicators, as examined by Bekaert et al. (2001), could provide further insight into this question. Another potentially fruitful avenue of research is to use disaggregated data, down even to the individual bank level, to assess the degree of sophistication of a nation's financial market. For example, Kwan (2002) found that Asian bank operating costs were declining from the early 1990s to 1997, at which point per-unit bank operating costs increased in response to their increased costs due to the problem loans arising from the Asian crisis and their declining output.

3.2 Korea in the 1990s

The short-term results above are somewhat surprising in light of the positive results found earlier for long-term panel studies both for financial development to positively influence economic growth and to reduce volatility over the long run. To obtain some intuition behind the forces driving the discrepancy between our long and short-term results, we turn to the experience of Korea over the crisis period.

A running theme in the literature on the causes of the Asian crisis is the proper sequencing of economic liberalization. A number of studies, such as Furman and Stiglitz (1998), ascribe Asia's financial vulnerability to its pursuit of financial liberalization

without matching reforms in the financial regulatory regime. Among all of the Asian nations, the influence of financial markets in shaping a nation's experience over the 1997 crisis appears to be most apparent in the case of Korea. Two characteristics of Korea's financial markets appear to have played a central role in the determination of its position going into the crisis and its performance over and subsequent to the crisis period. These characteristics are the adverse implications of partial liberalization on the condition of Korean banks and the growing reliance of the Korean economy on non-bank financing prior to the crisis. We examine each in turn.

Korea adopted a number of partial liberalizations of its financial markets in the early 1990s. However, because the financial liberalization was only partial, Korean commercial banks were left facing a number of distortions. Long-term deposit rates were liberalized first, resulting in a shift of deposits towards long-term assets and an increase in banks' funding costs. Moreover, regulatory ceilings precluded the banks from passing these increased funding costs onto their borrowers through higher lending rates. Banks responded by increasing their holdings of the more-profitable, short-term commercial paper made available to them after financial liberalization in 1993. The share of "other securities" in Korean commercial bank trust accounts increased from 16.9 percent in 1990 to 22.8 percent in 1996 [Ra and Yan (2000)].

Furthermore, Korea's banking liberalization program permitted the banks to open overseas branches. These foreign branches greatly expanded the ability of Korean banks to issue external obligations, resulting in massive increases in their foreign currency liabilities [Wang (2001)]. Thus, the increase in foreign currency liabilities of Korean

commercial banks was even larger than the recorded surges in foreign capital inflows would indicate, further placing Korean bank funding at risk.

In addition to the distortions caused by partial financial liberalization of the Korean banking system, other forms of financial liberalization induced excessive reliance on the commercial paper market and weakened Korean balance sheets. As outlined by Ra and Yan (2000), after the 1993 financial liberalization, Korean firms began issuing commercial paper in large amounts, mostly because the banks were more willing to buy commercial paper than issue loans. From 1991 through 1997, the Korean commercial paper market increased seven-fold, compared to a 260 percent increase in equity and bond issues. By 1995, the Korean money market in 1995 accounted for 38 percent of GDP, compared to 22.3 percent for Japan and 35.7 percent for the U.S. Commercial paper accounted for somewhere between 40 and 50 percent of the Korean money market.

The growth of the Korean commercial paper market was therefore indirectly encouraged by government policy. Although bank loan rates were officially deregulated in 1993, evidence suggests that government officials worked to keep them artificially low. For example, even after the liberalization, the prime lending rate was lower than the corporate bond interest rate. In contrast, the commercial paper rate was fully deregulated by the beginning of 1994. In response, investors, including banks, moved towards commercial paper rates.

The disparity in regulatory treatment across financial instruments led the banks to take on an adverse maturity match, with the banks borrowing longer-term and investing in risky, short-term instruments. While commercial paper issues were predominantly 90 day notes, Korean firms extensively used this form of borrowing to finance long-term

investment. As a result, Korean corporations left themselves vulnerable to default if they were to find themselves unable to roll over this debt.

Moreover, after further financial liberalization in 1994, Korean financial institutions began raising large amounts of offshore funds, and then lending these funds to Korean firms. Finally, to make matters worse, Korean firms also responded to the boom in investments in the early 1990s by increasing their leverage. Corporate sector leverage doubled in Korea from 200 percent in 1989 to 400 percent in 1997. Combined with their movement to short-term financing instruments, corporations had clearly left themselves vulnerable to shocks.

In time, a number of prominent chaebols, such as Hanbo, Sami and Kia, were driven into bankruptcy. These bankruptcies put great pressure on the balance sheet positions of Korean banks. By September of 1997, the total amount of problem loans in deposit banks had reached record levels of 28.5 trillion won and over 8 trillion won in merchant banks; see Ra and Yan (2000).

After Moody's lowered its credit rating on debt issued by the Korean Development Bank in July 1997, Korean banks found it more difficult to borrow and instead turned again to domestic markets. The banks recalled their foreign currency loans from merchant banks, forcing these banks to quickly raise foreign currency and exacerbating the pace of won depreciation.

There is some disagreement about the degree to which these conditions left Korea vulnerable to the shocks associated with the Asian crisis. Park (2000) suggests that Korea's crisis experience was unique during the 1997 crisis because of its relatively strong macroeconomic fundamentals going into the crisis. Nevertheless, even he finds a

relationship between a constructed indicator of "exchange market pressure" and various fundamentals, including Korea's real effective exchange rate, domestic credit levels, and the ratio of the domestic money supply to reserves. Three variables that he found to be significant for Korea match those found by Sachs, Tornell and Velasco (1996) for a cross-section of countries. However, other authors argue that Korean fundamentals were weakening even prior to the onslaught of the crisis. For example, Ra and Yan (2000) point out that Korean exports were already weakening by 1996, causing a number of bankruptcies among chaebol firms.

Korea's experience demonstrates the pitfalls of partial financial liberalization. By liberating only certain markets, the Korean government induced assets to move out of the banking sector into more risky forms of finance, leaving the Korean economy more exposed to the shocks coming from the rest of Asia in 1997. When financial liberalization is partial, as is often the case, such liberalization may well fail to contribute to short-run economic performance.

IV. Policy Implications for Asian Nations

There are two primary schools of thought concerning the causes of the Asian financial crisis. One school attributes the onset of the crisis to fundamentals, arguing that weak economic structures led agents to make poor investment decisions which led to weak economic fundamentals in the affected nations. For example, Park (2000) finds that Korea's financial crisis was not the resort of self-fulfilling panics, but instead was based on fundamentals, including excessive lending by financial institutions and mismanagement of foreign reserves.

The competing school of thought is that crises need not be based on fundamentals. Instead, panic by agents can be self-fulfilling, as "runs" on nations deteriorate their fundamentals. Obstfeld (1995) discusses a model where agents' expectations concerning the willingness of a nation's government to defend its exchange rate peg can affect the cost of doing so. In such a manner, expectations of the collapse of an exchange rate regime may be self-fulfilling.

The dichotomy of these two schools of thought can also be applied to the question of the role of financial development in the determination of economic fluctuations. Chang and Velasco (2001) introduce a model where panics by foreign creditors can lead to illiquidity in a developing nation's domestic banks. Through this channel, expectations of international default by a developing nation may be self-fulfilling, as an otherwise solvent commercial bank may find itself unable to service its short-term debt obligations in the wake of large foreign withdrawals of funds.

These two hypotheses concerning the origins of financial crises have very different policy implications. The financial panic schools of thought imply that the financial system is vulnerable to otherwise-avoidable shocks. As such, they tend to favor government intervention in the form of restrictions on foreign capital flows and domestic financial markets. In contrast, the fundamentals school of thought implies that the markets flee a country only when its economy is being mismanaged. As such, a financial panic, such as a surge in capital outflows, is a symptom of improper economic management rather than the cause of financial difficulty on its own.

It would seem that our failure to identify a significant relationship between financial development and economic performance over the crisis period tends to mildly

favor the panic literature over that of the fundamentals. If the Asian crisis was attributable to poor financial system development resulting in bad resource allocations, one would predict that nations with inferior financial systems would have fared more poorly over the crisis period than those with superior ones. As we demonstrated above, this did not turn out to be the case.

Nevertheless, there are a number of caveats. First, our measures of financial development are necessarily crude, and therefore may provide a weak signal concerning the relative quality of the financial systems considered. Second, holding financial issues constant, there may have been other fundamentals-based differences that influenced disparities in countries' Asia crisis experience, such as differences in monetary and fiscal policy.

V. Conclusion

This paper examined the relationship between indicators of financial development and economic performance both using long-term evidence from panel data and examining the evidence for a cross-section of countries immediately surrounding the Asian financial crisis. We fail to find a significant positive relationship between financial development and growth in our long-term panel after accounting for disparities in factor accumulation. This is in contrast with other studies that found a role for financial development in more simple specifications. It is important to remember that while these results do not support a role for financial development in enhancing total factor productivity growth, they still leave open the possibility that financial development enhances growth. However, the channel for financial development to facilitate growth

must come from encouraging greater accumulation of physical and human capital or through increasing levels of total factor productivity. Given the findings of a positive correlation between financial development and growth in the literature, one would think that such a channel is in operation.

We then examined the relationship between financial system development and economic fluctuations, both in the neighborhood of the Asian financial crisis and over the longer run using panel data. Our short-term examination failed to indicate a strong relationship between financial system development and economic performance in the period of the Asian financial crisis. However, the experience of individual countries over the crisis period, such as the details of Korea's experience outlined above, clearly indicate that financial conditions did play some role in that crisis. It is possible that limiting ourselves to a more homogeneous sample of countries would have allowed us to tease these relationships out of the data.

Nevertheless, we were able to identify a significant negative relationship between financial development and income volatility for our panel sample over the 1960-1990 period. This indicates that financial development does mitigate economic fluctuations over the long run. Our results are therefore consistent with recent findings in the literature, such as Loayza and Ranciere (2001) and Kaminsky and Schmukler (2002), that identify beneficial effects of financial development over the long run while finding mixed impacts over short horizons.

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Table 1
Financial Development and Long-Term Growth[1]

Dependent variable: Δy_{it} , change in log output per capita

	1	2	3	4
c	0.025**	0.022**	0.031**	0.019**
	(0.001)	(0.002)	(0.001)	(0.003)
DEPTH	0.021**			-0.027**
BANK		0.017**		0.026**
		(0.003)		(0.006)
PRIV/Y			0.010**	0.022**
			(0.001)	(0.007)
# of obs.	397	397	396	306
2nd-order Ser-Corr (p-val)	0.07	0.21	0.06	0.26

[1] Estimated by system-GMM with Δy_{it-1}, Δk_{it-1}, $DEPTH_{it-1}$, $BANK_{it-1}$, and $PRIV/Y_{it-1}$ used as instruments. All specifications include time dummies. Dummy coefficients estimates are available upon request. ** indicates statistical significance at the five percent confidence level, while * indicates statistical significance at the ten percent confidence level.

Table 2
Financial Development and Long-Term Growth (Neoclassical Specification)[1]

Dependent variable: Δy_{it} , change in output per capita

	1	2	3	4	5
c	0.040**	0.048**	0.072**	0.038**	0.057**
	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
Δl_{it}	-1.260**	-1.481**	-1.792**	-1.125**	-1.321**
	(0.082)	(0.085)	(0.068)	(0.780)	(0.093)
Δk_{it}	0.416**	0.415**	0.514**	0.420**	0.535**
	(0.104)	(0.014)	(0.017)	(0.017)	(0.032)
Δh_{it}	0.046**	0.063**	0.052**	0.075**	0.065**
	(0.007)	(0.004)	(0.005)	(0.006)	(0.010)
DEPTH		-0.009**			-0.028**
		(0.003)			(0.005)
BANK			-0.031**		-0.023**
			(0.003)		(0.005)
PRIV/Y				-0.001	0.030**
				(0.002)	(0.004)
# of obs.	433	397	392	396	306
2nd-order Ser-Corr (p-val)	0.84	0.29	0.70	0.29	0.33

[1] Estimated by system-GMM with Δy_{it-1}, Δk_{it-1}, $DEPTH_{it-1}$, $BANK_{it-1}$, and $PRIV/Y_{it-1}$ used as instruments. All specifications include time dummies. Dummy coefficients estimates are available upon request. ** indicates statistical significance at the five percent confidence sector.

[13] The level, while * indicates statistical significance at the ten percent confidence level.

Table 3
Financial Development and Long-Term Growth
(Endogenous Growth Specification)[1]

Dependent variable: Δy_{it} , change in output per capita

	1	2	3	4	5
c	0.044**	0.047**	0.057**	0.050**	0.064**
	(0.001)	(0.003)	(0.003)	(0.002)	(0.004)
Δl_{it}	-1.432**	-1.411**	-1.584**	-1.477**	-1.586**
	(0.040)	(0.072)	(0.061)	(0.046)	(0.119)
Δk_{it}	0.510**	0.504**	0.568**	0.547**	0.665**
	(0.010)	(0.013)	(0.013)	(0.012)	(0.033)
h_{it}	-0.009**	-0.009**	-0.006**	-0.021**	-0.016**
	(0.006)	(0.001)	(0.001)	(0.001)	(0.002)
$h_{it}\left(\frac{TFP_{mt}}{TFP_{it}}\right)$	0.002**	0.002**	0.002**	0.006**	0.005**
	(0.000)	(0.000)	(0.000)	(0.004)	(0.001)
DEPTH		0.003			-0.027**
		(0.003)			(0.006)
BANK			-0.011**		-0.020**
			(0.003)		(0.004)
PRIV/Y				0.023**	0.043**
				(0.002)	(0.007)
# of obs.	423	397	392	396	306
2nd-ord Ser-Corr (p-val)	0.78	0.22	0.60	0.20	0.27

[1] Estimated by system-GMM with Δy_{it-1}, Δk_{it-1}, $DEPTH_{it-1}$, $BANK_{it-1}$, and $PRIV/Y_{it-1}$ used as instruments. All specifications include time dummies. Dummy coefficients estimates are available upon request. ** indicates statistical significance at the five percent confidence level while * indicates statistical significance at the ten percent confidence level.

Table 4a
Financial Development and Income Volatility[1]

Dependent variable: $(\Delta y_{it})^2$, square of change in output per capita (000's)

	1	2	3	4
c	-657.38**	-771.48**	-818.79**	-908.16**
	(226.93)	(66.50)	(88.69)	(0.004)
tfp_{it}	226.93**	288.25	281.29**	306.52**
	(25.23)	(54.64)	(18.61)	(21.47)
DEPTH		-169.74**		
		(21.79)		
BANK			-113.51**	
			(29.19)	
PRIV/Y				-231.13**
				(37.23)
# of obs.	433	389	384	388
2nd-ord Ser-Corr (p-val)	0.35	0.33	0.37	0.33

[1] Figures are in thousands, except for lagged volatility, which is in ones. Estimated by system-GMM with Δy_{it-1}, Δk_{it-1}, $DEPTH_{it-1}$, $BANK_{it-1}$, and $PRIV/Y_{it-1}$ used as instruments. All specifications include time dummies. Dummy coefficients estimates are available upon request. ** indicates statistical significance at the five percent confidence level while * indicates statistical significance at the ten percent confidence level.

Table 4b
Financial Development and Income Volatility[1]

(lagged volatility included)

Dependent variable: $(\Delta y_{it})^2$, square of change in output per capita (000's)

	1	2	3	4	5
c	-835.18**	-1231.54**	-945.32**	-1500.21**	-1119.21**
	(176.57)	(147.61)	(223.49)	(232.44)	(43.91)
$(\Delta y_{it-1})^2$	-0.21**	-0.20**	-0.18**	-0.23**	-0.19**
	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)
tfp_{it}	288.25**	427.21**	350.07**	515.27**	363.25**
	(54.64)	(46.80)	(70.38)	(76.63)	(14.03)
DEPTH		-154.31**			16.40
		(30.95)			(15.02)
BANK			-126.47**		144.58**
			(53.35)		(13.11)
PRIV/Y				-265.68**	-319.95**
				(67.78)	(17.67)
# of obs.	359	316	312	324	306
2nd-ord Ser-Corr (p-val)	0.25	0.27	0.25	0.24	0.41

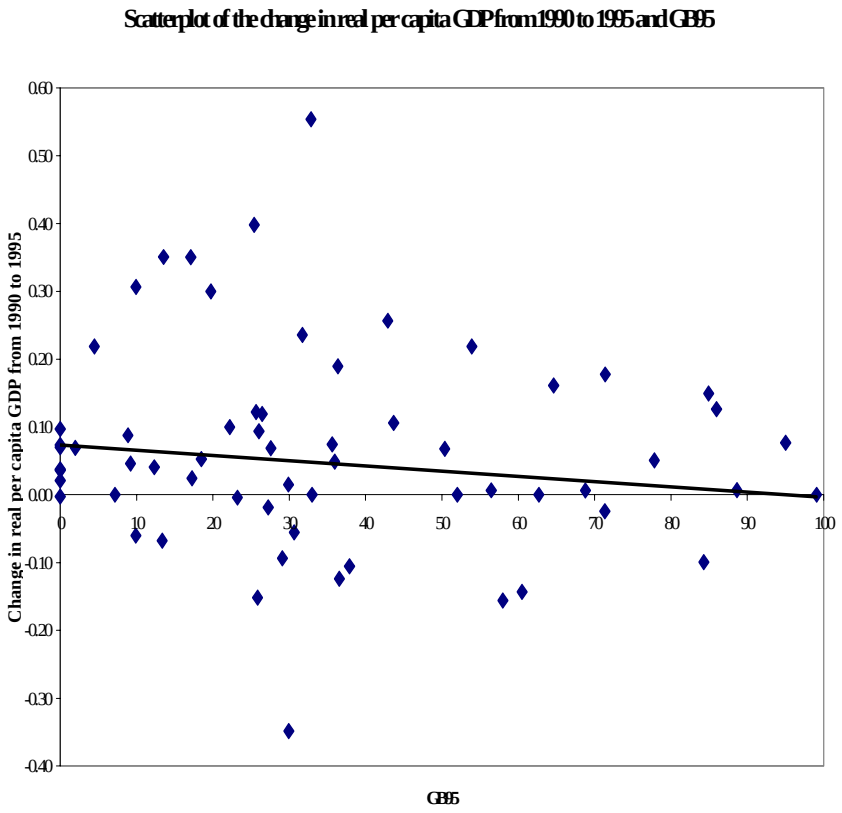
[1] Figures are in thousands, except for lagged volatility, which is in ones. Estimated by system-GMM with Δy_{it-1}, Δk_{it-1}, $DEPTH_{it-1}$, $BANK_{it-1}$, and $PRIV/Y_{it-1}$ used as instruments. All specifications include time dummies. Dummy coefficients estimates are available upon request. ** indicates statistical significance at the five percent confidence level while * indicates statistical significance at the ten percent confidence level.

Table 5.

Coefficients and p-values for bivariate regressions of economic performance indicators on financial development indicators

	GB95		**ΔGB**		**BCL**	
	1990-1995	**1995-1999**	**1990-1995**	**1995-1999**	**1990-1995**	**1995-1999**
Δ real per capita GDP	-0.00187 (9.2%)	-----	-----	0.00124 (17.1%)	-----	-----
ΔPRIV/Y	-0.00090 (15.8%)	-----	-----	0.00073 (4.2%)	-----	-----
ΔBANK	-----	-----	-----	-----	-----	-----

Figure 1a.


Scatterplot of the change in real per capita GDP from 1990 to 1995 and GB95
Change in real per capita GDP from 1990 to 1995
GB95
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
0
10
20
30
40
50
60
70
80
90
100

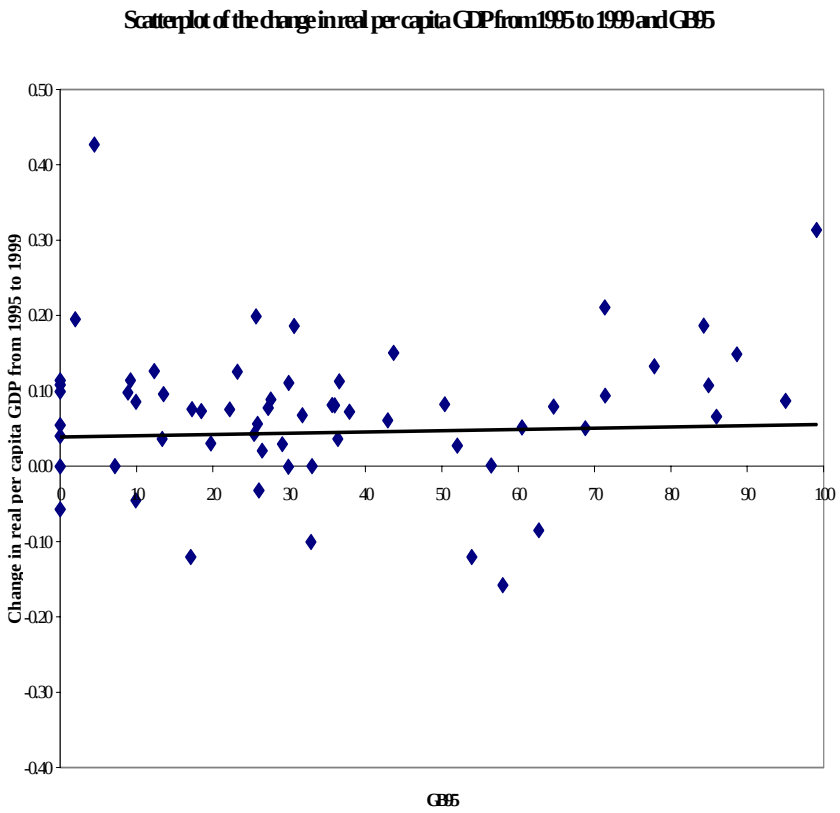
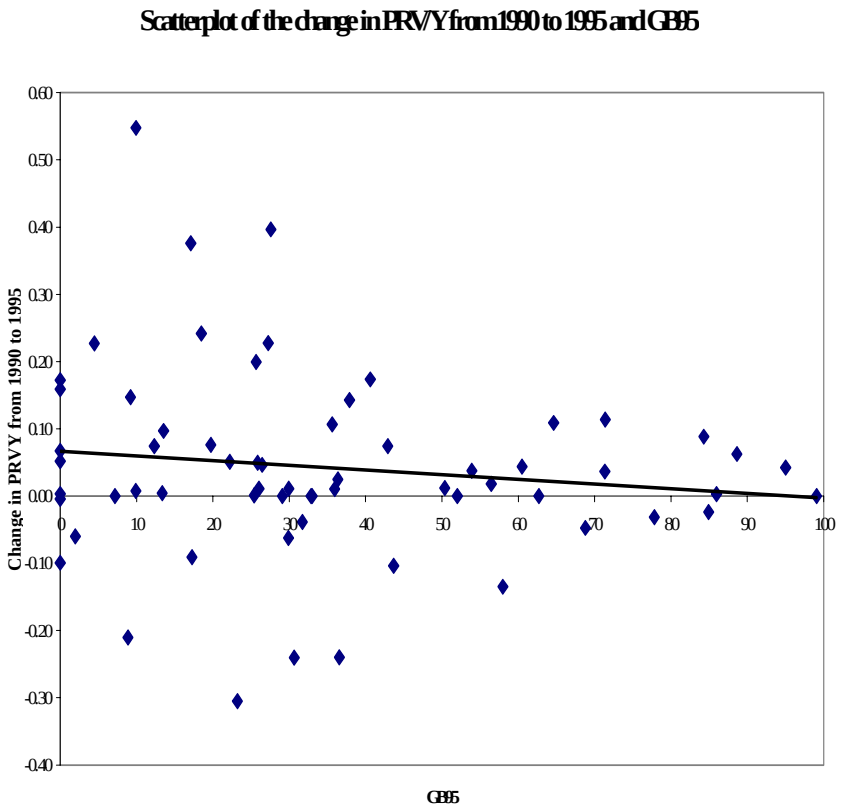

Scatterplot of the change in real per capita GDP from 1995 to 1999 and GB95
Change in real per capita GDP from 1995 to 1999
GB95
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
0
10
20
30
40
50
60
70
80
90
100

Figure 1b.


Scatterplot of the change in PRVY from 1990 to 1995 and GB95
Change in PRVY from 1990 to 1995
GB95
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
0
10
20
30
40
50
60
70
80
90
100

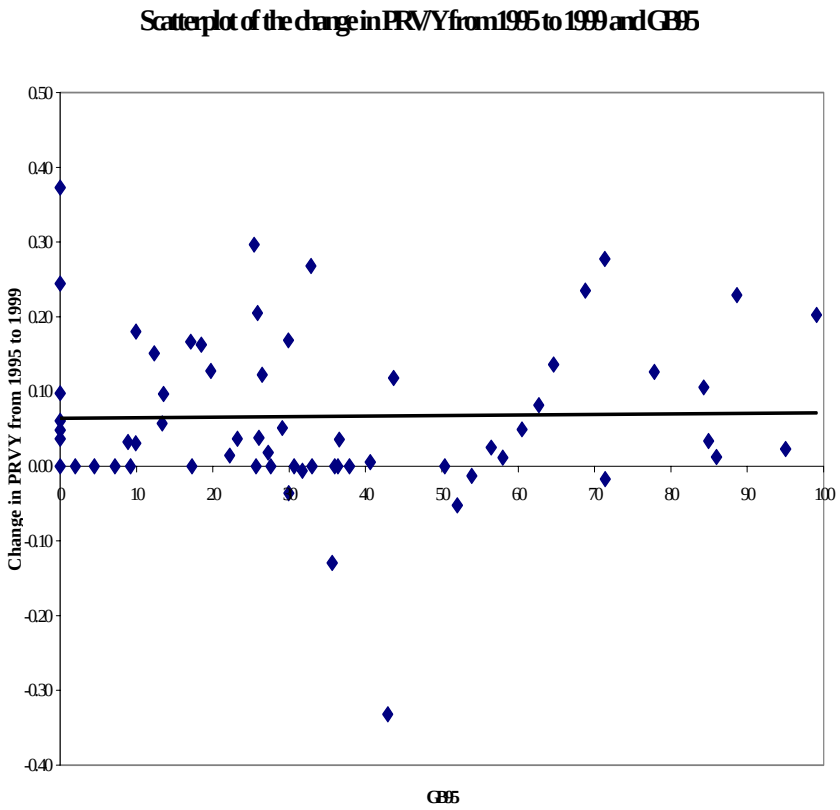

Scatterplot of the change in PRVY from 1995 to 1999 and GB95
Change in PRVY from 1995 to 1999
GB95
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
0
10
20
30
40
50
60
70
80
90
100

Figure 1c.

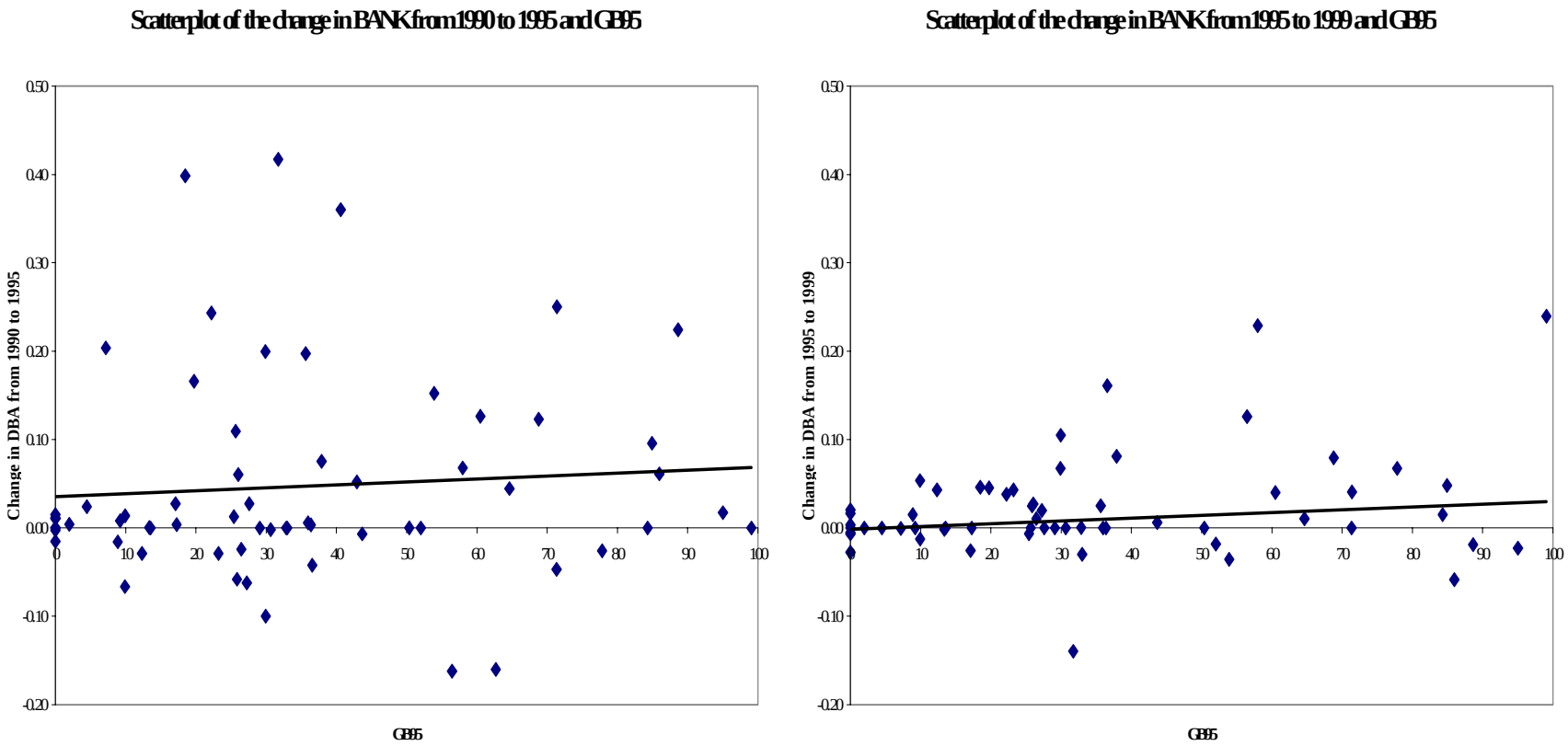

Scatterplot of the change in BANK from 1990 to 1995 and GB95
Change in DBA from 1990 to 1995
GB95
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
0
10
20
30
40
50
60
70
80
90
100
Scatterplot of the change in BANK from 1995 to 1999 and GB95
Change in DBA from 1995 to 1999
GB95

Figure 2a.

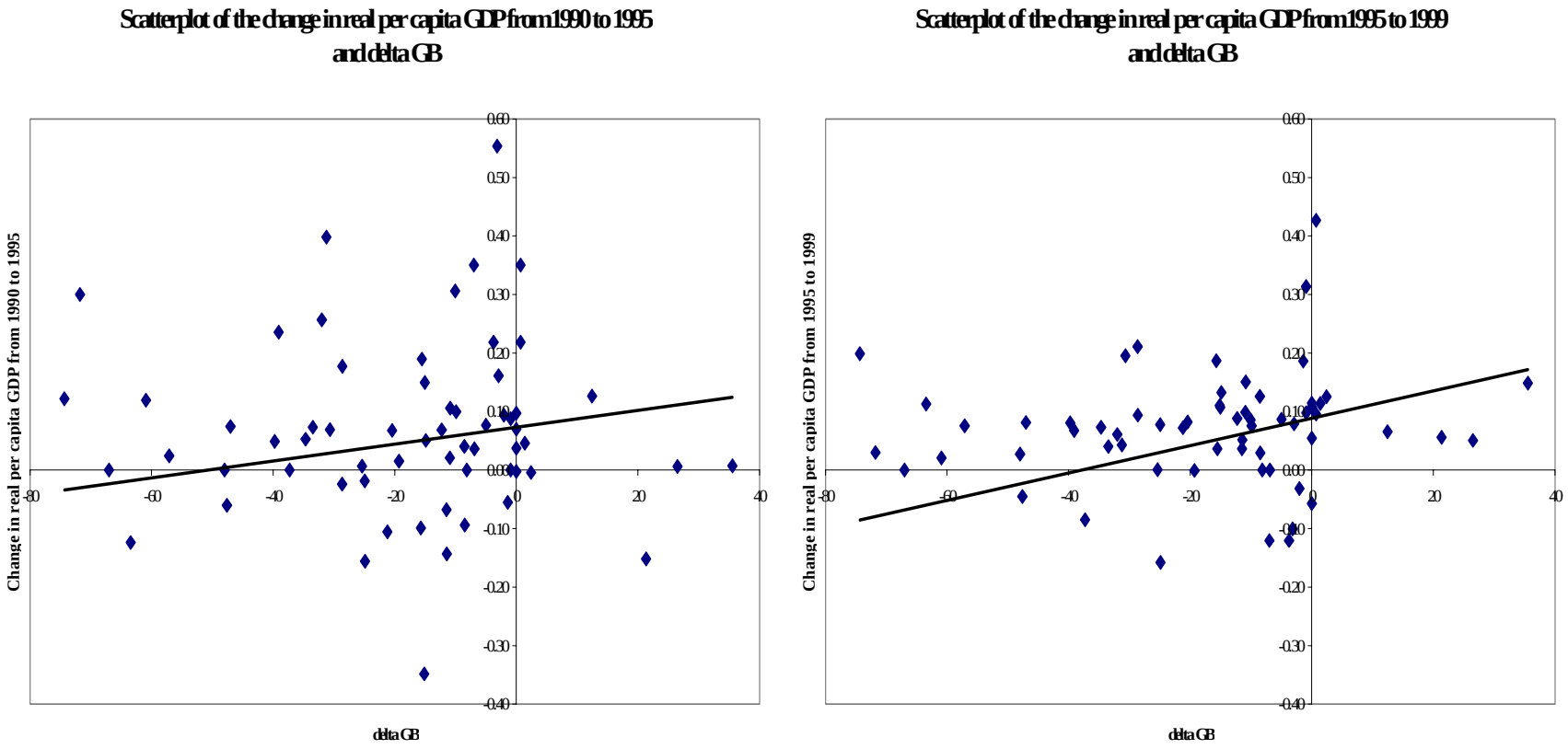

Scatterplot of the change in real per capita GDP from 1990 to 1995 and delta GB
Change in real per capita GDP from 1990 to 1995
delta GB
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-80
-60
-40
-20
0
20
40
Scatterplot of the change in real per capita GDP from 1995 to 1999 and delta GB
Change in real per capita GDP from 1995 to 1999
delta GB

Figure 2b.

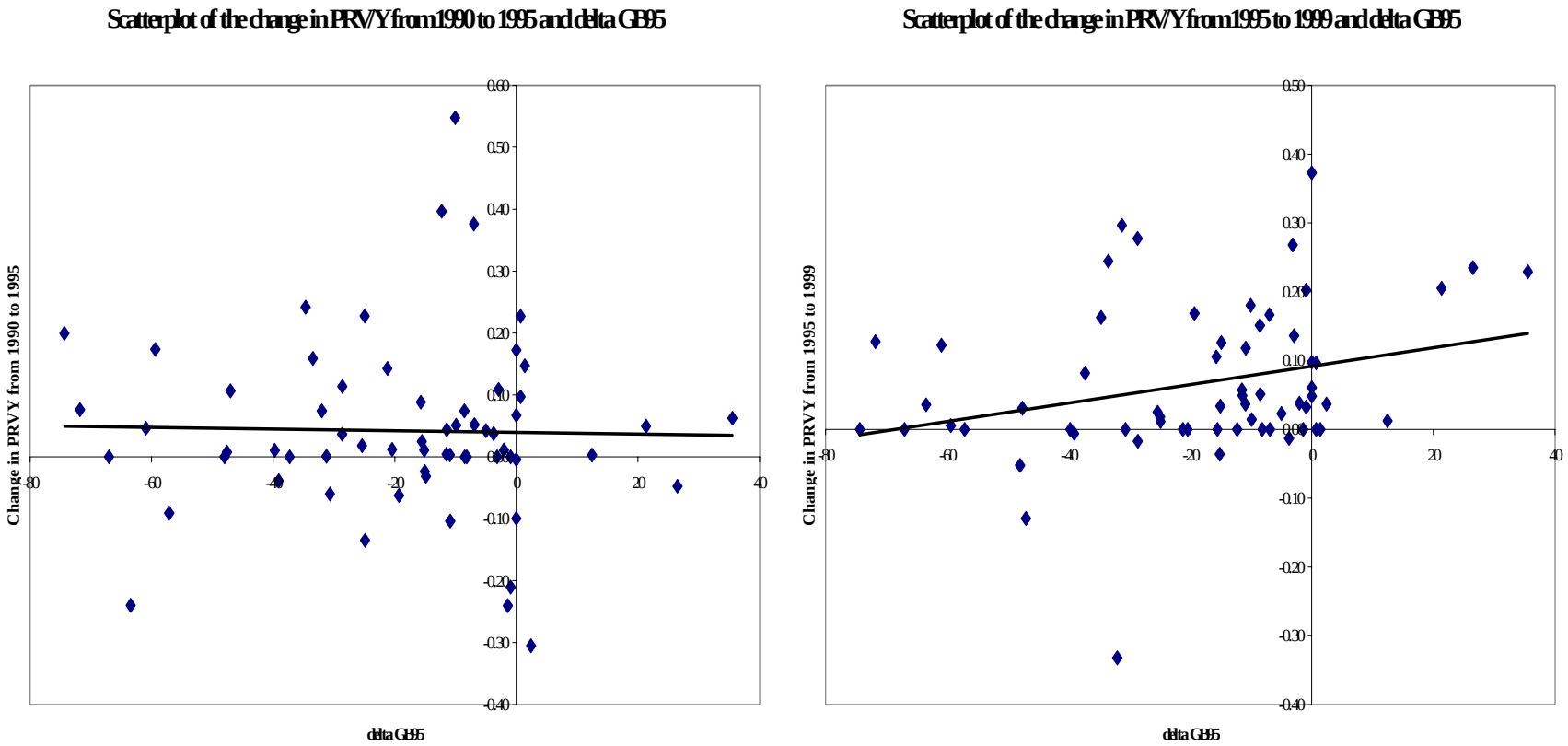

Scatterplot of the change in PRV/Y from 1990 to 1995 and delta GB95
Change in PRVY from 1990 to 1995
delta GB95
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-80
-60
-40
-20
0
20
40
Scatterplot of the change in PRV/Y from 1995 to 1999 and delta GB95
Change in PRVY from 1995 to 1999
delta GB95
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-80
-60
-40
-20
0
20
40

Figure 2c.

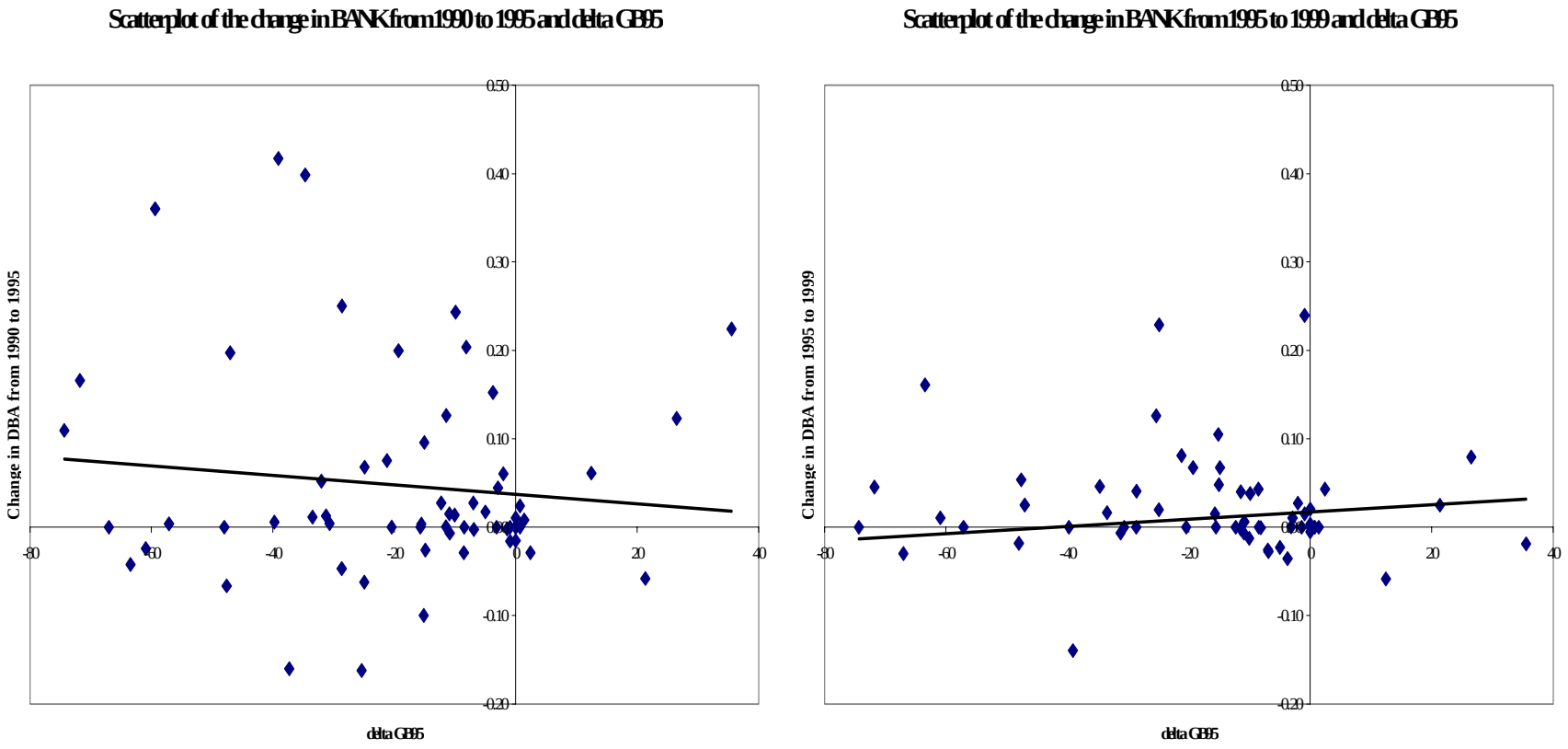

Scatterplot of the change in BANK from 1990 to 1995 and delta GB95
Change in DBA from 1990 to 1995
delta GB95
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-80
-60
-40
-20
0
20
40
Scatterplot of the change in BANK from 1995 to 1999 and delta GB95
Change in DBA from 1995 to 1999
delta GB95

Figure 3a.

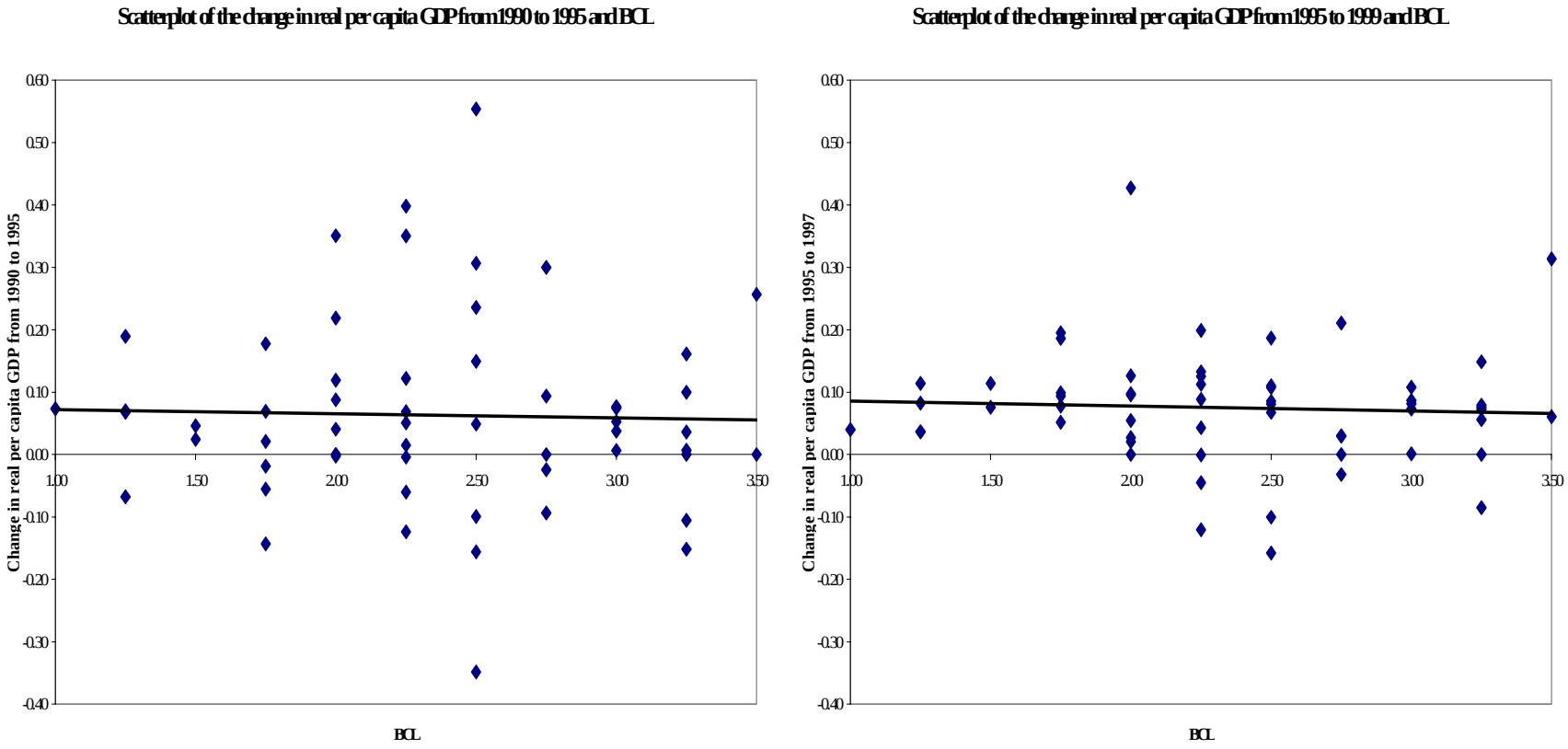
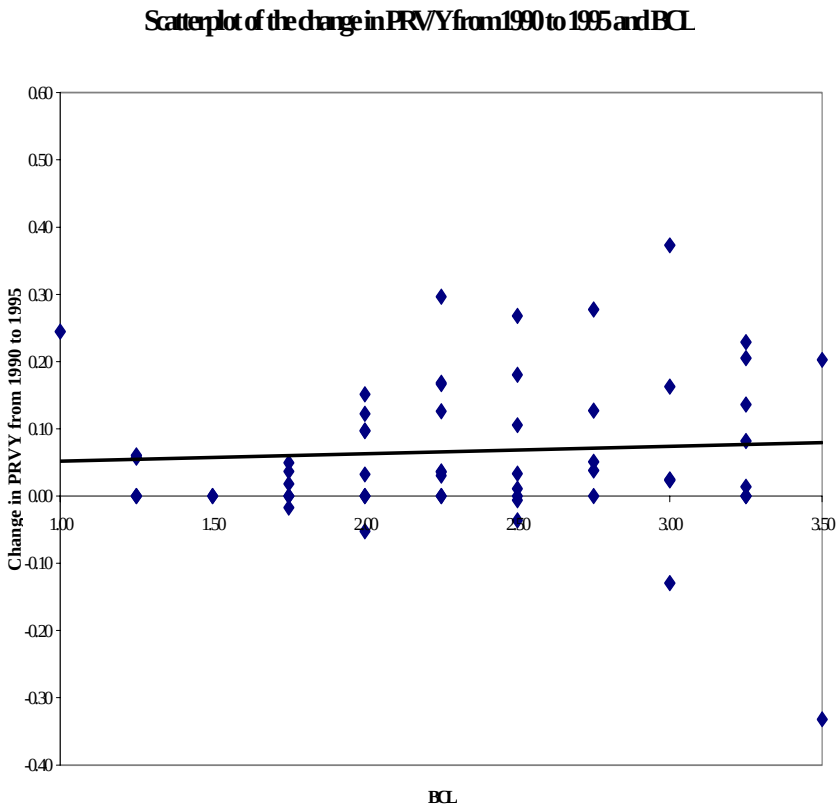

Scatterplot of the change in real per capita GDP from 1990 to 1995 and BCL
Change in real per capita GDP from 1990 to 1995
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
1.00
1.50
2.00
2.50
3.00
3.50
BCL
Scatterplot of the change in real per capita GDP from 1995 to 1999 and BCL
Change in real per capita GDP from 1995 to 1997
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
1.00
1.50
2.00
2.50
3.00
3.50
BCL

Figure 3b.


Scatterplot of the change in PRVY from 1990 to 1995 and BCL
Change in PRVY from 1990 to 1995
BCL
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
1.00
1.50
2.00
2.50
3.00
3.50

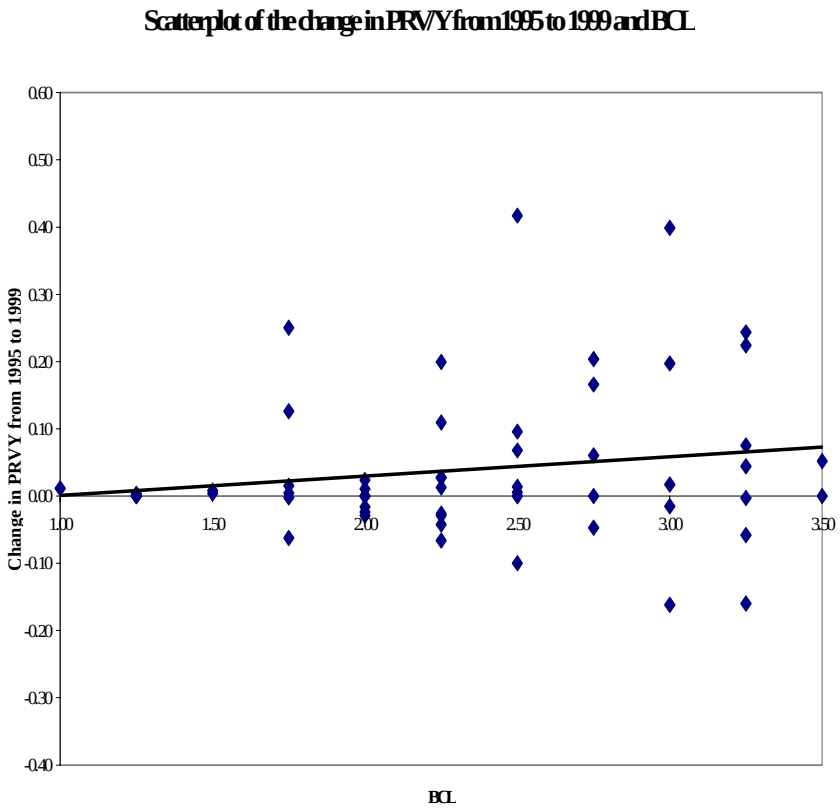
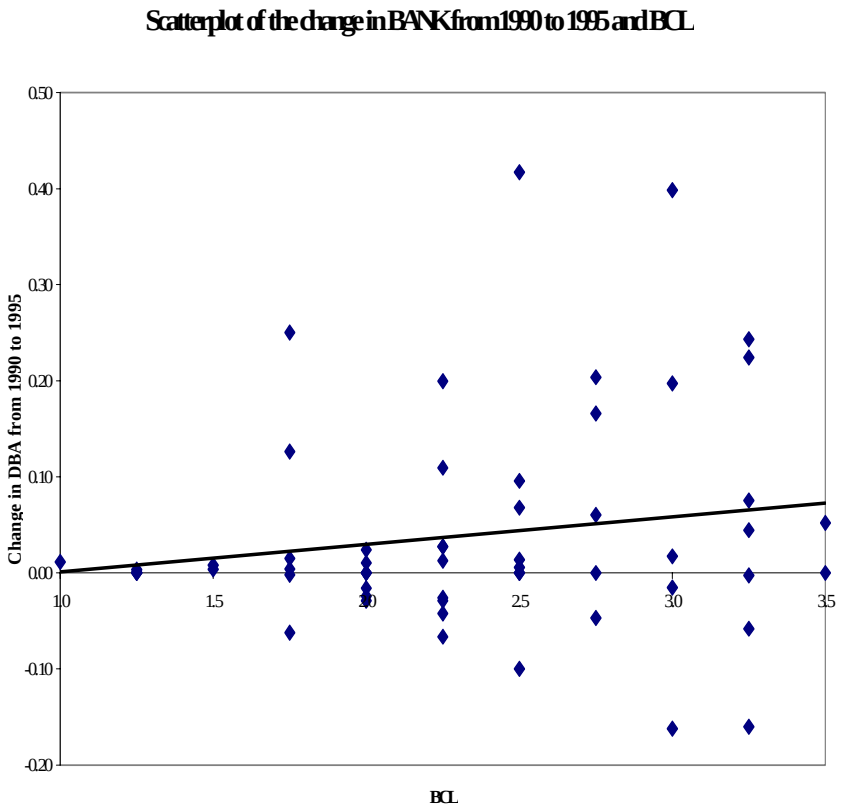

Scatterplot of the change in PRVY from 1995 to 1999 and BCL
Change in PRVY from 1995 to 1999
BCL
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
1.00
1.50
2.00
2.50
3.00
3.50

Figure 3c.


Scatterplot of the change in BANK from 1990 to 1995 and BCL
Change in DBA from 1990 to 1995
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
1.0
1.5
2.0
2.5
3.0
3.5
BCL

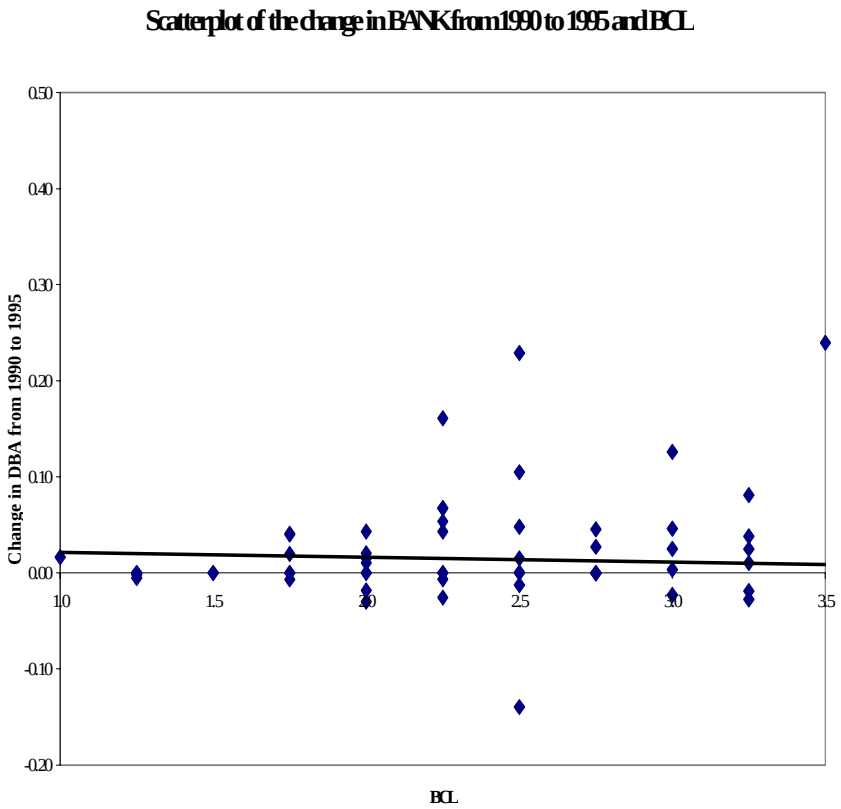

Scatterplot of the change in BANK from 1990 to 1995 and BCL
Change in DBA from 1990 to 1995
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
1.0
1.5
2.0
2.5
3.0
3.5
BCL

Figure 4.

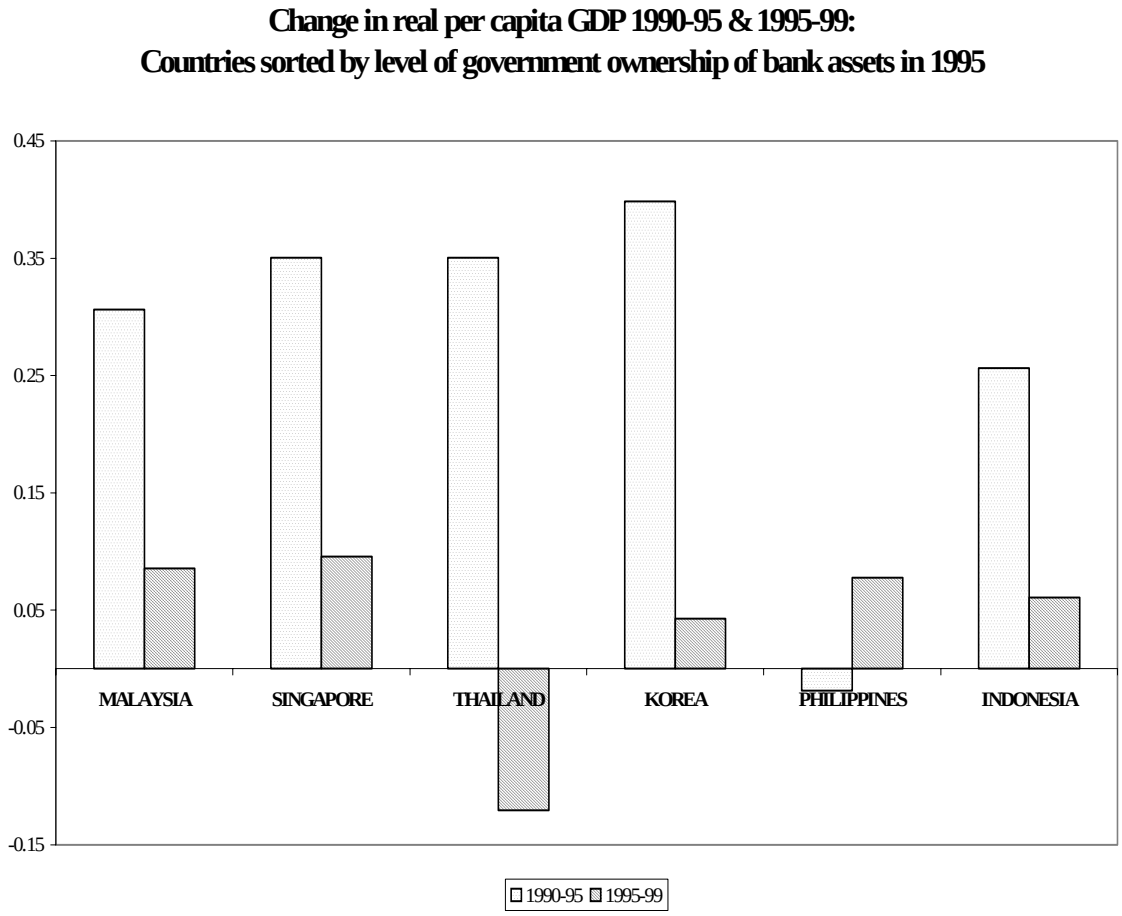
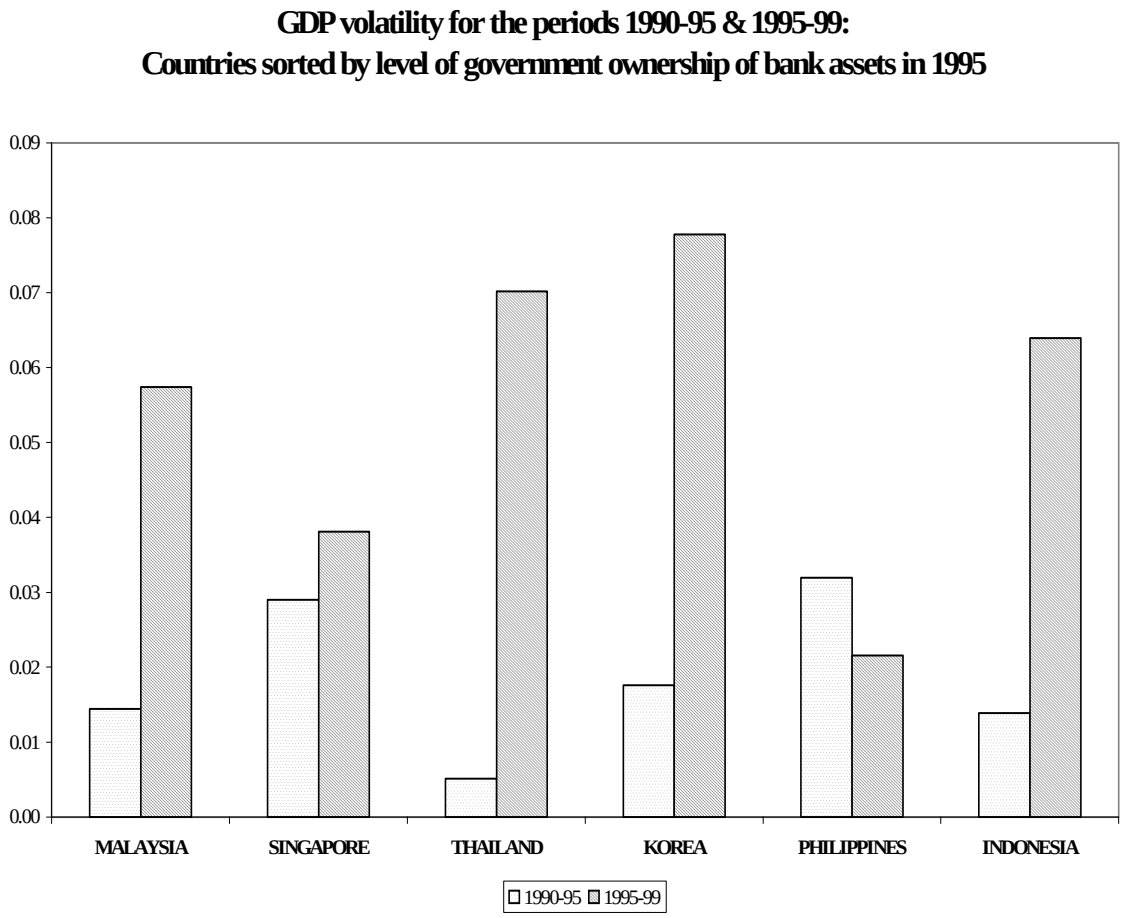

Change in real per capita GDP 1990-95 & 1995-99:
Countries sorted by level of government ownership of bank assets in 1995
0.45
0.35
0.25
0.15
0.05
-0.05
-0.15
MALAYSIA
SINGAPORE
THAILAND
KOREA
PHILIPPINES
INDONESIA
1990-95
1995-99

Figure 5.


GDP volatility for the periods 1990-95 & 1995-99:
Countries sorted by level of government ownership of bank assets in 1995
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
MALAYSIA
SINGAPORE
THAILAND
KOREA
PHILIPPINES
INDONESIA
1990-95
1995-99