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Kelly, Roger; Mavrotas, George

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Discussion Paper No. 2003/14

Financial Sector Development – Futile or Fruitful? An Examination of the Determinants of Savings in Sri Lanka

Roger Kelly[1] and George Mavrotas[2]

February 2003

Abstract

Using dynamic econometric techniques the paper investigates the determinants of private saving in Sri Lanka with a primary focus on the role of financial sector development. Empirical evidence is obtained indicating the existence of the Ricardian equivalence hypothesis, and the significance of credit constraints on private saving. Most significantly, an index of financial sector development variables is constructed, based on measures of the relative size of the financial sector, the absolute size, and the activity of financial intermediaries. The index is found to have a significant positive influence on the level of private saving, giving support to the hypothesized nexus between saving and financial sector development.

Keywords: saving, financial sector development, cointegration, principal components, Sri Lanka

JEL classification: E21, E44, C22

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1 European Investment Bank, 100 Boulevard Konrad Adenauer, L2950 Luxembourg, e-mail: kellyr@eib.org; 2 World Institute for Development Economics Research (WIDER), United Nations University, Katajanokanlaituri 6B, 00160 Helsinki, Finland, e-mail: mavrotas@wider.unu.edu.

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1 Introduction

The relationship between financial sector development and economic development has been the subject of a booming literature in recent years. However, the relationship between savings mobilization and financial sector development has received less attention. The lack of financial intermediation in developing countries is widely evidenced by the mismatch between institutional savings and investment. The need for investment is indisputable, and in the past has been addressed through structural adjustment programmes, such as the introduction of development finance institutions and other such vehicles, which provide credit at below market rates for the purchase of capital. Many policies introduced into developing countries by donors, such as concessionary discount facilities in Central Banks (vehicles for handling donor funds), high reserve requirements and extensive use of targeted credit programmes have discouraged deposit mobilization: the numerous small savers that exist, even in the poorest sectors of the least developed economies, have been overlooked as a source of internal funds. The problem is that it is far easier for governments to accept donor funds than to mobilize the savings of its population, even though the latter method may, in total, provide more credit for fixed capital formation than the former method (Mavrotas and Kelly 2001a).

What developing countries often lack is an appropriate financial sector, which provides incentives for individuals to save, and acts as an efficient intermediary to convert these savings into credit for borrowers. In pursuit of such a financial system, many developing countries have implemented far-reaching financial reforms, including lifting restrictions on bank lending, the provision of market-based systems of credit allocation, lowering of reserve requirements, and the easing of entry restrictions to the banking sector and privatization of state owned banks. The recent experience related to the financial crisis in Asia in 1997 clearly suggests that whilst this may be the ultimate aim of liberalization, the process must be correctly regulated (Brownbridge and Kirkpatrick 1999).

The purpose of the present paper is to provide an empirical examination of the impact of financial sector development on private savings by using time-series data on Sri Lanka over the period 1970–97. The method of Principal Components is used to construct an index for financial sector development, based on a number of different financial sector development indicators, including deposit money bank assets to central bank assets, liquid liabilities to GDP and private credit by deposit money banks and other financial institutions to GDP. The most recent time-series econometric techniques related to cointegration are used to estimate a dynamic econometric model of private saving behaviour.

The rest of the paper proceeds as follows: in section 2, data issues, measurement problems and specification issues are discussed. Econometric methodology issues are the subject of section 3; in the same section, empirical results from the estimation of a model of private saving is presented. Section 4 concludes the paper.

2 Specification, measurement and data issues

The data on private saving used in this paper are drawn from a new database on savings recently constructed by the World Bank, described in detail in Loayza *et al*. (1998) and Mavrotas and Kelly (2000). The database is the largest macroeconomic data set available on saving and related variables, covering 150 countries over the period 1960–94. The data has been subject to extensive consistency checks, resulting in a high quality savings dataset, compared to conventional data sets, which suffer from serious limitations and constraints. The relevant series' for Sri Lanka were extended to cover the period to 1997 following the same methodology used in the World Bank database.

On the modelling front, Modigliani's life-cycle model of savings, as extended by Jappelli and Pagano (1994) to examine the impact of liquidity constraints on private savings, is taken as a starting point. Other variables affecting saving behaviour in developing countries were added, including real gross disposable income, the budget deficit, an indicator of the availability of private credit, and a proxy for the rate of interest, as well as an index of financial sector development, given the focus of the present paper on the impact of financial sector development on savings. Much of the non-saving data were obtained from the World Development Indicators (1999). Definitions of the variables used, and the origins of the data are contained in Appendix 2. For all the variables included, a time span of 1970 to 1997 was used (i.e. 28 annual observations). Some potential determinants of private saving were dropped from the analysis because of determination problems. Notably, no indicators of uncertainty are used; changes in terms of trade and the real exchange rate were both considered, but problems were encountered due to short data spans, and so these measures were abandoned. In addition, other variables such as government saving and inflation were abandoned due to determination problems.

2.1 Measuring financial sector development

Measuring financial sector development is a complicated procedure since there are no concrete definitions as to what financial development is. As argued quite rightly by Bandiera *et al.* (2000) an ideal index of financial sector development should attempt to measure both the various aspects of the regulatory and the institution-building process in financial sector development. However, measuring the above aspects is a difficult if not impossible task.[1]

In a previous paper on India, Kelly and Mavrotas (2001) used three different types of financial sector development indicators to shed light on the possible impact of financial sector development on private savings. These variables were as follows: the ratio of deposit money bank assets to central bank assets (FSD1), which gives an indication of the relative size of the financial sector; the ratio of liquid liabilities to GDP (FSD2), which gives an indication of the absolute size of the financial sector; and the ratio of private credit by deposit money banks and other financial institutions to GDP (FSD3), which measures the activity of financial intermediaries. Details of these variables are contained in Appendix 3. The different indicators were used to construct three models

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[1] See Bandiera *et al.* (2000) for an excellent critical discussion of previous studies tried to quantify the effects of financial sector development on savings.

of private saving behaviour in India, one for each measure. Such a methodology allows a particular financial policy variable to provide insights on the effect of that policy, but under the assumption of *ceteris paribus*. However, given that a whole range of financial sector development policies can be implemented simultaneously, the derived coefficients may be biased. Including the variables separately in the same model can cause serious problems of multicollinearity, since it is likely that the relevant series may be correlated with each other. Furthermore, given the relatively small sample size, the inclusion of a large group of regressors could cause serious estimation problems.

In order to avoid the above problems, this paper seeks to include the entire set of financial variables in the model simultaneously by using the method of Principal Components to construct an index of financial sector development, which comprises all of the different financial policies. This approach has also been used by, *inter alia,* Demetriades and Luintel (1996, 1997) and more recently in Bandiera *et al.* (2000).

2.2 The method of principal components

The method of principal components is discussed in detail in Theil (1971) and involves transforming the possibly correlated variables FSD1, FSD2 and FSD3 (henceforth denoted X_1, X_2 and X_3) into a new set of variables that are pairwise uncorrelated (denoted Z), and ordered in terms of variance. Ordering the variables in terms of variance means that only a small number of the transformed variables are needed to account for most of the variation in the original variables. These are known as the principal components. In the case of Sri Lanka the first principal component accounts for over 99 per cent of the total variation in the variables.

The principal components are obtained using the eigenvalues and eigenvectors of the X'X matrix, where X is the 28x3 matrix of 28 annual observations on X_1, X_2 and X_3. Thus, Z=XA, where $A=[a_1,a_2,\ldots,a_k]$ are the eigenvectors corresponding to the eigenvalues $\lambda_1,\lambda_{2,\ldots},\lambda_k$ respectively, and $\lambda_1>\lambda_2>\ldots>\lambda_k$. These eigenvalues and eigenvectors were calculated using Gauss. Using the eigenvector corresponding to the largest eigenvalue, the vector Z was calculated: this forms the index henceforth referred to as FSDI, and used in the econometric analysis in section three.

3 Econometric methodology and empirical findings

The econometric methodology to be used to model the determinants of private saving is very much dictated by whether the data are stationary. The presence of non-stationary variables in a regression means that the traditional least squares methodology cannot be applied; failure to recognize and take account of non-stationarity will result in misleading inferences being drawn. Since many macroeconomic variables exhibit non-stationary properties, it is likely that cointegration techniques will need to be used to model the behaviour of saving and its determinants. In the first part of this section standard unit-root tests are used to test the stationarity of the series', and subsequently the Johansen technique is used to take account of possible cointegration between private saving and its determinants (Johansen 1988; Johansen 1992).

There are a number of necessary stages in implementing the Johansen technique. These are discussed in Hendry (1995) and Harris (1995) among others. First, the variables to

be included in the multivariate model must be tested for stationarity. As variables can be integrated of an order greater than one, the order of integration must be tested, as there are a number of implications involved in failing to recognize and take account of the fact that a variable is of an order of 2 or greater. Cointegration can still be present when there is a mix of variables of different orders of integration in the model. Table 1 below reports the results of the unit-root tests for the individual series:

Table 1: Unit root test results

Variable	ADF statistic [a]	5% CV	Order [c]	PP statistic [b]	5% CV	Order [c]
PSAV	-1.291	-2.98	I(1)	-0.866	-2.975	I(1)
BD	-1.718	-2.98	I(1)	-2.771	-2.975	I(1)
PCRED	-1.457	-2.98	I(1)	-1.382	-2.975	I(1)
RGPDI	-2.746	-2.98	I(1)	-2.528	-2.975	I(1)
DISCR	-2.781	-2.98	I(1)	-3.742	-2.975	I(0)
FSDI	-0.326	-2.98	I(1)	-0.018	-2.975	I(1)
FSD1	-0.125	-2.98	I(1)	0.053	-2.975	I(1)
FSD2	-1.907	-2.98	I(1)	-1.807	-2.975	I(1)
FSD3	-1.403	-2.98	I(1)	-1.115	-2.975	I(1)

Notes:

[a] Augmented Dickey Fuller statistic (see Dickey and Fuller 1981).
[b] Phillips-Perron statistic.
[c] Indicates the order of integration of the series.

Both the Augmented Dickey Fuller test (ADF) and the more advanced Phillips and Perron test were used to test for unit roots[2]. The statistic given in each case is that corresponding to the order reported. In all cases, higher orders of integration were rejected at the 5 per cent significance level. In the case of DISCR, the Phillips-Perron test and the Augmented Dickey Fuller test for unit roots came up with different orders of integration. For all other variables, the results were consistent for both tests. Given that the ADF statistic for DISCR is rejected at the 1 per cent level, it seems likely that the series is in fact I(0). The inclusion of stationary variables in the model is not a problem, however it must be borne in mind that each stationary variable included in the model will cause the number of cointegration relationships to increase accordingly.

The basic model specification is as follows:

$$\Delta z_t = \Gamma \Delta z_{t-1} + \Pi z_{t-1} + \Psi D_t + u_t$$

Where z_t is a vector of potentially endogenous variables and D_t includes weakly exogenous variables. The basic vector of potentially endogenous variables includes the following:

2 The ADF test takes account of extra terms in the data generating process by adding them to the regression model. By contrast, the Phillips-Perron test introduces a non-parametric correction to the t-test statistic to account for the autocorrelation that will be present in the error terms when the underlying DGP is not AR(1). Thus, this test is useful for analysing time series whose differences may follow mixed ARMA(p,q) processes of unknown order.

$z_t = [PSAV_t\ PCRED_t\ BD_t\ RGPDI_t\ DISCR_t\ FSDI_t]'$

As regards lag structure, the VAR model must be constructed such that the VECM has white noise error terms. This involves determining the lag structure using an appropriate criterion, such as the Akaike information criterion, to ensure that only significant lags are included. However, there may be variables that only affect the short-run behaviour of the model, which, if omitted will become part of the error term, u_t. Residual misspecification can arise as a consequence of omitting these conditioning variables.

In order to determine the lag structure of the VAR a number of misspecification tests were undertaken. The results of these tests are given in Appendix 1. The test statistics included the portmanteau test, which tests for white noise errors: if the selected model is correct, the residuals from the model should be white noise, implying that their autocorrelations should be zero for all lags. In addition, tests for normality, autoregressive conditional heteroskedasticity (ARCH) and serial correlation were used. Using two lags seemed to remove any serial correlation that was found when only one lag was used; however the normality test for RGPDI was rejected, an examination of the residuals showed an outlier in 1995 for this variable. During this year a particularly severe drought was experienced which had an adverse effect on food prices and exports, which could explain a fall in disposable income. Including a dummy variable in the vector D_t to represent this event seemed to solve the problem, and no other misspecification errors were recorded.

The next stage in the process involves identifying whether there are any trends in the data, and thus whether a constant and trend term should be included. This testing is undertaken simultaneously with testing for reduced rank. This involves expanding the VECM equation to include the various options. Johansen (1992) suggests testing the joint hypothesis of both the rank order and the deterministic components, based on the Pantula principle, whereby models incorporating all combinations of the deterministic components are estimated and the results are presented from the most restrictive alternative to the least restrictive alternative. The test procedure is then to move through from the most restrictive model and at each stage to compare the trace test statistic to its critical value and stop the first time the null is not rejected.

The most restrictive model is one in which the rank is zero, and there is an intercept that is restricted to the long run model, but no short run intercept and no trend variable. This is termed model one. The least restrictive model is one in which the rank is 5 and there are no restrictions on the deterministic variables, i.e. terms are present to capture intercepts in both the short term and the long term model and trend variables. This is termed model three. Model two allows for the presence of an intercept term in the short term and the long run model, but no deterministic trend. In view of the above discussion, the results in Table 2 are obtained.

Table 2: Testing for co-integration

	Maximal Eigenvalue			Trace		
Rank	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
0	50.62	50.62	51.22	140.1	125.6	146
1	36.2	35.57	40.82	89.51	75	94.79
2	27.91	19.24*	19.85	53.31	39.43*	53.97
3	12.44	12.23	15.84	25.4	20.19	34.11
4	9.442	7.956	11.18	12.96	7.963	18.27
5	3.518	0.007	7.091	3.518	0.007	7.091

Since the above results show that the first time that the null was not rejected (indicated by *) was in model 2, with a hypothesized rank of 2, testing proceeds under the assumption that there are two cointegration vectors and that an intercept should be included in both short and long run models, and that the model does not contain a deterministic trend. Both the maximum eigenvalue and trace statistics indicate the presence of two cointegrating vectors. As discussed, one of these is likely to represent the stationary variable, DISCR.

The next stage involves determining the specification of these unique cointegrating vectors. As discussed above, the presence of an I(0) variable in the VAR accounts for one of the cointegrating vectors: intuitively speaking, DISCR cointegrates with itself to form a stationary relationship. The other cointegrating vector is likely to involve the other variables; as private saving is the variable of interest, this can be normalized to equal one. The weakly exogenous variables are treated as such, and the following coefficients for the regressors in the long run equations are obtained for the three models. PSAV is the dependent variable which is normalized to take the coefficient 1:

Table 3: Coefficients from long-run equations

Regressor	RGPDI	PCRED	FSDI	BD	RDISC
Coefficient	0.537	-3.466	0.361	0.252	0.167
t value	7.783	6.167	2.560	0.923	1.347

A likelihood ratio test confirms the appropriateness of this specification.[3] The coefficients show that private saving is inversely related to the availability of credit (the credit constraint). Given the important policy implications of the above finding, namely that greater financial liberalization and financial sector development will lead, through the easing of liquidity constraints, to lower levels of private savings, this deserves some further discussion. The household's saving decisions are likely to be complicated by liquidity constraints in developing countries, in the form of borrowing constraints. Such constraints tend to ease with development of the financial sector, as intermediation develops and facilitates more efficient saving and borrowing. When a borrowing constraint is binding in the household's intertemporal consumption decision, the marginal utility of present consumption will exceed the expected utility of future

[3] The likelihood ratio statistic is 5.475. It is distributed as Chi-sq with 6 degrees of freedom; the critical value at the 5 per cent level is 12.591. The p-value is 0.452.

consumption. Along these lines, if financial sector reforms reduce these borrowing constraints, saving ratios would be reduced, because a binding borrowing constraint induces an individual to consume less than they would wish to, effectively forcing saving, or at least discouraging dissaving.[4] Studies, such as that by Jappelli and Pagano (1994), using the loan-to-value ratio and consumption credit as proxies of borrowing constraints, have shown that liquidity constraints on households raise savings, strengthen the effect of growth on saving and finally, increase the growth rate, if productivity growth is endogenous. Their sample, however, focuses on industrial countries, thus shedding little light on the relationship between financial sector development and savings in developing countries. The same finding is also reported in Sarantis and Stewart (2001) for OECD countries.[5,6]

Our own finding is also in line with the study by Loayza *et al*. (2000) which reports that the relaxation of credit constraints was responsible for a decrease in private savings in industrial and developing countries within the context of a dynamic panel data analysis.

Turning to the impact of the budget deficit variable (BD) on private savings, the empirical results seem to suggest evidence of Ricardian equivalence, as the private savings variable is positively related to the budget deficit. Ricardian equivalence states that public debt issues are macroeconomically indistinguishable from tax increases, and thus a change in public saving should be offset by an equal and opposite change in private saving. Our finding is in accordance with recent evidence reported in Bandiera *et al*. (2000) for Korea, Malaysia and Mexico (and depending on the specification used), for Chile and Zimbabwe as well. However, as the coefficient is not significant at the 5 per cent level, no strong conclusions can be drawn.

The other two variables, namely real gross private disposable income (RGPDI) and the discount rate, serving as a proxy for the deposit rate, are both correlated positively with private savings, as one would expect. The effect of income is particularly strong; at the same time, perhaps in line with the ambiguous findings of other studies, the effect of the rate of interest is not significant.

The most crucial variable of the present study, however, is the index of financial sector development. In view of the obtained empirical results, it is clear that the financial sector development index seems to have an important effect on private saving. The relevant policy implications are quite significant. Financial reforms and policies strengthening the financial sector of the economy may have a strong boosting effect on private savings which in turn may affect the entire growth process.[7] However, it is

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4 In such a situation the consumption Euler equation no longer holds, as agents cannot borrow against future income.

5 It is notable, however, that the result is in contrast with Edwards (1996) for a panel of OECD and developing countries and Callen and Thimann (1997) for OECD countries.

6 In the case of Colombia, Cardenas and Escobar (1998) test the validity of the hypothesis that private savings rates have fallen as a result of the relaxation of liquidity constraints following the structural reform package implemented in the early 1990s. They find that liquidity constraints are indeed a significant factor in recent declines in private saving.

7 Clearly, causality issues in the saving-growth relationship are of relevance here. See Mavrotas and Kelly (2001b) for a discussion and new empirical evidence within the context of a new econometric approach based on the Toda-Yamamoto test.

worth looking in slightly more detail at the financial sector development index. It is not strictly correct to interpret the index as a measure of financial sector development, because each component may not be positively correlated with all the constituent variables. However, it is possible to determine the influence of each variable on the dependent variable through the estimated regression coefficients of the retained principal components (Demetriades and Luintel 1996).

In the situation under investigation, the first principal component is retained from an analysis using three X variables. The first principal component can be expressed as follows:

$z_1 = a_{11}X_1 + a_{21}X_2 + a_{31}X_3$

The regression of the dependent variable (the private saving rate) on z_1 is then:

$Y = b_1 z_1 + e$

Using both these equations the effects of each of the Xs on Y are as follows:

$Y = b_1 a_{11} X_1 + b_1 a_{21} X_2 + b_1 a_{31} X_3$.

In order to uncover the effect of each of the variables on financial development the regression coefficient on the first principal component and its latent vectors are used. The computed coefficients, calculated based on the long run coefficient on the index of financial development calculated above, are given in Table 4.

Table 4: Influence of the FSD variables on the dependent variable

FSD	FSD	FSD
0.08	0.16	0.31

Table 4 shows that all of the measures have a positive effect on the rate of private saving. Of the three, the measure of the activity of financial intermediaries (FSD3) seems to have the strongest effect, followed by the measure of the absolute size (FSD2), while the measure of the relative size of the financial sector (FSD1) seems to have only a relatively small impact.

4 Conclusion

The recent Asian financial crisis seems to suggest that the significant nexus between financial sector development and saving mobilization, and therefore growth, has not been properly explored; such an exploration is becoming increasingly important for the policy agenda regarding sustainable economic development. In this paper the impact of financial sector development on private savings was examined by using improved savings data on Sri Lanka over the period 1970–97. An index of financial sector

development was created using the method of principal components; this was included in a model of private savings along with more traditional determinants of savings. Modern econometric time-series analysis relating to cointegration was used to derive robust empirical models. The empirical findings clearly suggest a strong and positive effect of financial sector development on private savings in Sri Lanka during the period under examination. The findings are robust to different specifications and tests tried. Evidence of Ricardian equivalence and an inverse relationship between the relaxation of credit constraints and private savings was also found.

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Appendix 1

Number of lags used in the analysis: 2
Variables entered unrestricted: Constant, drought

psav:	Portmanteau 4 lags	= 4.7288
RGPDI:	Portmanteau 4 lags	= 6.7293
FSDI:	Portmanteau 4 lags	= 1.7726
BD:	Portmanteau 4 lags	= 3.4614
rdisc:	Portmanteau 4 lags	= 3.088
pcred:	Portmanteau 4 lags	= 3.0303
psav:	AR 1- 1 F(1, 11)	= 6.3841 [0.0281] *
RGPDI:	AR 1- 1 F(1, 11)	= 3.0037 [0.1110]
FSDI:	AR 1- 1 F(1, 11)	= 0.67494 [0.4288]
BD:	AR 1- 1 F(1, 11)	= 0.19103 [0.6705]
rdisc:	AR 1- 1 F(1, 11)	= 0.010824 [0.9190]
pcred:	AR 1- 1 F(1, 11)	= 7.1311 [0.0218] *
psav:	Normality Chi^2(2)	= 0.11173 [0.9457]
RGPDI:	Normality Chi^2(2)	= 2.4838 [0.2888]
FSDI:	Normality Chi^2(2)	= 2.0234 [0.3636]
BD:	Normality Chi^2(2)	= 0.45804 [0.7953]
rdisc:	Normality Chi^2(2)	= 0.13685 [0.9339]
pcred:	Normality Chi^2(2)	= 0.05263 [0.9740]
psav:	ARCH 1 F(1, 10)	= 2.2412 [0.1653]
RGPDI:	ARCH 1 F(1, 10)	= 0.16548 [0.6927]
FSDI:	ARCH 1 F(1, 10)	= 0.089029 [0.7715]
BD:	ARCH 1 F(1, 10)	= 0.0062565 [0.9385]
rdisc:	ARCH 1 F(1, 10)	= 0.40236 [0.5401]
pcred:	ARCH 1 F(1, 10)	= 0.1728 [0.6864]

Vector portmanteau 4 lags = 125.54

Vector AR 1-1 F(36, 7) = 0.84069 [0.6666]

Vector normality Chi^2(12) = 10.871 [0.5400]

* indicates rejection at the 5 per cent level.

Appendix 2

PSAV: Private saving rate. The private saving rate is obtained using private saving, calculated by the World Bank Database using the Consolidated Central Government (CCG) definition of private sector, expressed as a percentage of gross private disposable income (GPDI). Gross private disposable income is in turn calculated as gross national disposable income (GNDI) less CCG saving less CCG consumption. Using GPDI is more appropriate than using GNDI or GDP, both of which have been used in the past, as we are examining the private saving rate, rather than national or aggregate savings.[8]

RDISC: Real discount rate. The absence of reliable data pertaining to the deposit rate of interest for most developing countries necessitates the use of a proxy. For those years in which data are available, a strong correlation is found between the deposit rate and the discount rate (0.764) indicating that the use of the discount rate is a suitable proxy. The discount rate is obtained from International Financial Statistics from the IMF. The real discount rate is measured as the discount rate less the rate of inflation measured by the GDP deflator.

PCRED: Private credit/GDP. This is used as an approximate measure of the liquidity constraint. Credit to private sector refers to financial resources provided to the private sector – such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable – that establish a claim for repayment. This measure is expressed as a percentage of GDP. The private credit data comes again from the WDI 1999.

BD: Budget deficit. Domestic financing, as obtained from WDI 1999 is used as a proxy for the level of budget deficit. Domestic financing (obtained from residents) refers to the means by which a government provides financial resources to cover a budget deficit or allocates financial resources arising from a budget surplus. It includes all government liabilities – other than those for currency issues or demand, time, or savings deposits with government – or claims on others held by government and changes in government holdings of cash and deposits. Government guarantees of the debt of others are excluded. The figure is expressed as a percentage of GDP.

RGPDI: Real GPDI per capita. This measure is expressed in log form, and is intended to serve as a measure of private disposable income at constant prices. It is derived from a variety of sources, as follows. It is the log of real GPDI, (GPDI as defined above, divided by CPI), divided by population, and converted using an Atlas conversion factor in order to smooth fluctuations in prices and exchange rates. The Atlas method applies a conversion factor that averages the exchange rate for a given year and the two preceding years, adjusted for differences in the rates of inflation between the country and the G-5 countries.

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8 The CCG definition of the public sector used in the World Bank Database comprises budgetary central government plus extra budgetary central government plus social security agencies. Essentially, CCG is equivalent to general government minus local and regional governments. The CCG definition defines public savings as inclusive of all net transfers from abroad. In view of the above, private savings = gross national saving – public sector saving. Note that as the CCG definition is used, private saving will include the saving of both local government and public enterprises (Loayza *et al*. 1998).

Appendix 3

FS1: Deposit Money Bank Assets to Central Bank Assets. This is a relative size measure, which measures the importance of the parts of the financial sector relative to each other. It equals the ratio of deposit money banks assets and the sum of deposit money and central bank assets. It is generally held that central banks lose relative importance as we move from low to high income countries, whereas other financial institutions gain relative importance. The data is taken from Beck *et al*. (1999).

FS2: Liquid Liabilities to GDP. This is a measure of the absolute size of the financial sector based on liabilities. It is the broadest available indicator of financial intermediation; it equals currency plus demand and interest bearing liabilities of banks and other financial intermediaries divided by GDP. Liquid liabilities is a typical measure of financial depth and thus of the overall size of the financial sector. It is held that financial depth, as measured by liquid liabilities to GDP, increases with income level.

FS3: Private Credit by Deposit Money Banks and Other Financial Institutions to GDP. This indicator measures the activity of financial intermediaries. The measure isolates credit issued to the private sector as opposed to credit issued to governments and public enterprises. It concentrates on credit issued by intermediaries other than the central bank. It measures the activity of financial intermediaries in channeling savings to investors.