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Linkages Between Financial Variables, Financial Sector Reform and Economic Growth and Efficiency

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Abstract

This paper analyzes the different channels through which financial
variables and financial sector reform can affect economic growth and
efficiency, using panel data for 40 countries which reformed their financial
systems. Financial sector reform is hypothesized to affect economic growth
and efficiency through three main channels: the real interest rate
representing the interest cost of capital, the volume of intermediation, and
financial sector efficiency. The results indicate that financial reforms
have structural effects; that financial variables and reforms are important
determinants of economic performance; that the impact depends on whether
countries did or did not face a financial crisis; and that the "quality" of
financial sector reform matters.

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Summary

This paper analyzes the relationship between the different dimensions of financial sector reform and economic growth and efficiency using panel data for 40 countries. Financial sector reform is hypothesized to affect economic growth and efficiency through three main channels: the real interest rate representing the cost of capital, the volume of intermediation, and financial sector efficiency. Using proxies for these three channels, the paper finds that the impact of the volume of intermediation on economic growth and efficiency was very different between repressed and reformed financial systems, and between countries that have experienced financial crisis and those that have not. Financial reforms were associated with strong improvements in economic growth and efficiency in countries that avoided financial crisis but with weaker growth and efficiency in countries that faced financial crisis.

Similar to previous empirical tests of the impact of financial variables on growth and efficiency, this paper uses the approach adopted in the endogenous growth literature. However, unlike earlier work, this paper seeks to separate and explore the effects of various dimensions of financial sector reform on economic growth and efficiency. The earlier studies have tended to use a single financial indicator at a time to proxy financial sector development; however, this approach does not take into consideration the multidimensional role of financial sector reforms. Moreover, these earlier studies do not seem to have sought to differentiate the effects of financial variables before, during, and after the reform.

The overall regression results imply that, even after controlling for commonly used policy indicators, the financial sector variables remain significant determinants of economic growth and efficiency. The results can be summarized under three broad categories. First, upward adjustments in real interest rates that are observed to accompany financial sector reforms do not appear to have had negative effects on growth. The failure of the crisis countries to adjust upward their real interest rates during the reform process may also partly explain the weaker economic growth and efficiency performances. Second, increased financial intermediation was associated with improvements in economic performance. However, the results for the crisis countries imply that, under conditions that are conducive to financial crisis, expansion of financial intermediation does not appear to improve growth and efficiency. Finally, the efficiency of the financial systems mainly affects the efficiency of investment, whereas the impact on growth is indirect. These results underscore the importance of the "quality" of financial sector reforms in terms of its effect on economic growth and efficiency.

I. Introduction

The experience of various countries in the aftermath of financial sector reform has been diverse. Many countries have had successful financial sector reforms accompanied by improvements to economic growth and efficiency, however, several other countries, developed and developing, have faced financial crisis and disruptions to economic growth. A concern is also sometimes expressed that financial sector reforms would involve transitional costs to economic growth associated with accompanying real sector restructuring. The purpose of this study is to examine some of the channels through which financial sector reform can affect real economic growth and the efficiency of capital using panel data (pooled cross country and time series data) from a sample of countries which have liberalized their financial system.

There is a large body of theoretical literature analyzing the extent of financial intermediation in an economy as an important determinant of its real growth rate, and identifying the channels of transmission from financial intermediation to growth. Early examples of this literature include Goldsmith (1969), McKinnon (1973), and Shaw (1973). These papers emphasized the role of financial intermediaries in the credit supply process and concluded that there is a strong positive correlation between the extent of financial development and economic growth. McKinnon (1973) and Shaw (1973) emphasized the role played by financial liberalization in increasing savings and, hence, investment, while Goldsmith (1969) focussed primarily on the relationship between financial development and the efficiency of investment. A survey article on financial structure and aggregate economic activity by Gertler (1988) describes these and subsequent models.

Some of the more recent studies, such as Greenwood and Jovanovic (1990) and Bencivenga and Smith (1991) argue that to the extent that financial intermediaries tend to alter the composition of savings in a way that is favorable to capital accumulation, they will tend to promote growth. Similarly, Levine (1992) concludes that financial structures enhance growth by promoting the efficient allocation of investment through various channels.

Empirical tests of the impact of financial intermediation on growth conducted in the context of a large sample of countries by Jappelli and Pagano (1992), Roubini and Sala-i-Martin (1992), De Gregorio and Guidotti (1992), and King and Levine (1993a, b), have concluded that financial variables have an important impact on economic growth. Most of these studies use a similar methodology and follow the strategy of adding variables of financial development to Barro's (1991) basic cross country regression in order to analyze their impact on growth. An alternative approach used by Agarwala (1983), Anderson (1987), Khatekhate (1988), Gelb (1989), Gallagher (1991), and Odedokun (1992) is to model the effects of financial variables on economic efficiency. These studies use the real interest rate and various monetary aggregates as a proxy for financial intermediation.

Although these studies allow inferences to be made about the impact of financial reform on economic growth and efficiency, to the best of our knowledge, none of the studies have sought to examine the role of financial reforms directly on economic growth and efficiency. Moreover, the studies have tended to proxy financial sector development by a single financial indicator--the ratio of money or credit to GDP or the real interest rate. However, this approach has its limitations given that financial development and reform has many dimensions. The need to examine the relationships between financial sector variables and the real sector at a more complex level becomes especially important in designing financial sector reforms, and in understanding the reasons why some countries have had more successful financial sector reform experiences than others. As noted by Galbis (1994) and Johnston (1994), the transition from repressed to more market-oriented financial systems involves shocks to interest rates, the exchange rate, and financial flows, and the authorities' reactions to these shocks can effect economic performance and the transitional costs of financial sector reform.

In order to help shed some light on these latter issues, this paper examines the impact of financial sector variables on economic growth and efficiency using panel data for 40 countries. The financial sector is hypothesized to affect economic growth and efficiency through different channels, which are proxied by the real interest rate, the volume of intermediation, and a measure of financial sector efficiency. In order to separate their effects, proxies for these channels are entered simultaneously into the estimation equations. The impact of financial sector reform is explored by examining pre-reform, reform, and post reform periods. A sample of countries which faced financial crisis following reforms is compared to a sample of countries which did not face financial crisis.

The results confirm earlier findings on the importance of financial variables in equations for economic growth and efficiency. Average economic growth and output to capital ratios in countries which reformed their financial systems and avoided financial crises improved quite strongly following the reforms. The results indicate that financial reforms have structural implications for the way financial variables affect the real economy, and that it is important to take account of the different dimensions of the financial reform, in terms of its effect on the interest cost of capital, and the volume and efficiency of intermediation, in explaining the impact of financial variables on economic performance. Moreover, the results show that financial variables had quite different effects in countries which avoided and those which faced financial crisis. The different results appear to be attributed partly to the failure of crisis countries both to adjust real interest rates and to prevent inflationary credit and monetary expansion which accompanied the financial sector reforms, and partly to the greater inefficiencies in the banking systems in the crisis countries.

The rest of the paper is organized as follows. Section II discusses the research methodology and the linkages between the financial sector and economic growth and efficiency. Section III discusses the data and estimation procedure, and provides the empirical results. Sector IV draws out some implications of the results in the form of conclusions.

II. Research Methodology and Linkages Between
Financial Sector Variables and the Real Sector

1. Research methodology

Financial sector reforms typically involve: (a) the liberalization of interest rates; (b) the liberalization of quantitative restrictions, including credit and exchange controls; and (c) measures to improve the allocative efficiency of the banking systems. The financial system, on the other hand, has its effect on the real sector through a number of channels, including: (i) the interest cost of capital; (ii) the volume of savings and investment funds; and (iii) the distribution of funds and project selection.

The channels through which the financial sector impacts on the real sector are not all readily observable, and therefore, it is necessary to rely on a number of observable indicators or proxies of financial development. In this study we focus on the impact of three proxies of financial development: (1) the level of the real interest rate; (2) the volume of intermediation; and (3) a measure of financial sector efficiency. Each of the above mentioned financial sector reform measures is likely to impact on all three proxies. For example, the liberalization of interest rates could affect the real interest rate, the volume of intermediation, and banking sector efficiency by permitting greater competition. There is also no necessary strict one to one relationship between these proxies and the channels through which the financial system affects the real sector. For example, the level of the real interest rate would impact on the interest cost of capital, the volume of savings, and possibly also the distribution of funds through adverse selection incentives. However, by entering all three proxies simultaneously into the equations for economic growth and efficiency, it should be possible to distinguish somewhat better the importance of the different channels. Thus, by including the volume of intermediation and a measure of banking efficiency along with the real interest rate in the estimation equations, this should allow the real interest rate term primarily to proxy the impact of the financial system on the interest cost of capital, while the savings/investment effect would be reflected in the volume of intermediation, and the allocative efficiency effect in the financial sector efficiency proxy.

The impact of financial sector reform would be observed partly through the movements in the proxies. However, financial sector reforms are also discrete events which are likely to have structural effects on the way the financial sector impacts on the real sector. The approach followed here is, therefore, to split the sample into separate subperiods--pre-reform, reform,

and post reform--with the period of reform identified as a five year period following the introduction of certain discrete financial reforms, usually elimination of interest rate or quantitative controls. This approach allows us to study the impact of the different channels through which the financial sector affects the real sector under conditions of financial repression, during the reform period, and in a post reform period. This approach also allows analysis of the transitional effects of financial sector reforms.

The transitional impact of the financial reforms on economic growth would depend partly on the starting conditions, including how far unproductive sectors have been supported previously, the extent to which subsidization of unproductive sectors continues, and how quickly the financial system can respond to the demands for new credit from viable sectors which previously had limited access to finance. The restructuring of old unprofitable sectors may have an initial adverse effect on growth, however, this would be offset by the higher productivity of new investments.

Two real sector variables are examined: the rate of real GDP growth and the output to capital ratio, as a measure of economic efficiency. There has been some discussion of whether the financial sector impacts mainly on economic efficiency or more directly on growth, and use of these two proxies allows us to study the importance of the different channels. We follow the methodology adopted in previous empirical tests of the impact of financial sector reform on growth and efficiency, by utilizing the approach in the endogenous growth literature. The use of this approach helps to control, inter alia, for the importance of commonly used policy indicators and structural determinants of growth which otherwise might explain the observed correlations between the financial variables and growth and efficiency.

As first developed by Barro (1991), the endogenous growth approach examines the determinants of growth by regressing average per capita growth on a set of relevant variables using cross-section data over an extended period of time. 1/ These variables include proxies for capital accumulation (human and physical), the macroeconomic environment, government spending, degree of openness, and the terms of trade. 2/ This approach has been helpful in highlighting the factors which affect growth, although the estimation of semi-reduced forms may present problems of endogeneity and interpretation of coefficient estimates. 3/

1/ The basic growth equations estimated by Barro (1991) include a cross-section study of about 100 countries during the 1960-85 period.

2/ The average growth per capita income is regressed on the following explanatory variables: the initial value of GDP, the initial amount of human capital as proxied by initial values of primary and secondary school enrollment rates, the rate of physical capital accumulation, the ratio of government spending to GDP, the openness of trade, the rate of inflation, the rate of foreign direct investment and an index for political tensions.

3/ See Levine and Renelt (1992) for a detailed study of the sensitivity of cross-country regressions of growth.

Among the earlier studies that have added variables of financial development to Barro's (1991) basic cross-country regressions, Roubini and Sala-i-Martin (1992) include a dummy variable for financial repression. 1/ They find that this variable has a negative and significant coefficient implying that a higher degree of financial repression leads to lower economic growth. De Gregorio and Guidotti (1992) add the ratio of domestic credit granted to the private sector by the Central Bank and commercial banks to GDP (CREDIT) as a proxy for the degree of financial intermediation; and find a significantly positive effect of this variable on long-run growth of real per capita GDP. 2/ However, when De Gregorio and Guidotti use a panel data set for 12 Latin American countries for the period 1950-85, they find a significant negative correlation between CREDIT and economic growth. They interpret this result as evidence that more financial intermediation may be associated with lower efficiency of investment in the absence of proper regulation following the experiments of financial liberalization which subsequently collapsed.

King and Levine (1993a) conduct both a cross-country analysis using data averaged over the 1960-89 period and a pooled cross-country time-series study (panel data) using data averaged over the 1960s, 1970s, and 1980s. They use four indicators of the level of financial sector development: (1) the ratio of liquid liabilities of the financial system to GDP; 3/ (2) the ratio of deposit money bank domestic assets to deposit money bank domestic assets plus central bank domestic assets; (3) the ratio of claims on the nonfinancial private sector to total domestic credit; and (4) a variable similar to CREDIT used by De Gregorio and Guidotti. Including the indicators one at a time in the regressions, they conclude that higher levels of financial development are positively associated with faster rates of economic growth, physical capital accumulation, and economic efficiency improvements. 4/

1/ The variable takes the value 1 when real interest rates are positive; 2 when real interest rates are negative but higher than -5 percent; and 3 when real interest rates are lower than -5 percent. As an alternative approach, they use the reserve requirement ratio as a proxy for financial repression and conclude that high required reserves lead to a lowering of economic growth.

2/ The effect is particularly strong in middle- and low-income countries, and stronger in the 1960s than in the 1970s and 1980s.

3/ Liquid liabilities are defined to consist of currency held outside the banking system plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries (a measure of M3).

4/ The dependent variables used are the real per capita GDP growth rate, average growth rate of the real per capita capital stock, the ratio of investment to GDP, and the residual of real per capita GDP growth after accounting for the rate of physical capital accumulation (a proxy for economic efficiency).

Odedokun (1992) examines the effect of selected policies on economic efficiency measured by the incremental output-capital ratio (the ratio of the change in GDP to investment) in 81 developing countries using panel data over various subperiods between 1961-90. 1/ He concludes that the stock of credit to private sector to GDP ratio is a better proxy for financial depth than the stock of liquid liabilities to GDP, and that in general increases in the real interest rate have a positive effect on the efficiency of resource use.

The empirical work reported here differs from this earlier work in a number of respects. The earlier studies have tended to proxy financial sector development by a single financial indicator at a time, and have not distinguished between pre and post financial reform experience. However, this approach does not take into consideration the many channels through which the financial sector can impact on the real sector. This study examines the simultaneous impact of the three main proxies for the channels of financial sector development on economic growth and efficiency. Another difference between this study and earlier work, is the use of the output to capital ratio as the measure of economic efficiency. The output to capital ratio is a better indicator of economic efficiency than the incremental output capital ratio both qualitatively and quantitatively. Private capital stock data compiled by the World Bank is used in calculating the output to capital ratio. This study also seeks to differentiate the effects of financial variables prior to, during, and after the reform, and between the experiences of countries which faced financial crisis following reforms and those which did not face such crises.

2. Relationship between the proxies and economic growth and efficiency

    a. The real interest rate

The channels for the impact of the real rate of interest on financial sector development, include its role on financial savings, and on the cost of capital. 2/ The real rate of interest is determined by real factors over the longer-term, however, the real rate of interest is to some extent a policy variable in the short-run reflecting the scope for temporary inflationary financing. Hence, the monetary policy reaction of the

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1/ Odedokun emphasizes that ideally the actual output to capital ratio (as opposed to the incremental ratio) should be used as the appropriate index. However, due to lack of data on capital stock for developing countries he uses the IFS data on investment. The variables included in the regression are export orientation, size of the public sector, inflation rate, real exchange rate distortion; and the financial variables examined are the real interest rate, directed credit program through development bank lendings, and financial depth (measured as the ratio of the stock of liquid liabilities of the banking system to GDP).

2/ See McKinnon (1973), Shaw (1973), Fry (1988), Leite and Sundararajan (1990).

authorities can influence real sector performance in the short run. Maintenance of a low real interest rate via monetary financing could result in the supporting and expansion of unproductive, nonviable projects, and the channeling of funds into consumption rather than investment which would be detrimental to economic growth and efficiency.

Under repressed financial systems, the real interest rate may be maintained at a low level through directed credits and central bank refinancing of certain projects at subsidized interest rates. However, the real rate of interest may also be extremely high for other projects which do not meet the criteria for central bank refinance, and source their funds in the curb markets.

Financial sector reform would involve an upward adjustment in the real rate of interest on subsidized projects, and a decline for other projects. This might require some restructuring of the capital stock with a retiring of capital from previously subsidized firms which are no longer viable. However, the reforms would also increase the opportunities for new and more productive activities.

In theory, higher equilibrium real interest rates should be associated with more efficient investment, higher rates of return on capital, higher savings and growth. However, very high real interest rates may also be associated with the problem of adverse selection and the channeling of funds into more risky projects. Very high real interest rates may also reflect a lack of credibility or a country risk premium or fragility of the banking system. 1/

The calculation of the real interest rate is problematic since it depends on inflation expectations and can vary depending on the agents involved and the tax system. The real interest rate (RIR) is proxied here by the average deposit rate less the concurrent annual rate of change of consumer prices. Except for the caveats mentioned above, we would expect a positive relationship between RIR and economic growth and efficiency.

b. The volume of intermediation

McKinnon (1973) and Shaw (1973), among others, have emphasized the role played by financial intermediaries in increasing savings and hence investment. Liberalization of interest rates and the introduction of new financial instruments as part of financial sector reform encourages the holdings of financial assets and financial deepening. Various monetary indicators of financial development (deposit/currency and broad money/GDP ratios) are observed to improve with financial sector reforms.

1/ See Calvo (1988), Calvo and Guidotti (1991), and Persson and Tabellini (1990).

However, two main factors are likely to determine whether the observed increase in intermediation will be reflected in an improvement in economic growth: the sources and uses of credit expansion. First, to result in higher growth, the increase in financial intermediation should involve a savings rather than a purely inflation component. Inflationary increases in money and credit would at most have a temporary effect in increasing economic growth, and subsequent higher inflation would have detrimental longer term effects.

Based on countries' experiences, financial sector reforms may involve shocks to the volume of intermediation. Rapid credit expansions are observed to follow the liberalization of controls on the banking system. 1/ The domestic liberalization can also lead to a reflow of capital flight and improvements in countries' capital accounts, especially if accompanied by external sector liberalization. 2/ Nonsterilized foreign exchange inflows would add to the supply of free reserves in the banking system and fuel the credit boom.

The financial sector reforms will also have structural effects. Liberalization of the financial system resulting in higher financial savings may mean that the authorities will be able to tolerate a somewhat more rapid growth of money and credit in the post reform period without increasing inflationary pressures. A higher foreign demand for the country's financial assets following external liberalization, which could take a considerable time to work through, may allow the country to sustain a somewhat large current account balance of payments deficit and, therefore, to accept some loss of competitiveness and real exchange rate appreciation. Hence, the authorities may be able to accommodate some of the initial credit and external shocks without affecting long-term growth prospects. However, beyond allowance for these structural shifts, the resulting monetary and credit expansion will be inflationary and will, therefore, need to be offset by the central bank if the credit expansion is not to have an adverse effect on economic performance.

The second factor which will determine whether an increase in intermediation will be reflected in an improvement in economic growth and efficiency are the uses of the increase in credit. As already noted, the increase in credit may be channeled to consumption rather than investment or into unproductive activities. The impact of these facts should be picked up by the level of the real interest rate and the proxy for the efficiency of the financial system. Hence, we anticipate that the volume of intermediation variable will mainly proxy the role of the financial system

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1/ See Sundararajan and Baliño (1991), Bisat, Johnston, and Sundararajan (1992), and Drees and Pazarbasioglu (1995).
2/ See Calvo et al. (1993), Johnston and Ryan (1994), and Schadler et al. (1993).

in promoting savings or in providing inflationary financing. The former should be positively related to growth and efficiency, while the latter would be negatively related.

We use two alternative proxies for the volume of financial intermediation through the banking system: the share of credit to the private sector by banks in GDP (denoted as CRED), and the share of M2 in GDP (denoted as M2GDP). These variables proxy the two main functions of financial markets which are closely interrelated: the credit allocation role and the deposit mobilization role. CRED is a more appropriate indicator of the volume of intermediation through the banking system than the CREDIT variable used by De Gregorio and Guidotti (1992) and Levine and King (1993a,b) as it excludes the credit granted to the private sector by the central bank which is often high during financial repression.

c.   Efficiency of intermediation

The channelling of finance through organized financial intermediaries can improve investment and growth for a number of well known reasons, including the benefits of economies of scale in savings mobilization and allocation, and the role of intermediaries in project selection. However, it also has to be recognized that efficiency in intermediation is not something which is necessarily automatic, particularly after prolonged periods of financial repression and has to be promoted as part of the process of financial sector reform.

Banking solvency is quite often an issue at the commencement of financial sector reforms. Insolvent banks have incentives to allocate credit to high risk/high return projects without due regard to the prospects for loan recovery. Following financial reforms, the interrelations of ownership can result in increased lending to interrelated enterprises, magnifying risk exposures and reducing the supply of credit to new borrowers. Large and inefficient financial institutions may seek to exploit their monopoly power following financial liberalization. Weaknesses in financial intermediation may also be created by poorly designed legislative frameworks which are not tuned to enforce contracts and bankruptcy and, thus, financial discipline among borrowers, by inadequate accounting and information systems, and inadequate institutional capabilities, knowledge, and skills. Rapid credit expansion in the wake of financial liberalization can also strain credit approval procedures and result in increased lending to more risky projects.

It is difficult to measure directly the efficiency of the banking system in the allocation of credit. However, the efficiency of banks in credit allocation is likely to be reflected in other aspects of their activity. For example, inefficiency in the banking industry may be associated with wide lending margins reflecting, inter alia, lack of competition between banks and attempts by insolvent banks to recoup loan losses. It may also be reflected in the management of bank assets, for

example, in the tendency of inefficient banks to hold larger nonremunerated excess reserves, or revealed by the portfolio behavior of nonbanks in their willingness to hold and use bank deposits rather than cash.

Two different variables are used to proxy the efficiency of intermediation. The gross spread between the average lending and deposit rates (denoted as SPREAD) and the ratio of reserve money to deposits (denoted as RMDEP). The spread variable is calculated as the difference between the average lending and deposit rates. However, some caveats are in order. The spread may not be a good measure of efficiency prior to financial reform when interest controls are in place or after financial reform if it reflects different regulations on the banking industry. The spread may also vary with the level of nominal interest rates and inflation, although this will be partly accounted for in the estimates through the inclusion of a separate inflation term in the regression equations.

Reserve money is defined as the currency in circulation plus the required and excess reserves of the banking system. The variable RMDEP, therefore, includes: the currency to deposit ratio which is a measure of the efficiency of the banks in mobilizing deposits; the excess reserves which proxies the efficiency of banks in the use of funds; and required reserves which is a measure of the banking system, which tends to be high under financial repression. RMDEP would also pick up the effect of an unsound banking system, if this leads to a run on deposits and shift to cash. A negative relationship is expected between the efficiency proxies and economic growth and efficiency.

III. Estimation and Results

1. Sample and estimation procedures

Our sample includes 40 industrial and developing countries which undertook financial sector reforms. The sample is divided according to the stages of the financial reform process: pre-reform, reform, and post reform. For analytical purposes, the start of reforms is identified with the elimination of credit ceilings and/or elimination of interest rate controls, and the reform period was identified with the five year period following the start date of the reforms. The five year period preceding the start of financial sector reforms is identified as the pre-reform period, and the five year period following the reform period as the post-reform period. The use of five-year data periods is somewhat arbitrary, but country experience also indicates that many countries have implemented financial reform programs over this type of time horizon. The sample was further divided into two subsamples, namely, the noncrisis and crisis countries based on whether the country experienced a financial crisis after the onset of the reform process. The cases of financial crisis were

identified from a review of country case studies. 1/ Appendix I provides a list of the sample countries, the subsamples of crisis and noncrisis countries, as well as the subperiods for each country in the sample.

The dependent variables used are the rate of growth of real GDP, (RGDPGR), as a proxy for economic growth and the output to capital ratio, (OCR), as a proxy for economic efficiency. The explanatory variables include the rate of inflation, (INF), (or alternatively the GDP deflator, (GDPDEF)), ratio of government spending to GDP, (GEGDP), openness of trade as proxied by the share of total exports plus imports in GDP, (XMGDP), share of investment in GDP, (INVGDP), share of foreign direct investment in GDP, (DIGDP), and the financial reform variables which are discussed in Section II. Because of the problem of endogeneity with using investment to GDP ratio as an explanatory variable, this variable was instrumented in the regressions. 2/ Appendix II provides a list of the variables and data sources.

The estimation equations are of the following form:

$$(1) \qquad y_{it} = \alpha_i + \beta x_{it} + u_{it}$$

where i denotes a country and t a time period (pre-reform, reform and post-reform periods), α_i is a country specific parameter, y represents RGDPGR or OCR, and x is a matrix of explanatory variables as described in the previous paragraph.

In estimating equation (1) we use panel data "random effects" method which considers each country-specific parameter as a random variable and includes its stochastic component in the error term of the regression. 3/ Hausman test statistics were utilized to check for correlated effects. In all cases, the hypothesis that the intercepts are drawn from a common distribution with mean α and variance σ_α^2 was rejected, implying that the use of random effects model would provide consistent estimates and thus the equation has to be estimated by Generalized Least Squares.

2. Average performance during financial reforms

The mean values for rates of growth, the output to capital ratios, and the financial explanatory variables for the pre-reform, reform, and post reform periods for the crisis and noncrisis countries are shown in Table 1. For the noncrisis countries, the financial reforms are associated with

1/ See for example, Sundararajan and Baliño (1991), Bisat, Johnston, and Sundararajan (1992), Drees and Pazarbasioglu (1995).

2/ The current level of investment was regressed on lagged values of itself and the fitted value was included in the regressions.

3/ See Hsiao (1986).

strong improvements in average economic growth rates and output to capital ratios. However, the crisis countries encountered, on average, a deterioration in economic growth and a decline in output to capital ratios.

Concerning the behavior of the financial variables, the noncrisis countries increased the average real interest rate quite sharply to positive real levels comparing the pre-reform and reform periods. Real interest rates increased further on average in the post reform period, suggesting that while the real interest rate adjustment during the reform was significant, it may have involved some modest undershooting.

The volume of financial intermediation expanded following the reforms with the ratio of credit to the private sector to GDP increasing on average by a larger amount than the ratio of broad money to GDP. This is consistent with earlier observations that credit grows more rapidly than money immediately following the reforms. However, in the noncrisis countries, credit to the private sector to GDP ratio continued to be much lower than the ratio of M2 to GDP, suggesting that the credit expansion was constrained. This constraint may have been because a significant percentage

Table 1. Mean Values for Selected Variables

| | Noncrisis Countries | | | Crisis Countries | | |
	Pre-Reform	Reform	Post-Reform	Pre-Reform	Reform	Post-Reform
Dependent variables						
RGDPGR	2.64	4.18	4.36	4.18	3.51	2.16
OCR	0.35	0.36	0.39	0.34	0.33	0.31
Financial variables						
RIR	-5.79	1.43	2.51	-3.20	-6.56	6.14
CRED	0.32	0.42	0.53	0.34	0.48	0.43
RMDEP	0.35	0.30	0.26	0.37	0.27	0.39
M2GDP	0.48	0.54	0.56	0.39	0.50	0.38
SPREAD	4.08	4.61	4.07	5.86	8.27	11.05

of banking sector assets continued to be directed or subject to portfolio constraints during the reform period, or because the banks were risk averse. Only in the post reform period, did the ratio of credit to the private sector to GDP increase to the level of M2 to GDP.

The ratio of reserve money to deposits fell substantially during the reform period. However, the average spread between banks' loan and deposit rates widened during the reforms before declining in the post reform period. This widening of the spreads has been observed in other studies and attributed to the greater freedom to price credit according to risks, to delays in improvements in banking competition, and to greater reliance on noninterest bearing reserve requirements during the reforms. 1/

There are some important differences in the behavior of the financial variables comparing the crisis countries with the noncrisis countries in the reform and pre-reform periods. In the crisis countries, the real interest rates became more negative during the reform period rather than becoming positive; the volume of intermediation expanded much more rapidly with the ratio of credit to the private sector to GDP reaching a level very close to that of M2 to GDP; and the spread between deposit and lending rates widened very sharply. While these results are only indicative, they suggest that during the reform period, the crisis countries permitted a much more rapid monetary and credit expansion in the context of a relatively inefficient financial system. 2/

The mean values for the crisis countries for the post reform period indicate the magnitude of subsequent policy adjustments as real interest rates were raised on average to very high positive levels. In addition, the financial crises were associated with a reversal of financial deepening, as measured by the ratio of credit to the private sector and M2 to GDP. The fact that the ratio of credit to GDP exceeds the ratio of M2 to GDP may reflect official support operations in the wake of financial crisis. The indicators of financial intermediation efficiency worsened during the post reform period in response to the banking crisis. The crisis countries experienced a sharp reduction in real economic growth in the post reform period.

3. Estimation results

In this section we examine the direction of the effect of each explanatory variable. First, we provide a brief discussion of the effects of the macroeconomic variables which are commonly used in the literature and subsequently we discuss in more detail the effects of the financial reform

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1/ See Bisat, Johnston, and Sundararajan (1992) and King and Levine (1993a).
2/ See also Drees and Pazarbasioglu (1995) for a discussion of the expansionary impact of financial deregulation and subsequent financial crises in the case of Nordic countries.

variables. 1/ Tables 2 and 3 provide the estimation results for the real rate of growth for the crisis and noncrisis countries respectively, for the whole period, and the pre-reform, reform, and post reform periods. Tables 4 and 5 provide the results in a similar format for the output to capital ratio. The effect of the macroeconomic variables are as follows:

- The size of the public sector proxied by the share of government expenditure in GDP (GEGDP) has a significantly negative effect on both economic growth and efficiency in the reform and post reform periods and for both noncrisis and crisis countries, indicating that the expansion of the public sector may be detrimental to economic growth and efficiency.

- The inflation rate (INF) has a significant and negative effect across all subperiods and in both noncrisis and crisis countries, implying that inflation hampers both growth and efficiency of resource allocation through channels other than the impact of financial variables. 2/

- The openness of trade, proxied by the ratio of the sum of exports and imports over GDP (XMGDP), has the expected positive sign during the reform period, implying that trade liberalization is generally beneficial to economic growth and efficiency. However, for the crisis countries the impact of the openness of trade on growth and efficiency becomes negative in the post-reform period. This unexpected result may be explained by the greater vulnerability of the more open economies to loss of international confidence following the onset of banking crisis, resulting in withdrawals of foreign capital, and also, possible greater recourse in these countries to trade and exchange restrictions in the aftermath of the crisis.

- The ratio of investment to GDP (INVGDP) has the anticipated positive effect on growth. The ratio of foreign direct investment to GDP (DIGDP) has a positive effect on growth in the noncrisis countries and on the efficiency of the resource utilization during the post reform period. For the crisis countries, the variable is negative in the growth equations in the pre-reform period, which is an unexpected result.

With regards to the impact of financial reform variables, all three financial channel proxies enter with the correct sign in the real growth and efficiency equations for the whole period for noncrisis countries, and are significant in the growth equations where financial efficiency is proxied by the spread. Hence, the results show the importance of financial variables on the real sector even after controlling for commonly used policy

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1/ The value of primary school enrollment rate (EDUCP) was used for the regressions for the whole period. This variable has a significant positive effect on both growth and efficiency.

2/ Similar results are obtained when the GDP deflation is used to measure inflation.

Table 2. Estimation Results for the Non-Crisis Countries
(Growth Equations)

	Constant	GEGDP	INF	XMGDP	INVGDP	DIGDP	EDUCP	RIR	CRED	M2GDP	RMDEP	SPREAD	R^2
Whole Period													
(1)	6.677*	-11.638*	-0.114*	0.422	0.132*	22.995	0.218**	0.049**	1.024*	--	-0.407	--	0.48
	(5.38)	(-5.02)	(-4.11)	(1.37)	(11.93)	(1.40)	(1.72)	(1.84)	(1.95)	--	(-0.34)	--	
(2)	6.996*	-11.229*	-0.114*	0.360	0.132*	23.540	0.220**	0.050**	--	1.574**	-0.297	--	0.48
	(5.41)	(-4.84)	(-4.09)	(0.32) (-	0.15)	(1.44)	(1.74)	(1.77)	--	(1.83)	(-0.45)	--	
(3)	7.156*	-11.859*	-0.106*	0.217	0.136*	23.540	0.228**	0.044**	1.215*	--	--	-0.060**	0.49
	(7.70)	(-5.30)	(-3.80)	(0.18)	(12.11)	(1.35)	(1.77)	(1.78)	(1.94)	--	--	(-1.80)	
(4)	7.423*	-11.307*	-0.105*	0.176*	0.137*	22.497	0.231**	0.045**	--	1.789**	--	-0.062**	0.48
	(7.73)	(-4.97)	(-3.78)	(0.15)	(12.18)	(1.38)	(1.88)	(1.72)	--	(1.80)	--	(-1.74)	
Pre-Reform													
(1)	4.361*	-3.995	-0.065	0.027	0.101*	6.388**	--	0.007	-1.241	--	-0.924	--	0.52
	(1.86)	(-1.02)	(-1.26)	(1.01)	(3.89)	(1.76)	--	(0.12)	(-0.55)	--	(-0.31)	--	
(2)	3.791**	-3.777	-0.063	0.209	0.103*	6.225**	--	0.008	--	-0.384	-0.282	--	0.52
	(1.68)	(-0.979)	(-1.24)	(0.10)	(4.01)	(1.74)	--	(0.14)	--	(-0.19)	(-0.09)	--	
(3)	3.720*	-3.886	-0.073	0.062	0.096*	6.887*	--	0.009	-0.815	--	--	-0.036	0.53
	(2.30)	(-1.01)	(-1.58)	(0.03)	(3.53)	(1.84)	--	(0.18)	(-0.45)	--	--	(-0.48)	
(4)	3.504*	-3.787	-0.067	0.247	0.098*	6.777*	--	0.007	--	-0.254	--	-0.038	0.53
	(2.16)	(-0.99)	(-1.53)	(0.13)	(3.60)	(1.83)	--	(0.17)	--	(-0.14)	--	(-0.51)	
Reform													
(1)	5.275*	-7.558*	-0.115**	3.537*	0.136*	19.298	--	0.041**	0.215*	--	-0.197	--	0.64
	(2.93)	(-2.99)	(-1.72)	(3.49)	(6.41)	(0.94)	--	(1.68)	(1.87)	--	(-1.16)	--	
(2)	5.601*	-7.155*	-0.117*	3.549*	0.136*	18.872	--	0.036**	--	0.761**	-0.078	--	0.64
	(3.46)	(-2.71)	(-2.04)	(3.52)	(6.51)	(0.93)	--	(1.69)	--	(1.75)	(-0.66)	--	
(3)	5.412*	-7.735*	-0.118**	3.522*	0.136*	16.694	--	0.043**	0.322**	--	--	-0.016	0.65
	(3.28)	(-3.18)	(-1.69)	(3.54)	(6.35)	(0.79)	--	(1.72)	(1.77)	--	--	(-1.32)	
(4)	5.720*	-7.207*	-0.125*	3.559*	0.136*	15.982	--	0.034**	--	0.912**	--	-0.022	0.65
	(3.83)	(-2.78)	(-2.13)	(3.57)	(6.47)	(0.77)	--	(1.68)	--	(1.79)	--	(-1.45)	
Post-Reform													
(1)	14.613*	-19.043*	-0.129**	2.227	0.172*	15.260	--	0.070*	5.958*	--	-2.119	--	0.78
	(3.84)	(-4.48)	(-1.76)	(1.17)	(5.81)	(0.61)	--	(1.89)	(2.82)	--	(-1.10)	--	
(2)	8.856*	-13.606*	-0.065*	2.888	0.173*	10.579	--	0.050*	--	2.981*	-0.144	--	0.74
	(2.73)	(-3.24)	(-1.84)	(1.18)	(5.70)	(0.05)	--	(2.60)	--	(2.13)	(-0.76)	--	
(3)	13.028*	-17.555*	-0.149*	2.309	0.166*	10.854	--	0.093*	5.036*	--	--	-0.012	0.76
	(3.84)	(-4.21)	(-2.03)	(0.95)	(5.95)	(0.41)	--	(1.76)	(2.47)	--	--	(-0.16)	
(4)	18.818*	-13.630*	-0.065*	14.373	0.169*	39.536	--	0.068*	--	2.338**	--	-0.054	0.73
	(2.89)	(-3.27)	(-1.92)	(1.51)	(5.97)	(0.30)	--	(1.85)	--	(1.86)	--	(-0.69)	

Table 3. Estimation Results for the Crisis Countries
(Growth Equations)

	Constant	GEGDP	INF	XMGDP	INVGDP	DIGDP	EDUCP	RIR	CRED	M2GDP	RMDEP	SPREAD	R^2
Whole Period													
(5)	1.705	-3.764	-0.502**	1.592*	0.152*	29.767	0.597**	0.004	-2.41**	--	-0.871	--	0.53
	(0.54)	(-0.83)	(-1.82)	(3.62)	(8.34)	(0.97)	(1.84)	(1.28)	(-1.82)	--	(-1.11)	--	
(6)	2.236	-4.891	-0.478**	1.691*	0.153*	40.279	0.845**	0.004	--	-0.601**	-0.918	--	0.53
	(0.80)	(-1.01)	(-1.84)	(3.90)	(8.28)	(1.33)	(1.74)	(1.29)	--	(-1.76)	(-1.22)	--	
(7)	0.544	-3.618	-0.434*	1.562*	0.147*	21.763	0.369	0.004	-3.134**	--	--	-0.009*	0.52
	(0.18)	(-0.79)	(-1.93)	(3.35)	(8.16)	(0.72)	(1.52)	(1.28)	(-1.89)	--	--	(-1.97)	
(8)	1.116	-6.172	-0.415*	1.689*	0.149*	31.787	0.704	0.005	--	0.237**	--	-0.006*	0.53
	(0.42)	(-1.30)	(-1.98)	(3.70)	(8.08)	(1.07)	(1.69)	(1.29)	--	(1.73)	--	(-1.98)	
Pre-Reform													
(5)	13.175*	-1.617	-0.018	-1.146	0.086*	-14.914*	--	0.032	-3.424	--	-3.438	--	0.51
	(2.16)	(-0.25)	(-1.23)	(-1.49)	(2.22)	(-2.51)	--	(0.74)	(-0.53)	--	(-1.30)	--	
(6)	16.757*	-1.492	-0.034	-5.500	0.108*	-14.578*	--	0.052	--	-1.441**	-4.131**	--	0.56
	(2.87)	(1.28)	(-1.21)	(-0.68)	(2.66)	(-2.58)	--	(0.81)	--	(-1.72)	(-1.85)	--	
(7)	12.874*	-1.437	-0.179*	-1.624*	0.063**	-14.224*	--	0.249*	-6.206	--	--	-0.185	0.61
	(3.50)	(-1.66)	(-2.56)	(-2.27)	(1.73)	(-2.76)	--	(2.92)	(-1.24)	--	--	(-1.58)	
(8)	12.402*	-2.420*	-0.161*	-1.439*	0.086*	-15.664*	--	0.155**	--	-6.228	--	-0.158	0.61
	(3.38)	(-2.00)	(-2.36)	(-1.95)	(2.33)	(-3.11)	--	(1.70)	--	(-0.88)	--	(-1.53)	
Reform													
(5)	5.493	-7.168	-0.355**	3.087*	0.172*	-50.630	--	0.103*	-7.024**	--	-8.120	--	0.78
	(0.55)	(-0.88)	(-1.69)	(3.08)	(5.10)	(-0.94)	--	(2.05)	(-1.68)	--	(-1.15)	--	
(6)	-12.272	-24.691*	-0.203	16.329*	0.168*	-48.535	--	0.081**	--	-19.177*	-8.211	--	0.80
	(-0.95)	(-2.06)	(-0.87)	(2.11)	(5.86)	(-1.03)	--	(1.76)	--	(-2.25)	(-1.25)	--	
(7)	12.452	-2.732	-0.217	20.064*	0.168*	-53.641	--	0.082**	-1.830**	--	--	-0.052	0.77
	(1.55)	(-1.4)	(-0.47)	(2.82)	(5.79)	(-1.16)	--	(1.71)	(-1.74)	--	--	(-1.52)	
(8)	13.486**	-0.927	-0.045	23.897*	0.159*	-45.405	--	0.068**	--	-6.001**	--	-0.071**	0.77
	(1.72)	(-0.13)	(-0.08)	(2.86)	(5.39)	(-0.97)	--	(1.73)	--	(-1.83)	--	(-1.68)	
Post-Reform													
(5)	-6.297*	-4.062*	-0.085*	-3.508*	0.196*	-48.090	--	-0.044**	-3.581*	--	-0.533	--	0.78
	(-3.27)	(-4.27)	(-2.09)	(-3.50)	(4.85)	(-1.02)	--	(-1.79)	(-7.59)	--	(-1.39)	--	
(6)	19.066	-3.476*	-0.599*	-3.566	0.121*	-53.224	--	-0.031*	--	-4.591*	-0.469	--	0.72
	(0.78)	(-2.06)	(-1.94)	(-1.62)	(1.99)	(-1.30)	--	(-2.35)	--	(-3.53)	(-1.61)	--	
(7)	-3.307	-2.822*	-0.489	-2.146**	0.129*	-48.531	--	-0.115*	-3.067*	--	--	-0.019	0.73
	(-1.63)	(-2.47)	(-1.62)	(-1.72)	(3.48)	(-1.45)	--	(-2.51)	(-6.71)	--	--	(-0.20)	
(8)	5.397	-3.704*	-0.411*	-1.768	0.165*	-59.874	--	-0.237*	--	-4.265*	--	-0.158	0.70
	(0.24)	(-2.14)	(-1.91)	(-1.55)	(3.25)	(-1.07)	--	(3.38)	--	(-3.56)	--	(-0.67)	

Table 4. Estimation Results for the Non-Crisis Countries
(Efficiency Equations)

	Constant	GEGDP	INF	XMGDP	DIGDP	EDUCP	RIR	CRED	M2GDP	RMDEP	SPREAD	R^2
Whole Period												
(1)	0.364* (9.02)	-0.288* (-5.13)	-0.014* (-2.40)	0.025 (0.80)	0.693* (1.93)	0.020* (3.84)	0.009** (1.74)	0.091* (4.64)	--	-0.030 (-1.09)	--	0.58
(2)	0.386* (9.26)	-0.265* (-4.73)	-0.013* (-2.33)	0.028 (0.89)	0.784* (2.19)	0.021* (3.94)	0.010 (1.58)	--	0.126* (4.66)	-0.021 (-1.46)	--	0.59
(3)	0.387* (11.42)	-0.304* (-5.63)	-0.014* (-2.41)	0.034 (1.09)	0.711* (1.98)	0.020* (3.84)	0.009** (1.75)	0.098* (5.45)	--	--	-0.004** (-1.72)	0.57
(4)	0.404* (11.85)	-0.274* (-5.04)	-0.013* (-2.34)	0.035 (1.11)	0.805* (2.26)	0.020* (3.97)	0.010** (1.68)	--	0.134* (5.50)	--	-0.003** (-1.78)	0.56
Pre-Reform												
(1)	0.320* (6.87)	-0.025 (-0.43)	-0.002* (-3.21)	0.036 (1.25)	1.155* (3.41)	--	-0.002* (-2.90)	-0.046* (-1.91)	--	-0.048 (-1.30)	--	0.58
(2)	0.302* (6.36)	-0.027 (-0.48)	-0.002* (-3.34)	0.033 (1.13)	1.122* (3.46)	--	-0.002* (-3.00)	--	-0.065 (-1.56)	-0.057 (-1.56)	--	0.49
(3)	0.341* (8.54)	-0.029 (-0.50)	-0.018* (-2.89)	0.022 (0.73)	1.121* (3.35)	--	-0.001* (-2.53)	-0.033** (-1.68)	--	--	-0.002** (-1.86)	0.51
(4)	0.332* (8.25)	-0.032 (-0.56)	-0.017* (-2.91)	0.018 (0.61)	1.099* (3.40)	--	-0.001* (-2.52)	--	-0.047 (-1.21)	--	-0.002* (-1.91)	0.50
Reform												
(1)	0.462* (8.22)	-0.217* (-3.98)	-0.006 (-0.94)	0.038** (1.76)	0.299 (1.20)	--	0.003** (1.73)	-0.039 (-1.17)	--	-0.147* (-3.87)	--	0.43
(2)	0.506* (8.38)	-0.203* (-3.78)	-0.004 (-0.53)	0.029** (1.77)	0.282 (1.14)	--	0.004** (1.76)	--	0.096* (1.98)	-0.178* (-4.41)	--	0.46
(3)	0.359* (6.42)	-0.175* (-3.22)	-0.005 (-1.66)	0.052** (1.70)	0.023 (1.11)	--	0.005** (1.73)	-0.010 (-0.92)	--	--	-0.004** (-1.79)	0.53
(4)	0.358* (6.21)	-0.173* (-3.16)	-0.004 (-0.61)	0.051** (1.78)	0.022 (0.86)	--	0.006** (1.80)	--	0.065* (1.94)	--	-0.004** (-1.74)	0.55
Post-Reform												
(1)	0.011 (0.11)	-0.062** (-1.75)	-0.021* (-3.29)	0.147* (3.70)	0.211* (1.94)	--	0.006** (1.75)	0.036** (1.76)	--	-0.067* (-2.06)	--	0.65
(2)	0.009 (0.09)	-0.012** (-1.81)	-0.023* (-3.21)	0.159* (3.68)	0.260** (1.83)	--	0.006** (1.84)	--	0.027** (1.77)	-0.046* (-1.95)	--	0.64
(3)	0.072 (0.57)	-0.061* (-1.92)	-0.022* (-3.02)	0.170* (4.03)	0.144 (1.57)	--	0.004 (1.63)	0.028* (1.91)	--	--	-0.001** (-1.71)	0.67
(4)	0.087 (0.68)	-0.024** (-1.88)	-0.024* (-2.94)	0.176* (3.91)	0.201** (1.77)	--	0.004* (2.58)	--	0.034** (1.75)	--	-0.002** (-1.73)	0.65

Table 5. Estimation Results for the Crisis Countries
(Efficiency Equations)

	Constant	GEGDP	INF	XMGDP	DIGDP	EDUCP	RIR	CRED	M6GDP	RMDEP	SPREAD	R^2
Whole Period												
(5)	0.791* (12.23)	-0.118** (-1.72)	-0.010** (-1.62)	0.226* (4.23)	0.554 (1.61)	0.093* (6.92)	-0.005** (-1.73)	0.049** (1.77)	-- --	-0.001 (-1.11)	-- --	0.43
(6)	0.755* (10.99)	-0.075 (-1.04)	-0.009** (-1.85)	0.206* (3.87)	0.429 (1.25)	0.083* (5.71)	0.006 (1.58)	-- --	-0.015 (-1.33)	-0.005 (-1.58)	-- --	0.45
(7)	0.790* (12.46)	-0.109** (-1.70)	-0.023* (-1.91)	0.219* (4.03)	0.570 (1.67)	0.093* (6.98)	-0.006** (-1.75)	-0.049** (-1.83)	-- --	-- --	-0.001** (-1.70)	0.44
(8)	0.756* (11.35)	-0.064** (-1.89)	-0.023 (-1.59)	0.199* (3.67)	0.467 (1.36)	0.082* (5.82)	-0.005 (-1.67)	-- --	-0.013 (-1.29)	-- --	-0.001** (-1.73)	0.42
Pre-Reform												
(5)	0.715* (4.81)	-0.009* (-2.09)	-0.033* (-2.08)	-0.098 (-1.24)	0.339 (0.63)	-- --	-0.009* (-2.09)	-0.046 (-1.61)	-- --	-0.025 (-1.45)	-- --	0.53
(6)	0.719* (4.99)	-0.048* (-2.38)	-0.027 (-1.65)	-0.075 (-0.91)	0.410 (0.82)	-- --	-0.006* (-2.16)	-- --	-0.087 (-1.11)	-0.028 (-1.52)	-- --	0.57
(7)	0.683* (6.66)	-0.296* (-2.07)	-0.025* (-2.48)	-0.043 (-0.67)	0.531 (0.51)	-- --	-0.005* (-3.70)	-0.070* (-2.13)	-- --	-- --	-0.002* (-2.84)	0.62
(8)	0.695* (7.24)	-0.274* (-2.01)	-0.022* (-2.32)	-0.031 (-0.48)	0.232 (0.58)	-- --	-0.004* (-2.92)	-- --	-0.066 (-1.05)	-- --	-0.002* (-2.64)	0.61
Reform												
(5)	0.864* (5.60)	-0.042 (-0.45)	-0.011* (-2.05)	0.238* (3.63)	-0.417 (-0.96)	-- --	0.008* (1.85)	-0.159* (-3.63)	-- --	-0.070 (-0.92)	-- --	0.69
(6)	0.884* (5.27)	-0.086 (-0.71)	-0.020** (-1.74)	0.237* (3.05)	-0.257 (-0.54)	-- --	0.005* (1.98)	-- --	-0.042** (-1.73)	-0.038 (-0.38)	-- --	0.58
(7)	0.917* (9.15)	-0.059 (-0.73)	-0.047** (-1.82)	0.203* (3.07)	-0.468 (-1.10)	-- --	0.004** (1.75)	-0.135* (-3.29)	-- --	-- --	-0.002 (-1.64)	0.68
(8)	0.811* (8.84)	-0.022 (-0.38)	-0.038** (-1.75)	0.169* (2.29)	0.255 (1.32)	-- --	0.005* (2.26)	-- --	-0.054** (-1.76)	-- --	-0.001* (-2.17)	0.67
Post-Reform												
(5)	0.868* (5.12)	0.386* (2.61)	-0.066** (-1.70)	-0.116** (-1.71)	0.363 (1.57)	-- --	-0.002* (-3.47)	-0.060* (-2.30)	-- --	-0.058* (-3.38)	-- --	0.64
(6)	1.024* (9.92)	0.607* (5.45)	-0.095* (-2.72)	-0.104** (-1.78)	0.478 (1.46)	-- --	-0.001* (-4.13)	-- --	-0.312* (-4.30)	-0.036* (-2.55)	-- --	0.66
(7)	0.827* (3.58)	0.485* (2.63)	-0.054** (-1.81)	-0.126* (-1.93)	0.874** (1.68)	-- --	-0.001* (-2.01)	-0.144* (-2.71)	-- --	-- --	-0.002** (-1.78)	0.62
(8)	1.030* (13.22)	0.590* (10.58)	-0.098* (-1.94)	-0.134 (-1.67)	0.801** (1.78)	-- --	-0.001** (-1.88)	-- --	-0.296* (-7.61)	-- --	-0.003* (-2.14)	0.69

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indicators and structural determinants of growth. They also indicate the importance of taking account of the different dimensions of financial reform in explaining economic growth over a fairly long data period and across countries.

There are, however, some important differences in the results comparing the pre-reform periods with the reform and post reform periods, and between the crisis and noncrisis countries. These are discussed below.

a.   The real interest rate

The real interest rate (RIR) has an insignificant effect on real growth and a significantly negative impact on economic efficiency in the pre-reform period. This suggests that the measured real interest rate was not a good indicator of the real cost of capital, perhaps reflecting the impact of credit rationing and the importance of directed finance under financial repression.

Following financial reforms, the impact of the real interest rate on economic growth and efficiency becomes positive and significant. Upward adjustments in real interest rates which are observed to accompany financial sector reforms, therefore, do not appear to have had negative effects on growth. The failure of the crisis countries to adjust upwards their real interest rates during the reform process, may also partly explain the weaker economic growth and efficiency performances.

In the post reform period, the real interest term becomes negative for the crisis countries. The sharp increases in real interest rates which generally follow financial crises, therefore, appear to have had quite adverse real sector effects as the interest costs rise significantly. These effects may also be magnified given the potential for "adverse selection," namely the allocation of credit to more risky borrowers under conditions of high real interest rates. The real interest rate continues to have a significant positive effect on growth and efficiency in the noncrisis countries in the post reform period.

b.   The volume of intermediation

The volume of financial intermediation (proxied by CRED or M2GDP) is not a significant determinant of economic growth and has a significant negative effect on efficiency during the pre-reform period. This result would be consistent with the weakness of the banking sector in mobilizing savings, and with expansions in intermediation involving inflation rather than savings components, and the allocation of credit into low productivity uses under financial repression.

Following financial reforms, the volume of financial intermediation has a generally positive and significant effect on growth and efficiency for the noncrisis countries. This is the expected effect to the extent that the banking system contributes to enhancing savings mobilization. This positive effect continues in the post reform period. However, for the crisis countries, the volume of intermediation has a significantly negative effect

on growth and efficiency following financial reforms. Hence, under conditions that are conducive to financial crisis--which may involve factors such as banking insolvency, lending to interrelated institutions, etc.-- expansions of financial intermediation do not appear to improve growth and efficiency. As noted in the discussion of mean values, credit expansion was considerably more rapid in the crisis than noncrisis countries during the reform period. So, the negative impact of intermediation on growth and efficiency may reflect the much larger inflationary component in intermediation in the crisis countries compared to the noncrisis countries during financial reforms.

During the post reform period, the size of the financial system continues to be negatively related to growth and efficiency in the crisis countries. The latter result may reflect the burden on growth imposed by financial sector restructuring in the wake of financial crises, and the continuing weak role of the banking systems in savings mobilization. 1/ It also suggests that countries which downsized their financial systems more rapidly in the wake of a banking crisis may have improved growth and efficiency.

c. Efficiency of intermediation

The proxies of the efficiency of financial intermediation, RMDEP or SPREAD, have the correct sign. The variables are insignificant in the growth equations and significant in the efficiency equations for the noncrisis countries. These results indicate that the efficiency of the financial system impacts mainly on the efficiency of investment, while the impact on growth is indirect. The results are similar for the crisis countries, however, the efficiency proxies are nonsignificant during the reform period, which may again underline the weakness of the banking systems in these countries, and their role in the efficient mobilization and allocation of resources.

IV. Conclusions

The results reported in the previous section lead to three broad conclusions. First, the results support the view that financial sector reforms can have important structural implications for the way financial sector variables affect the real economy. In particular, the a priori expected effects of financial variables on economic growth and efficiency became evident only after countries reformed their financial systems. Under conditions of financial repression, expansions of financial intermediation can have limited or even perverse effects on economic performance. Also, policies to raise interest rates are likely to be ineffective under financial repression, unless accompanied by reforms intended to make the banking systems more responsive to financial variables.

1/ De Gregorio and Guidotti (1992) provide similar results.

Second, the results provide evidence that it is important to take into account the different dimensions of financial sector reforms in explaining the impact of financial reforms on economic performance. Earlier research has tended to proxy financial development by a single variable. However, our results from the whole sample as well as the subsamples suggest that separate effects on the interest cost of capital, the volume of intermediation, and the efficiency of intermediation can be identified, and that these effects are important in understanding how financial reforms influence the real sector. For example, the positive effects on growth and efficiency of interest rate liberalization could be blunted by inefficiencies in the banking system, thus, illustrating the importance of having balanced approaches to financial sector reform that include institution building as well as financial liberalization.

Third, whether countries did or did not face financial crisis is an important determinant of the response of the real sector to financial sector reform and financial variables more generally. The noncrisis countries experienced quite strong improvements in economic growth and efficiency following the financial reforms. However, for the crisis countries, expansions in financial intermediation appear to have negative effects on economic growth and efficiency. Moreover, the wide fluctuations in real interest rates and the volume of intermediation in these countries had overall negative effects on economic performance. The timing and intensity of the banking crisis and the timing and size of the financial sector reforms, differ considerably between the sample of countries. Nevertheless, analysis of the data suggests that the banking crises may in part have been related to the failure of the authorities to respond to the monetary shock which can accompany financial reform, and the failure to adjust real interest rates during the reforms. In addition, crisis may also have reflected the greater inefficiency and possibly solvency problems in the banking systems prior to reforms.

These results underscore the importance of managing the monetary shocks which accompany financial sector reforms and which may lead to temporary inflationary financing, and of addressing institutional and banking sector weaknesses at a very early stage in financial sector reforms. In summary, the "quality" of reform matters and the design of reforms is an important determinant of the success of financial sector reforms and their impact on economic performance.

Table 6. Financial Sector Reform Dates

Countries 1/	Date of Financial Reforms	Pre-Reform Period	Post-Reform Period
United Kingdom	1971-75	1966-70	1976-80
Chile Uruguay	1974-78	1969-73	1979-83
Argentina	1977-81	1972-76	1982-86
Japan	1978-82	1973-77	1983-87
Australia Korea Philippines	1981-85	1976-80	1986-90
Indonesia Italy	1983-87	1978-82	1988-92
France Israel Morocco New Zealand Norway Spain Sri Lanka Turkey	1985-89	1980-84	1989-93
Brazil Costa Rica Finland Greece Ireland Jamaica Malaysia Mexico Portugal Thailand	1986-90	1981-85	1990-93

Table 6 (concluded). Financial Sector Reform Dates

Countries 1/	Date of Financial Reforms	Pre-Reform Period	Post-Reform Period
Guatemala Mauritius Venezuela	1989-93	1984-88	--
Ghana Honduras Kenya Malawi Paraguay Peru Tanzania	1990-93	1986-90	--
El Salvador Zambia	1991-93	1987-91	--

1/ Countries which encountered banking crises after the reform process include Argentina, Chile, Finland, Ghana, Israel, Norway, The Philippines, Thailand, Turkey, Uruguay, and Venezuela.

Description of the Data

This appendix provides the description of the annual data used in the empirical analyses.

RGDPGR: First difference of real GDP (line 99b.p of IFS).

OCR: Output-capital ratio, calculated as output at 1987 prices divided by capital stock at 1987 prices (World Bank Database).

GEGDP: Central government expenditure (line 82 of IFS) divided by nominal GDP (line 99b of IFS).

GDPDEF: GDP deflator, calculated as nominal GDP divided by real GDP.

INF: Percentage change in consumer price index (line 64 of IFS).

XMGDP: Sum of exports (line 77aad of IFS) and imports (line 77abd of IFS) divided by nominal GDP.

DIGDP: Foreign direct investment (line 77bad of IFS) times the exchange rate (line rf of IFS) divided by nominal GDP.

EDUCP: Primary school enrollment rate (World Bank Social Indicators Database).

RIR: Real interest rates, calculated as the nominal deposit interest rate (line 601 of IFS) minus the inflation rate.

CRED: Claims on private sector by deposit money banks (line 32d of IFS) divided by nominal GDP.

M2GDP: The sum of money (line 34 of IFS) and quasimoney (line 35 of IFS) divided by nominal GDP.

RMDEP: Reserve money (line 14 of IFS) divided by nom GDP.

SPREAD: Lending rate (line 60p of IFS) minus deposit rate (line 601 of IFS).

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