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Real Effects of Financial Reform"

Fabio Schiantarelli

Izak Atiyas and Gerard Caprio, Jr.
The World Bank

John Harris and Andrew Weiss
Boston University

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Fabio Schiantarelli
Boston College

Izak Atiyas
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Credit Where Credit Is Due? How Much, For Whom, and What Difference Does It Make? A Review of the Macro and Micro Evidence on the Real Effects of Financial Reform

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The relatively recent drive for financial reform in most countries has been spurred by the belief that the existing financial structure was not adequate to promote and assist growth in the real economy. Although specific arrangements differed from country to country, many systems were characterized by interest rate controls that had led to low, often negative real interest rates. Moreover, there was a high degree of interference by the government in the allocation of credit, with designated priority sectors enjoying a privileged access to credit. It has become common to use the label of financial repression to characterize the state of the financial systems under these circumstances. Many developing countries have moved away, in different degrees, from this model, and have introduced liberalization measures designed to leave to the market a greater role in the determination of interest rates and in the allocation of financial resources.

Together with the practical dissatisfaction with the existing structure of the financial systems, the move to liberalization was also influenced by the intellectual challenge to financial repression that started with the seminal contributions by McKinnon (1973) and Shaw (1973). Although the details of the analysis differ, the basic idea is that lifting the ceiling on interest rates and eliminating other interventions into the credit allocation process will increase the amount of financial

savings, the quantity and quality of investment, and stimulate growth. Much has been written since on the role of the financial system in promoting growth, but there has been relatively little convincing empirical evidence on the real effect of financial liberalization, in part because in many cases reform programs did not take hold until the 1980s. Until very recently, one had either to rely on country by country case studies, or on mostly aggregate econometric evidence.

The objective of this paper is two fold. First, after a critical discussion of the channels through which financial development may influence the real economy, we review what we learn about the effects of financial liberalization from studies based on aggregate data. Second, and most importantly, we provide a survey of recent empirical evidence based on firms' panel data. The access to firm level panel data makes it possible to investigate the micro effects of financial reform on the allocation of credit and changes in sources of funds. This is particularly important if, as it is likely to be the case, the impact of the latter varies according to firm's characteristics like size, age and market orientation. Moreover, the availability of both the time series and cross section dimension provides us with the possibility of identifying more precisely the importance of regimes shifts following the liberalization measures.

In Section 1 we touch on the general issues involved in the comparison between a system of directed credit with a free market regime, critically appraise the arguments in favor of financial liberalization, and discuss some recent theoretical contributions on the relationship between financial development and growth. In Section 2 we review the aggregate evidence on the effects of financial reform, and in Section 3 we summarize the more recent evidence from firms' panel data.

Section 4 concludes the paper.

1. WHAT ARE WE COMPARING AND WHAT CAN WE LEARN FROM THE THEORY?

When we compare a system of directed credit with a free market regime we are not necessarily comparing a regime governed by the whims of government bureaucrats with one determined purely by economic efficiency. A free market banking system has many problems. Because of information imperfections and contract enforcement problems free market economies might not allocate investment funds to areas where the marginal product of investment is greatest. Also, in no country today is all credit allocated by the market; all governments have some mechanism to set aside some portion of credit for various and sundry groups--farmers, small and medium enterprises, exporters, etc. Indeed, recent data for the United States, often argued to be among the more market-oriented put the governments direct and indirect share of credit of 25% of the total.¹ Moreover, even in developed countries, the larger fraction of financing for investment comes from internally generated funds, although there are marked differences between countries. For instance, during the period 1970-1985 retentions accounted for 102.4% of total sources in the U.K. and 85.9% in the U.S., at the top of the range. The corresponding figure for Italy was 51.9% and for Japan 57.9%, at the bottom of the range (see Mayer (1990)).² In developing countries, a sample of 20

¹ See Schwarz (1992).

² This figures are calculated on a net basis, in which case accumulation of equivalent financial assets is subtracted from liabilities. The figures on a gross basis are lower. The general point that retentions are in most cases the most important source of financing remains true.

countries showed that own funds accounted for about 60% of investment financing. For both developed and developing countries most of external finance is accounted for by bank loans and in no country do firms raise a substantial part of their finance in stock markets.³

Thus we can take as our bench mark with which to compare directed credit regimes, a market-based financial system characterized by informational imperfections and in which internally generated funds are of great importance in the allocation of investable funds. If we look at outside credit, it is not at all clear that in a free market for credit, lenders will finance those investments with the highest expected gross returns. Lenders will care about the probability of loans being repaid, not about the expected gross returns on projects. Some of the factors that affect which firms get loans in a competitive banking system are degrees of leverage, liquidity, collateralizable wealth, and long-term relationships with the lender.⁴ These factors, which tend to favor large well established firms and to discriminate against start-ups, may outweigh the profitability of investments in determining which firms get loans.

Of course firms--at least those with the intention of repaying--will generally only apply for loans if they think that the private return from the project they wish to have financed will outweigh their interest rate costs. This positive selection effect will mitigate some of the problems discussed in the previous paragraph. However, while selectivity on the part of potential borrowers is a mitigating factor, there are still many potential borrowers who are either turned down for loans, or who do not

³ Honohan and Atiyas (1989).

⁴ This point is important both because of better information flows and because those long term relationships generate good incentive effects.

apply, even though their projects have positive expected net returns. One reason they do not apply may be because they know that given their assets and liabilities they have little chance of obtaining outside finance. On the other hand, directed credit programs in some countries appear to have encouraged an attitude that loans do not have to be repaid, thereby limiting efficiency gains associated with self-selection.

For all these reasons comparing a system of directed credit with a market-based allocation of funds involves a comparison between two imperfect systems.⁵ In general, liberalization will not necessarily lead to efficiency gains, and/or to the relaxation of financial constraints faced by firms in the presence of informational and enforcement problems. Ultimately, only an empirical investigation of the consequences of financial liberalization in those countries where it has occurred will allow researchers to assess the overall effect of reforms. However, in order to evaluate the relevance and importance of the empirical evidence discussed in the next two sections, it is useful to start from a brief review of the theoretical arguments in favor of financial liberalization.

The intellectual challenge to government interventions in the financial system, which keep interest rates artificially low and, possibly, replace market with administrative allocation of funds, is contained in the seminal contributions by McKinnon (1973) and Shaw (1973). There are three main ingredients of the McKinnon and Shaw position.⁶ First, low interest rates on deposit may discourage total savings. Second, even if the amount of total saving is not affected, the

⁵ Following Stiglitz-Weiss (1981), Cho (1986) has indeed argued that removing an interest rate ceiling will not lead to a fully optimal allocation of capital, in the absence of well functioning equity markets.

⁶ See Fry (1988) for a more extensive discussion of the McKinnon and Shaw position.

composition of saving -- and how it is intermediated -- is. In particular, potential lenders may prefer unproductive assets (commodity stocks, gold, etc.) to bank deposits. This limits the supply of loanable funds and has adverse effects on investment. Finally, when there are interest rate ceilings, the quality of investment will suffer: when banks cannot charge a risk premium, they will be unwilling to finance high yielding but risky investment projects. Also, interest ceilings usually imply that some part of available credit will not be allocated according to economic criteria. All these effects will result in lower growth compared to that which could be achieved if the constraints impeding the development of the financial system were removed. It should also be noted that even if not mentioned by McKinnon or Shaw, reducing financial repression might boost savings due to increases in the types of financial instruments offered and/or the proliferation of bank branches. However, this last effect has thus far not been fully examined.

The consequence of an increase in interest rates on the total amount of savings -- a popular subject of economic research -- is obviously theoretically ambiguous, and only empirical evidence can help in assessing whether financial liberalization can have favorable effects on savings. Similarly, as we have remarked above, even in a free market it is not clear that lenders will finance investment projects with the highest expected returns. The issues concerning the total amount of savings and the quality of investment projects, however, were not at the center of the theoretical debate that followed the McKinnon and Shaw contribution. The main discussion concerned portfolio composition effects, and the supply side consequences of an increase in interest rates. It has been argued that it is not necessarily true that financial liberalization will unambiguously increase the

real supply of credit available to firms. The Neo-Structuralist critique of the McKinnon and Shaw approach (see Van Wijnbergen (1982), (1983a,b), (1985), Taylor (1983), Buffie (1984), Khosaka (1984), Lim (1987), and Morisset (1993)), emphasizes the existence of informal (curb) credit markets that satisfy the residual demand for credit by firms, and are not subject to reserve requirements. In this setting, the effect of an increase in the deposit rate on loanable funds depends upon whether households substitute out of curb market loans or out of cash (or unproductive assets held as inflation hedges). If time deposits are closer substitutes for curb market loans than for cash, then the supply of funds to firms will fall, given that banks are subject to reserve requirements and curb market institutions are not. Moreover the resulting increase in the interest rate on curb market loans may lead to a cost-push increase in prices and to a decline in output.

The view of informal credit markets as an efficient channel to intermediate funds from lender to borrowers may however not be an accurate description of reality; informal lenders may have lower costs than formal intermediaries because they are avoiding taxes, hence this cost structure may imply little about their efficiency. Whereas it is true that the use of local knowledge may decrease information costs on certain type of loans, the informal market is often characterized by a high degree of segmentation with limited possibilities of exploiting economies of scale in risk pooling and information processing or economies of scope. Indeed, curb markets are frequently regionally specialized, making them less safe--more exposed to local shocks -- than more diversified banks. It is moreover not clear that all the resources intermediated by the informal markets will be channelled to firms. They may be employed instead to finance consumption or may be appropriated as

monopoly profits by lenders, or put to other unproductive uses. Ultimately the result of liberalization will depend upon the comparative efficiency of the banking sector and of the informal sector in the process of intermediation.⁷ Also in this case the controversy cannot be solved at a theoretical level, but will require empirical evidence in order to discriminate between alternative models. This debate is similar to that in U.S. banking history regarding tradeoffs between unit banks -- one office with no branch network -- compared with larger, more diversified branching banks, or the similar controversy between adherents of local and nationwide banking. Calomiris (1992) reviews the evidence and finds that large, more diversified banks were less prone to fail and experienced smaller losses than smaller unit banks. However, most observers appear to agree that at some point diseconomies of scale take over -- in the United States the scale at which this takes place may only become clear when limits on interstate banking are completely removed -- as the superior information at the local level is ignored or lost.⁸

A very recent set of papers has attempted to formalize, in the context of endogenous growth models, the idea contained in the work of McKinnon and Shaw, and Goldsmith (1969) before them, that the development of the financial system is essential for economic growth. The mechanism through which this may occur differs in the various papers. In Bencivenga and Smith (1991) the existence of financial intermediaries reduces the investment in liquid assets with low rates of

⁷ See Owen and Solis-Fallas(1989) for an attempt at incorporating these considerations in Van Wijnbergen's model.

⁸ This debate is important for small developing countries, where banks with nationwide branches may have as concentrated portfolios as U.S. unit banks in the 1900s. Restrictions on holding foreign assets make small economies' banks inherently fragile, since if the local economy is highly specialized, a bank that holds only local assets will have an excessively concentrated portfolio.

return, and prevents the unnecessary liquidation of investment by entrepreneurs in order to satisfy liquidity needs. Under appropriate assumptions about the value of structural parameters (for instance, if risk aversion is high enough), the equilibrium with intermediation can be shown to yield higher growth rates than the equilibrium without financial intermediaries, although this is not true in general. Greenwood and Jovanovic (1990) stress instead the role that intermediaries play in collecting and in analyzing information, making it possible for investors to put funds to better uses. Cooley and Smith (1991) emphasize the idea that financial markets may promote specialization (especially entry into entrepreneurial activity), technological innovation, and learning by doing. The importance of financial markets in allowing a greater specialization of resources is also discussed in Saint-Paul (1992). Roubini and Sala-i-Martin (1992) suggest that financial development can be seen as reducing the transaction costs of converting non liquid into liquid assets.

Finally, some of the papers stress the fact that the relationship between financial and real development runs both ways (for instance, see Greenwood and Jovanovic (1990) and Levine (1992) in the context of an endogenous growth model; see also Gertler and Rose (1991). Financial intermediaries may promote growth, and economic growth, in turn, stimulates changes in financial markets. Although all these theoretical contributions are very helpful in giving us insights into the relationship between financial and real development, they do not provide a complete and unambiguous answer as to the consequences of financial liberalization. Typically the models are very stylized, and fail to capture fully the issues that arise in economies characterized by informational imperfections, and

with different types of financial intermediaries (banks, curb market institutions).⁹ Ultimately, an assessment of the real effects of financial reform must rely on the empirical analysis and testing of the various hypotheses suggested by the theoretical contributions discussed in this section.

2. THE EFFECTS OF LIBERALIZATION: EVIDENCE FROM AGGREGATE DATA

Until recently most of the empirical evidence on the effects of liberalization has been based on aggregate data. We will provide here a brief critical review of the main results obtained thus far.¹⁰

A first group of papers presents direct empirical evidence on the relationship between aggregate growth rates for different countries and financial development, using cross section or pooled cross section time series data. The growth rates are regressed either on measures of financial deepening, like the ratio between widely defined money aggregates and GDP or on real interest rates.¹¹ Higher real rates are seen as the consequences of the process of financial liberalization. The standard result is that growth rates are positively and significantly associated both with measures of financial development and real interest rates. King and Levine (1993, 1993a) do the most thorough empirical investigation of finance and growth to date

⁹ See Bencivenga and Smith (1992) for an endogenous growth model that allows for an informational friction that makes it difficult to distinguish high from low quality investment, and may give rise to credit rationing.

¹⁰ Fry (1988, Chapter 6), provides additional references and a more detailed discussion of some of the empirical issues addressed in this section.

¹¹ See Gertler and Rose (Chapter 2), World Development Report (1989), and the papers quoted in Fry (1988).

and find a significant positive relationship for a sample of 119 countries during the 1960-89 period.¹² They regress the average real per capita growth on the logs of initial income and school enrollment, the ratio of trade to GDP, that of government spending to GDP, and average inflation, as well as four financial indicators -- financial depth, as measured by liquid liabilities to GDP, the ration of commercial (deposit money) bank assets to total bank assets (including those of the central bank), the proportion of credit to private sector firms to total credit, and the ration of claims on the private sector to GDP. All four financial sector indicators are significant at the 5% level and the size of the coefficients is indicative of an important impact. An interesting feature of the King-Levine study is the finding countries that have more lending intermediated by the commercial banking sector (compared with those with much central bank credit, a proxy for directed credit programs) grow faster.

Moreover, using extreme bounds analysis, they (and Levine-Zervos, 1993) show that the links between finance and growth are quite robust. King and Levine (1993a) also find that when predicting growth over the 1960-89 period using the above nonfinancial variables, indices of civil liberties, numbers of revolutions and coups, and of assassinations, as well as indicators of monetary, fiscal and trade policies, the residual -- the unexplained part of growth -- is closely related to the financial depth at the start of the period. In other words, finance appears to be an important component of the economy, in particular in the way in which the financial sector helps to allocate resources.

¹² Similar results are also obtained by Roubini and Sala-i-Martin (1991) and by Atje and Jovanovic (1992), whose proxy for financial development incorporates measures of stock market size.

Although the King-Levine evidence certainly is more persuasive than most of the literature, as it appears to find a link between initial financial development and subsequent growth, most of the empirical literature cannot be read as evidence that financial liberalization necessarily *causes* faster growth.¹³ For instance, the financial system might develop and prosper to a greater extent in faster growing countries. The existence of a class of good borrowers with collateralizable assets is instrumental to the development of intermediation, as argued in Gertler and Rose (1991). The value of collateralizable assets depends upon future profit prospects and these will be more favorable when growth rates are higher. Moreover, the positive correlation between growth rates and interest rates could reflect the fact that in macroeconomically stable countries with lower inflation the demand for money as a proportion of income is higher, stock markets are more prosperous, and the real growth rate is higher. Indeed, Jung (1986) finds that Granger causality tests confirm that causation runs both ways between finance and growth, for a sample of 56 countries with at least 15 annual observations each; however, he offers some hope: causation runs somewhat more often from financial development to growth rather than in the opposite direction.

Another approach to testing the effects of financial liberalization has focused on the effect of interest rates on savings. The basic idea is that financial liberalization should lead to higher real interest rates, stimulating in this way national savings, which provide the major part of resources for investment. In the context of endogenous growth models (Romer (1986) and Lucas (1988)), the increase in the savings rate permanently affects the real growth rate. Apart from the

¹³ For most of the literature, as we have already discussed, it is possible to argue that causation runs also in the opposite direction.

obvious observation that the effect of the real rate of interest on savings is theoretically ambiguous, the econometric results obtained on aggregate data suggest that there is not a robust and strong correlation between interest rates and saving behavior. Fry ((1978),(1980),(1988)) finds a significant positive effect of the interest rate in a traditional aggregate saving equation, using panel data for Asian Countries. However, the statistical significance of the interest rate coefficient is not robust to changes in the time period used, and/or the countries included in the regression (Giovannini (1983), (1985)). The latter paper by Giovannini estimates the Euler equation for consumption for a consumer that faces a perfect capital market. Rossi (1988) estimates the appropriate Euler equation for liquidity-constrained consumers on aggregate panel data for a large set of developing countries from all regions of the world. With the exception of countries in Sub-Saharan Africa and in South America, the effect of the rate of interest on consumption is not only negative, but also significant.

Whatever the significance level, the magnitude of the effect of interest rate changes on saving is rather small for most countries (see also Fry (1988)). The general conclusion is that there is no convincing empirical support for the proposition that a higher real interest rate leads to substantial increases in domestic savings in less developed countries. Jappelli and Pagano (1992) have suggested that lack of financial development that results in consumers being liquidity constrained, may lead to higher saving rates. When the maximum loan to value ratio for the purchase of a house is used as an inverse proxy of liquidity constraints for households, estimation of an aggregate saving equation on a panel of (mainly) OECD countries suggests that indeed this is the case. They also show that in the

context of an endogenous growth model, liquidity constraints may enhance growth. Econometric results from standard growth regressions on a sample of thirty countries provide some empirical support for this contention, since the maximum loan to value ratio is significantly and negatively associated with growth. Note, however, that the regressions do not include other proxies for financial development that capture the effect of different degrees of sophistication of the intermediation system on investment, and hence no overall conclusion can be reached about the overall effect of financial development. Moreover, liquidity constraints may also have negative effects on growth, since individuals' inability to borrow against future income reduces the incentives for human capital accumulation.¹⁴

Returning to the effect of the interest rate on saving, another strand of the literature looks for non-linear effects. Tests of changes in interest rates within the narrow band of slightly positive or slightly negative rates that have held for most industrial economies may be precisely the range within which interest rate variation has no impact. Yet it remains possible that increases in rates from substantially negative levels to the neighborhood of zero may well induce greater saving (not just the proportion of saving intermediated by the financial sector), as this change amounts to the elimination of a heavy tax on saving, especially on financial saving. Once inflation reaches a certain point, the emphasis is devoted to spending funds as fast as possible, and it is in rapidly inflating economies where substantially negative real interest rates are found. Reynoso (1989) presents some evidence (also hinted at in Dornbusch and Reynoso (1989)) suggesting that the relationship between

¹⁴ See De Gregorio (1992) for a theoretical and empirical contribution in this area.

saving and real interest rates may be a parabola, with saving increasing most significantly when rates rise from sharply negative to just below zero, then leveling off, and finally declining as real rates become highly positive. Since saving and interest rates are both endogenous variables, it may be important to examine the specific causes of higher rates. Lastly, one approach to test for non-interest components of liberalization is to investigate empirically the effect on saving of greater accessibility to depository institution in rural areas. There is some evidence that greater proximity may lead to an increase in savings from a limited sample of 5 countries over time (Fry, 1988). However it is unclear if this result holds up for a broader sample.¹⁵

Instead of looking at the effect of financial liberalization on savings, another set of papers directly analyzes its effect on investment. The basic idea here is that financial liberalization will increase credit availability (because of the hypothesized, although questionable, positive effect of higher real deposit rates on savings), and relax the severity of credit constraints faced by firms. All of the studies use aggregate data and estimate ad hoc flexible accelerator type of investment equations containing proxies for the availability of credit, typically the stock of real domestic credit. The latter variable tends to be significantly and positively related to investment. However, the econometric techniques used in estimating these equations are often not appropriate, either because endogeneity problems of the regressors are disregarded, or because country specific effects are not sufficiently accounted for, when using pooled time series cross section data. Moreover, one

¹⁵ One reservation about Fry's results is that he regressed savings rates which are generally trending on several stationary variables and branching per capita over a 25-year period. However, since branching in the countries covered likely increased more or less steadily over time, any explanatory power may have been picking up a time trend.

may want to allow the effect of variables capturing the stringency of financial constraints to vary in the pre- and post-liberalization periods. With aggregate data, however, there are not many degrees of freedom to estimate separate coefficients, given that the process of financial liberalization in most countries is a rather recent phenomenon.

A last strand of the literature attempts to investigate the impact of financial reform by looking at economy-wide measures of efficiency. The most sensible way of rationalizing the work in this area is to think in terms of a production technology with a fixed capital/output ratio under the assumption that the supply of labor is infinitely elastic (as in the stripped down version of the Harrod-Domar model). The efficiency of investment is then measured by the incremental output capital ratio, IOCR for short, that is meant to capture the technical (or organizational) ability to transform the capital input into output. The empirical work in this area is vast. Just to mention one of the more recent contributions, Gelb (1989) finds evidence from a cross-section of 34 countries over the 1965-85 period for which reliable interest rate data were available that increased interest rates are associated with greater efficiency, as measured by the IOCR, and with higher growth through this channel. The channel he finds runs from higher real rates to a greater share of savings intermediate by the formal financial sector to increased efficiency, by his measure. And for the countries investigated in this study there are some signs of an upturn of the IOCR following the onset of financial reforms.¹⁶ However, these ratios in practice are not straightforward in their

¹⁶ This ratio rises in 5 of the 7 countries examined in Chapter 6 of Caprio, et al., eds., (1994), and indeed in Malaysia, one of the two cases in which the ratio clearly declines, the comparison is biased, as the base period dates from before the generalized decline in productivity at the time of the first oil shock. Since the mid-80s (1984-5), when Malaysia was adjusting to the decline of real

measurement, being sensitive to the method by which the deflator for capital goods is estimated. Moreover, short-term comparisons of the IOCR are extremely sensitive to business cycle fluctuations, so it is premature to place much emphasis on this upturn.

King and Levine (1993a) also find cross section evidence of a relationship between different indicators of financial development and efficiency, using a measure similar to the IOCR. Briefly, they find both that efficiency gains are associated with a higher ratio of liquid liabilities (broad money) to GDP, and also with increases in the proportion of credit intermediated by commercial banks instead of central banks, in systems relying heavily on directed credit. In other words, freeing up the financial system -- letting banks have control over their resources and lend them to the private sector -- appears to contribute to gains in this measure of efficiency.

A serious reservation about "ICOR-based" estimates of efficiency relates to the simple underlying Harrod-Domar view of technology. The reciprocal (ICOR) can be interpreted generally as a proxy for the (marginal) capital intensity of production. Any formal investment model with standard neoclassical technology with flexible production coefficients implies that the capital intensity of production will decrease (and with it the ICOR) if the real interest rate increases, everything else equal.¹⁷ A lower ICOR is therefore not informative about "efficiency", since it could be the result of technical progress, better utilization of capital, or changes in

commodity prices, the incremental output-investment ratio has increased by 34 percentage points. Indonesia, a heavy oil- and non-oil commodity exporter, saw a gain of 14 percentage points from the same period. All of the ratios reported here use data for nominal GDP and nominal gross investment, or, which is the same, deflate numerator and denominator by the same GDP deflator.

¹⁷ Even if the technology were putty-clay we would expect that the capital output ratio on the last vintage decreases if new machines become more expensive relative to labor.

factor proportions. Moreover, the links between such a change in factor proportion and the "efficiency" of investment is unclear, if efficiency is taken to mean "profitability" of the investment project, as it is sometimes the case in this literature. Perhaps a way to rescue the relevance of the empirical work described above is to argue that in countries with an abundance of labor, it is reasonable to assume that the use of more labor intensive techniques is a good thing. Insofar as financial liberalization removes a price distortion that favors highly capital intensive projects, it may therefore have beneficial effects.

Another approach that has been advocated by some economists to assess the effect of financial liberalization on the efficiency with which resources are allocated is to measure whether the cost of capital becomes more nearly equal across firm and industries after liberalization. The assumption is that the cost of credit is a good proxy for the unobserved marginal productivity of capital. Cho (1988) shows that the variance across industries of the average cost of credit in Korea is reduced after liberalization and concludes that this is an indication of an improved locative efficiency. Unfortunately a serious problem arises from differences between the shadow value of capital and the interest rate paid by borrowers who get credit. Suppose a government decreed that all loans must be made at a 1% real interest rate. We would find that in that economy all borrowers paid the same interest rate, however there would be vast differences in the availability of capital. There would be great reliance on internally generated funds, and there would likely be great differences in the marginal product of capital across firms. Even if all firms have an equal cost of funds and equal access to those funds, that cost may be so high or the access so limited that firms rely mainly on cash flow as a source of investment

funds. Again in that case there could be a great disparity in the productivity of investment across firms. In conclusion, it is not possible to infer much about allocative efficiency from changes in the dispersion of the observed averaged cost of credit.

3. NEW EMPIRICAL EVIDENCE FROM FIRM PANEL DATA

In this section we will discuss new empirical evidence on the effects of financial liberalization obtained using firm by firm panel data for developing countries. The use of panel data for individual firms presents a set of potential advantages. First, it allows researchers to investigate the effects of financial liberalization on the sources and uses of funds. It is in fact likely that firms were treated differentially in a regime of financial repression, but it is also likely that the effects of liberalization differ across firms according to their size, age, market orientation, etc.. This is so because, as explained above, the alternative to a financially repressed system is not a perfect capital market, but a market for funds characterized by informational asymmetries and less than complete contract enforceability, giving rise to agency problems, whose severity varies for different types of firms.

Second, the availability both of the time series and the cross section dimension for a large number of firms provides us with the possibility of identifying more precisely the effects of liberalization. One should remember that financial reform is not an act, but a process, so a conclusive answer concerning its effects will require more years of observation than are available now. It takes time

for institutions to adapt and for practices to change. However, the availability of panel data for countries that have liberalized during the eighties, permits us to draw some tentative conclusions.

Firm level panel data can be used to compare the efficiency of the allocation of credit before and after liberalization. There are several approaches one can take to measure this allocative efficiency. A production function can be estimated with a firm specific, time invariant component that measures the distance of each firm from the production possibility frontier. This has been defined in the literature as "technical efficiency."¹⁸ Technical efficiency (inefficiency) captures the degree of X inefficiencies and/or the access to the best practice technology. We can then estimate whether the more efficient firms according to this component get a greater or smaller share of investment funds after liberalization.

Using a panel of 420 Ecuadorian firms in the manufacturing sector, Jaramillo, Schiantarelli and Weiss (1992a) provide evidence that, *ceteris paribus*, there has been an increase in the flow of credit accruing to technically more efficient firms, after liberalization, controlling for other firms' characteristics. This result is robust to different specifications of the production function and to different estimation methods.¹⁹ An advantage to using this definition of technical efficiency to explain the allocation of capital is that it is less likely to be open to objections concerning endogeneity and reverse causation. For instance, if one uses the rate of profits from operations as an explanatory variable to explain the allocation of credit, a significant association between debt allocation and efficiency can be found simply

¹⁸ See the seminal contribution by Aigner, Lovell and Schmidt (1977), and the one by Schmidt and Sickles (1984) on the estimation stochastic production frontiers, when panel data are available.

¹⁹ Different methods employed included least squares dummy variables, GLS, and GMM estimators.

because firms that had access to external funds could invest in better technology and become more efficient and profitable. Note that the econometric results for Ecuador also suggest that efficiency is directly correlated with size and age. In particular, there is a shift of resources from smaller firms to larger firms, which are both more efficient and more profitable after liberalization. The econometric analysis is consistent with the simple observation that the degree of leverage decreases for all firms after financial liberalization, but there is evidence that the decrease is more substantial for small firms. It is also consistent with the fact that the share of new debt, relative to value added, decreases for small firms after liberalization. This shift is not surprising, if one considers carefully the initial conditions. In Ecuador there was a subsidized credit program for small firms that was basically eliminated after liberalization. More generally, it is quite possible that in a world of asymmetric information, small firms may find it hard to obtain credit from financial intermediaries because they are riskier and have not yet accumulated "reputation capital."

Indonesia, another country that went through a process of financial liberalization, reveals both differences and similarities (see Harris, Schiantarelli and Siregar (1994) and Siregar (1992)). Econometric estimation of the determinants of changes in the allocation of new credit in Indonesia on a panel of 524 establishments in manufacturing confirms the results obtained for Ecuador of a positive and significant association between the latter variable and measures of firms' technical efficiency based on production function estimates (See Siregar (1992)).²⁰ Also for Indonesia there is evidence therefore that the process of

²⁰ As for Ecuador, the efficiency measure is positively related to size.

financial liberalization has helped to direct resources to more efficient firms. However, it appears that the degree of leverage increased for small firms after liberalization, contrary to what happens in Ecuador. Leverage also increased for large firms and decreased for medium-size firms. Looking at the distribution of debt pre- and post-liberalization, it appears that both small and large firms increased their share of new domestic debt relative to value added, while medium firms experienced a decrease. The data also suggest that in the post-liberalization period, larger firms are successful in obtaining foreign credit.

The empirical evidence described so far in this section has concentrated on the issue of the efficient allocation of resources. The availability of panel data also allows us to investigate whether financial liberalization has succeeded in relaxing financial constraints faced by firms. Jaramillo, Schiantarelli, and Weiss (1992b) develop a model in which they allow both for the interest rate paid by firms to be an increasing function of the degree of leverage, and the existence of a ceiling on the maximum degree of leverage that lenders are willing to accept. Estimation of the appropriate Euler equation for capital on the panel of Ecuadorian firms suggests that both forms of capital market imperfections affect small firms, although not larger ones. If one believes that banks are more efficient in screening and monitoring borrowers than the curb market, one may expect a decrease of the premium for external finance after liberalization. The shift from a curb market to one dominated by efficient banks would lead to an outward shift of the supply curve for funds and to a lower premium for external finance, for a given level of borrowing and collateralizable wealth.

Ultimately, however, it is an empirical question whether this hypothesis is

correct. Moreover, swings in borrower net worth could dominate the results of a change in the form of financial intermediation on the premium paid by a firm at each level of borrowing. It is also an empirical question whether financial liberalization decreases the degree of rationing. The econometric results for Ecuador suggest that there was not a significant decrease in the premium for external finance paid by small firms after liberalization at each level of the debt to capital ratio. Similarly, there was not a relaxation of the maximum degree of leverage allowed. These results should be interpreted with caution, because of the short nature of the panel, and because of the macroeconomic conditions in Ecuador (the 1987 earthquake shock and the concomitant episode of fiscal instability led to high inflation and to a reduction in the supply of credit to the private sector). However, they are consistent with the results obtained above on the allocation of credit, that suggest that small Ecuadorian firms were not the gainers in the process of financial liberalization.

Estimation of an ad hoc investment equation for Indonesian firms (Harris, Schiantarelli, Siregar (1994)), confirms the basic message that had been obtained for the allocation of credit flows. When investment is regressed on output growth, cash flow, and the degree of leverage, investment by small firms is more sensitive to cash flow than for larger firms. If cash flow is taken as an indicator of differential access to outside funding, and of the necessity to use internal funds, the results imply that small firms are more financially constrained. Moreover, investment for small firms is negatively related to the degree of leverage, as one would expect if the degree of leverage is a proxy for the premium to be paid on outside finance. After liberalization, the coefficient for cash flow for small firms

decreases, and the one for the degree of leverage becomes closer to zero. This suggests that small firms are less financially constrained after liberalization, and enjoy a better access to outside funding. The use of cash flow as an indicator only of financial constraints is open to criticism. Cash flow is, in fact, also a proxy for future profitability. When future profits are added as an additional regressor, cash flow remains significant for small firms, although with a smaller coefficient that now does not change significantly after liberalization. The interesting fact is that future profits matter much more for larger firms than for smaller firms, particularly before liberalization. Post liberalization, the response to future profits becomes more similar across firms. Also in this case, the coefficient on leverage decreases after liberalization. All this is consistent with a scenario in which smaller firms can respond better to profit prospects after financial reform, perhaps because they have better access to outside funding.

The effect of financial factors on investment behavior was also analyzed for the case of Korea; although the data did not permit an investigation of efficiency, an examination of the impact of reform on financing decisions was possible. A Q-model of investment was estimated for about 180 firms in the manufacturing industries, over the period 1984-88 (Atiyas, (1992)). Lagged investment, degree of leverage, output, Q-ratio and a stock measure of liquidity were used as independent variables.²¹ Results show that over the whole sample period, and for the entire sample of firms, the effect of debt on investment is not significant, whereas liquidity does enter significantly. Moreover, the estimated coefficients do not exhibit any significant change between the earlier and later years of the reform

²¹ The data did not allow the calculation of an accurate measure of cash flow. Hence, a stock measure of liquidity was used instead to capture the effect of the availability of internal funds.

period.²² When the sample is split according to size, however, a different picture emerges. Investment behavior of small firms are affected by both liquidity constraints and debt; however, the impact of both are reduced in late 1980s. Hence small firms' access to external finance seems to have improved after liberalization. For large firms, however, while the impact of financial variables was insignificant in the early 1980s, the effect of both liquidity and indebtedness become significant in the late 1980s, suggesting that financial reform actually decreased the access of this group to external finance. At least until the late 1980s, then, the main effect of financial reform was to change cross-sectional patterns of access to finance.

These results are not surprising, given the change in targeted credit policy during the reform period. Even though most preferential interest rates applied to directed credit programs were abolished, and the volume and scope of directed credit was reduced, directed credit nevertheless was not eliminated. More importantly, the target of directed credit was switched from large companies in heavy and chemical industries to small and medium firms. Therefore, the empirical results at least partially seem to reflect this reorientation of credit policy.

4. CONCLUSIONS

The empirical results on the effects of financial liberalization obtained from firms's panel data for developing countries are a very useful addition to the macro evidence available. On the one hand, micro evidence can address problems that cannot be

²² Financial reform in Korea is characterized by its gradualism; hence no single year in the 1980s can be identified as the one in which financial reform took place. Instead, it was assumed that the impact of financial reform was revealed in the last two years off the sample period.

usefully tackled using more aggregate data, such as the differential effects of financial liberalization on different types of firms. On the other hand, results from macro studies are sometimes inconclusive, and often subject to serious problems of interpretation, or at least courageous assumptions (like the lack of substitutability among factors of production in studies using the IOCR as a measure of efficiency). In general the evidence that financial reform has positive efficiency effects appears supported from the micro studies reviewed here. Firm level data show clear evidence of credit flowing to more efficient firms following the adoption of financial reforms in Ecuador and Indonesia. Interestingly, the financing constraint was relaxed for small firms in Korea and Indonesia. While in the former case this likely was not a result of liberalization but merely a different credit rule favoring small firms, in Indonesia it appears to be the result of less government interference with credit allocation and pricing.

An important difference that may explain the different effect of financial liberalization on financial constraints faced by small firms in Indonesia and Ecuador concerns the pace of credit expansion. Credit in Indonesia has been growing at a rapid rate since reforms began (averaging close to 25% a year between 1983 and 1991 in real terms), in sharp contrast to the decline in real credit in Ecuador (approximately 7% a year). So one could argue that small firms in Indonesia faced less tight financial conditions also because of the easier credit policy. This may explain why the evidence from investment equations suggests that there has been a relaxation of financial constraints for small firms in Indonesia, but not in Ecuador. However, since Indonesia authorities achieved and maintained single-digit inflation rates over the second half of the 1980s, it is not clear that from a macro standpoint

credit growth was excessive.

Of course these conclusions must be viewed as preliminary: ideally a longer time span of post-reform data and data from more countries would be desirable. However, the initial micro results discussed here should give some encouragement to those who think that finance matters. With the passage of time, more and better data sets should help us see which types of pre-reform controls were the least efficient, and which types of liberalization paid the largest returns.

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