

**DOES FINANCIAL LIBERALIZATION IMPROVE THE ALLOCATION  
OF INVESTMENT?**

**Micro Evidence from Developing Countries<sup>1</sup>**

by

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**Abstract**

Has financial liberalization improved the efficiency with which investment funds are allocated to competing uses? In this paper, we address this question, using firm level panel data from twelve developing countries. The basic idea is to investigate whether financial liberalization has increased the share of investment going to firms with a higher marginal return to capital. To this end we develop a summary index of the efficiency of allocation of investment. We then examine the relationship between this index and various measures of financial liberalization. The results suggest that in the majority of cases financial reform has lead to an increase in the efficiency with which investment funds are allocated.

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## I. INTRODUCTION

Since the mid 80's several developing countries have liberalized their financial systems. This liberalization has been characterized by greater scope granted to market forces in the determination of interest rates and in the allocation of credit. One crucial question that needs to be addressed is whether the financial reforms that have been implemented have lead to an improvement in the allocation of resources.

It is curious that while governments were moving away from state control toward a free market orientation, economists were focusing their research effort on the negative consequences caused by informational imperfections in a market system. Financial liberalization in general involves replacing one deeply flawed system characterized by heavy government intervention with another with different flaws. Whether these changes will improve the allocation of savings and investment is fundamentally an empirical question.

Cross-sectional country level growth regressions find evidence of positive effects of various measures of financial development on growth.<sup>2</sup> Note that financial liberalization tends to be accompanied by an improvement in various measures of financial depth. At the same time, there is no evidence that financial reform increases private savings. Actually in some countries the effect may even be significantly negative.<sup>3</sup> All this suggests that, therefore, if there is a beneficial effect of financial reform on growth, this is not likely

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<sup>2</sup> Most of the studies use cross-country aggregate data. See, for instance, King and Levine (1993), Levine (1997), Levine (1998), Levine and Zervos (1998) and Beck et al. (1999). For a different approach see Rajan and Zingales (1998) who rely on industry level data to show that industries with the greater need of external finance, grow faster in more financially developed countries. Demirguc-Kunt and Maksimovic (1998), instead, show that firms grow at a faster rate, relative to a benchmark growth rate that would hold in the absence of external finance, in countries with a more developed financial system.

to go through its effect on the quantity of saving. Moreover, cross-country growth regressions also reveal that measures of financial development do not have a significant impact on the quantity of investment, but they positively and significantly affect measures of total factor productivity growth.<sup>4</sup> So, if financial liberalization has a positive effect on growth, the most important channel is likely to be to be the effect of financial reform on the efficiency with which investment is allocated across firms and across sectors.<sup>5</sup>

There is very little micro evidence on the effect of financial liberalization on the efficiency of resource allocation.<sup>6</sup> Using a panel of Ecuadorian firms during the 80's, Jaramillo, Schiantarelli and Weiss (1992) find that there was an increase in the flow of credit accruing to technically more efficient firms after liberalization, controlling for other firms' characteristics. Technical efficiency is calculated using panel data estimates of a Cobb Douglas production function. Similar results are also obtained by Siregar (1992) for Indonesian establishments in the 80's.<sup>7</sup> Other papers based on micro data address the related, but distinct question of whether financial constraints have been relaxed following financial liberalization (or financial development) and find that in most, but not all cases, smaller firms have improved their access to external resources following financial reform.<sup>8</sup>

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<sup>3</sup> See Bandiera et al. (1999).

<sup>4</sup> See Beck et al. (1999)

<sup>5</sup> Financial liberalization may have also contributed to faster technological progress. See King and Levine (1993)

<sup>6</sup> See Schiantarelli et al. (1994) for a more detailed review. See also Atiayas et al. (1994) and Fry (1995) for a comprehensive review of financial liberalization.

<sup>7</sup> Schiantarelli and Weiss, with Siregar, in an unpublished paper using a similar methodology to the one proposed in this paper, find a negative effect of financial liberalization on the efficiency of the allocation of investment in Indonesia.

<sup>8</sup> This is the case for Indonesia in the 80's (see Harris et al. (1994)), but not for Ecuador (see Jaramillo et al. (1994)). See also Gelos and Werner (1999) for Mexico and Gallego and Loayza (2000) for Chile. See also Love (2000) and Leaven (2000) for micro evidence for several countries. The former focuses on financial development, the latter on financial reform

However, it is not obvious, without further considerations, what effect a relaxation of financial constraints for small firms has on the efficiency of resource allocation.

Wurgler (2000), using industry level data provides evidence that the rate of growth in investment is more closely associated with contemporaneous growth in value added, in countries with more developed financial systems. He measures financial development by the average size of credit and equity markets relative to GDP. More specifically, countries which have a more developed financial system, both increase investment more in their growing industries and decrease investment more in their declining industries. The emphasis of that paper is on cross-country variation in time invariant measures of financial development and not on the changes resulting from the process of financial reform. Finally, other papers (see Cho (1988) for Korea)) have focused on the change in the variance of expected marginal returns to capital across industries, as measured by an industry specific user cost of capital, before and after liberalization. A decrease in the variance is taken as a sign of increased efficiency as it is taken to suggest that liberalization better allows the flows of capital to equate returns.

Although these approaches provide useful insights on particular effects of financial markets or financial reform in different countries, they still leave us without a comprehensive answer on whether financial liberalization has resulted in a more efficient allocation of investment funds in developing countries.

In this paper, we investigate whether financial liberalization has increased the share of investment going to firms with a higher marginal return to capital. To this end we develop a summary index of the efficiency of allocation of investment. The index compares different measures of the marginal returns of investment summed across firms in

each year with the hypothetical returns in a benchmark economy where investment funds had been allocated to firms in proportion to their share of capital in the economy. To implement this approach, we use firm level panel data from twelve developing countries: Argentina, Brazil, Chile, India, Indonesia, Korea, Malaysia, Mexico, Pakistan, Philippines, Taiwan, and Thailand. We discuss at length the simplifying assumptions needed to construct the index, as well as its potential drawbacks.

We then relate this index with different measures of financial liberalization based on a careful reconstruction of the timing of liberalization measures along several dimensions of financial development (see Leaven (2000)). The methods used range from ocular econometrics (eyeballing the figures) to panel estimation, using the country-year specific measures of our efficiency index. We also control for other potential determinants of changes in the efficiency of resource allocation, such as trade liberalization.

The results suggest that financial liberalization in the majority of cases leads to an improvement in resource allocation, although there are interesting exceptions. Panel estimation suggests that on average there is a significant positive association between measures of liberalization and our index, even controlling for other effects, such as trade liberalization.

The structure of the paper is as follows. In section II, we discuss the construction of the index of efficiency we propose. In Section III we describe the panel data set we use, we calculate the index for twelve developing countries, and we provide descriptive and econometric evidence on the relationship between the index and various measures of financial liberalization. Section IV concludes the paper.

## **II. MEASURING THE EFFICIENCY IN THE ALLOCATION OF INVESTMENT**

In assessing the effect of financial liberalization we want to see whether it succeeds in directing resources towards those uses with the higher marginal returns. This is the concept of efficiency we focus on. In order to develop a synthetic measure of efficiency in the allocation of investment, we first need to measure the marginal return to investment. Our index approach measures marginal returns either by the sales to capital ratio or by the ratio of operating profits to capital. The former is appropriate if the production function is Cobb-Douglas in capital, labor and materials. In this case the marginal return to capital is proportional to the sales to capital ratio. The constant of proportionality equals the product between one plus the markup of prices over marginal costs times the inverse of the elasticity of output with respect to capital.<sup>9</sup> The operating profit-based measure is an appropriate approximation under a generic constant return to scale production function and perfect competition in the output market. We then estimate the total return on investment for each firm by multiplying the firm's investment in a particular year by one of our measures of the firm's marginal return to investment. We sum the total return to investment for each firm across all firms to get an estimate of the total return to investment for the economy in a particular year.

To measure the efficiency of the allocation of investment in a year, each of our estimates of the total return on investment must be compared to a benchmark. The benchmark we use is an estimate of total return if investment funds had been allocated to

firms in proportion to their share of capital in the economy. In every case we use the same estimates of the marginal product of capital for each firm to estimate actual returns, and returns for the benchmark allocation. We divide our measure of total return actually achieved, by this benchmark to obtain a measure of the efficiency with which investment funds were allocated in each year.

This approach generates two different measures of the efficiency of the allocation of investment funds: one where sales per unit of capital is used as a measure of the marginal product of investment, the other where operating profits per unit of capital is used as the appropriate measure. We obtained very similar results using both measures. Let us assume that investment becomes productive with one period delay. Moreover, assume that we use the capital stock at the beginning of year  $t$ ,  $K_t$ , as a fraction of total capital at the beginning of year  $t$ , to measure the proportion of investment funds that the firm would receive if investment funds were assigned in the same proportion as in the past. The two versions of our index for year  $t$  are:

$$EI_t^S = \frac{\sum_i \frac{S_{i,t+1}}{K_{i,t+1}} I_{i,t}}{\sum_i \frac{S_{i,t+1}}{K_{i,t+1}} \cdot \frac{K_{i,t}}{K_t^T} \cdot I_t^T} \quad (1)$$

or:

$$EI_t^P = \frac{\sum_i \frac{P_{i,t+1}}{K_{i,t+1}} I_{i,t}}{\sum_i \frac{P_{i,t+1}}{K_{i,t+1}} \cdot \frac{K_{i,t}}{K_t^T} \cdot I_t^T} \quad (2)$$

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<sup>9</sup> In the presence of imperfect competition, the sales based measure of marginal returns allows for variations in the markup across years, but not across firms.

where  $S_{it}$  denotes firm  $i$  sales at time  $t$ ,  $p_{it}$  operating profits and  $I_{it}$  investment.  $I_t^T$  and  $K_t^T$  represent, instead, aggregate investment and aggregate capital at time  $t$ , respectively. Note that each unit of investment in year  $t$  increases the capital stock, and hence generates a return, in year  $t+1$ .

There are two reasons that make the sales based index preferable to the profit-based index. First, it allows for departures from perfect competition. Second, sales are probably measured more accurately in the balance sheets than operating profits. Calculation of the latter requires a valuation of cost of goods sold, and hence of changes in inventories of raw materials, which is a tricky exercise, particularly in inflationary environments.

Both measures have common potential drawbacks. A first drawback is that we make the implicit assumption that the same marginal (and average) return to capital applies to all units of investment. A second drawback is that we have ignored adjustment costs of investment. Given our procedure for computing the efficiency of the allocation of investment funds, allocative efficiency would be greatest if the firm with the highest ratio of operating profits or value added to capital were to get all the investment funds available for a given year. However, the discrepancy due to omitting adjustment costs may not be large. For instance, if adjustment costs are internal and additive, and take the form  $(b/2)(I/K)^2 K$ , the omitted term is  $(b/2)(I/K)^2$ , which should be relatively small for a large range of realistic values of the investment rate.

A third drawback is the implicit assumption that market prices reflect the social value of outputs and inputs. Presumably, there were social, political or even economic



reasons for why governments favored particular industries or regions prior to liberalization. That bias in the allocation of investment funds *could* have been (2<sup>nd</sup> best) socially efficient given other distortions in the economy. For instance, if favored industries were producing exports, and if the currency was overvalued, then the domestic market price of their outputs, would understate the true value of their products (correct valuations would use the shadow price of foreign currency). Using the “wrong” exchange rate would lead the private return on investment in the export sector to be less than the social return. Therefore favoring export industries whose private returns are relatively low could actually increase the social productivity of investment. Similarly, government policies that encouraged investment with positive spillovers and discouraged investment with negative spillovers would enhance social efficiency. Finally, governments may want to favor particular regions in order to improve inter-regional income distribution. Programs of directed credit might be more efficient means of aiding those regions than would other programs intended to reduce inter-regional income disparities such as tax holidays for investments in economically depressed regions. Those tax exemptions encourage vertically integrated firms to use transfer prices to move profits into the subsidized region. In general programs of directed credit may be a second best solution to problems for which the first best solution is not politically feasible.

A fourth problem involves interpreting differences in the allocation of capital. In equilibrium, the marginal product of capital of a perfectly efficient economy would be the same in all firms. Consequently random allocations of capital would do as well as any other allocation. No banking system could do better. This would be a serious problem for us if we were looking at the results of a financial liberalization that had been in effect for

many years. However, we are observing the allocation of capital for the years immediately following the implementation of financial liberalization. For financial liberalization to eventually result in an equalization of the returns to capital across firms, it must have redirected investment funds toward the firms where the marginal product of capital was highest. This reallocation of investment is precisely what we are seeking to measure. In addition, even a cursory look at the data suggests that there are great differences in the marginal revenue product of capital across firms.

There is also a set of problems introduced by measurement error of the capital stock. It is very difficult to get good measures of the market value of capital. Firms reporting large levels of capital are likely to have less capital than they actually report, and firms reporting low levels of capital are likely to have more capital. These measurement errors bias our measures of the return to capital in favor of firms that report low levels of capital and against firms reporting high levels of capital. However, it is difficult to know whether financial liberalization directs the flow of investment funds in favor or against firms with positive or negative reporting errors. As a result, it is not possible to determine *a priori* the sign of the bias this causes in the measurement of efficiency.

A final problem with using operating profits as a measure of the return to capital is that operating profits are correlated with cash flow. During periods of financial repression the correlation between cash flow and investment may be higher than normal. Thus we would expect the operating profit measure of the efficiency of the allocation of investment might be biased in favor of periods of financial repression. In fact, the previous literature in this field tends to find that financing constraints are relaxed for small establishments after financial liberalization. For medium and large establishments there is no significant

change in the severity of constraints. However, if in spite of all this, we find that our profit based measure of efficiency increases after financial reform, this is a strong indication that there has been an improvement in the allocation of resources.

### **III. EMPIRICAL RESULTS**

Has financial reform lead to an improvement in the allocation of resources as measured by our index? In order to answer this question we need firm level panel data to construct the index, and we need to be more precise in defining the evolution of financial reform. After providing some background on the data used, we will present a set of empirical results that provide some answers to our central question.

#### **III.1. The Data**

Our empirical investigation is based on firm level panel data for 12 developing countries that have introduced various measures of financial reform over the last several years: Argentina, Brazil, India, Indonesia, Korea, Malaysia, Mexico, Pakistan, Philippines, Taiwan, and Thailand. The source of the firm level information is the Worldscope database, which provides balance sheet information on publicly traded firms. The advantage of this data set is the cross-country comparability of the accounting information. The obvious drawback is the absence of information on non-publicly traded, which are, on average, smaller firms. Another limitation is that prior to the 90's, very little data is available for the subset of countries of interest to us.<sup>10</sup>

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<sup>10</sup> Although for some countries data are available also for the second half of the 80's, the number of firms included is very small.

We use an unbalanced panel, but we require at least three consecutive years of observation on each firm, and a minimum of fifteen observations (firms) for each country-year. Moreover we have deleted outliers following the criteria summarized in the Data Appendix. Descriptive statistics for the main variables of interest are presented in Table A1, while the total number of firms available for each country is reported in Table A2.

We will rely on different measures of liberalization. They are all based on analysis of the timing of the introduction of various aspects of financial reform as discussed in Leaven (2000). Leaven provides a dating of interest rate deregulation, reduction of entry barriers, reduction of reserve requirements, reduction of credit controls, privatization of state banks, and strengthening of prudential regulation. These measures focus on the banking sectors and correspond to the classification used also in Caprio et al. (2000) for a smaller subset of countries.<sup>11</sup> A first measure of liberalization is obtained by attributing a dummy equal to one (zero) to the years characterized by the more (less) liberalized regime. A first continuous measure of liberalization is obtained by summing the six dummies (so that the index varies between zero and six). We will denote this measure by  $fli_t$ . Another measure is meant to distinguish in a discrete fashion country-years characterized by a more or less fully liberalized regime, versus one still characterized by many restrictions. As in Leaven (2000) we will divide observations depending upon whether the overall index is less than five, versus equal to five or six. This yields a partition of the years that is similar to the one proposed by Williamson and Mahar (1998). We will denote this dummy by *Libdummy1*.

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<sup>11</sup> Caprio et al. (2000) also include information on securities market developments and international financial liberalization.

In addition, we construct a dummy variable, denoted by *Libdummy2* that equals one the year following the removal of the main restrictions on interest rates and credit allocation (the latter in the form of directed credit or credit ceilings). This final measure enables us to focus on the aspect of financial liberalization that are more likely to affect the allocation of investment funds.

Finally note that all these measures of liberalization focus on financial intermediaries. All the countries in our sample have also introduced changes designed to promote the development of stock markets. However, stock market liberalization takes place in most countries at the end of the 80's and in the remaining countries in the very early nineties, while our firm level data set is basically limited to the nineties. This is one of the reasons we have decided to focus on the liberalization measures regarding financial intermediaries. Further investigation of the role of stock market development is left for future research

### **III.2. Descriptive evidence**

In this section we will present descriptive evidence on the effect of financial liberalization on the allocation of investment. We start by plotting in Figure 1 (a through m) our efficiency index for sales,  $EI_t^S$ , against the financial liberalization index,  $fli_t$ . The vertical line in the graphs represents the year in which both interest rate and credit controls were removed. This exercise in “ocular econometrics” reveals some very interesting patterns. First, for a subset of countries, Brazil, India, Pakistan and Thailand, there is a clear and positive association between  $EI_t^S$  and  $fli_t$ , suggesting that financial liberalization is associated with an improvement in the allocation of resources. In Chile  $fli_t$  has also a clear upward trend in the 90's. The only caveat here is that at the beginning of the 90's the

financial system is by a large extent already liberalized, so that the most informative experiment would be to see the behavior of the efficiency index over the 80's. It is interesting however that the value of the index in Chile, a country with one of the most liberalized financial systems, tends to be higher than for the other countries.

For another group of countries, there is also evidence of an improvement of the efficiency index following the introduction of liberalization measures. This is true for Argentina, Korea and Mexico. For instance, in Korea, the index is below one (indicating an efficiency in investment allocation actually worse than one based purely on size) in the initial years and increases above one with the introduction of liberalization measures. However, in all these cases, there are significant reversals in the improvement, around periods of financial and currency crisis: 1995 for Argentina, 1998 for Korea and 1994 and 1998 for Mexico. Finally, for a subset of countries, such as Indonesia, Malaysia, Philippines, the index shows no clear trend, while it is decreasing over time for Taiwan.

The efficiency index based on profits,  $EI_t^P$ , paints a picture largely similar to the one for  $EI_t^S$ . Brazil, Chile India, Pakistan and Thailand are the countries for which one observes the clearer improvements. However, now  $EI_t^P$  decreases over time for Argentina and there is a worsening of the allocation of resources around periods of financial/currency crises in Mexico and Korea. Again, no clear pattern emerges for Indonesia, Malaysia, and Philippines, while the index shows a decrease in the latter years for Taiwan.

The overall pattern described above is confirmed and made more precise by comparing the mean value of the index over sub-periods, defined as pre- and post-liberalization. The results are reported in Tables 1 (in part 1 for  $EI_t^S$  and in part 2 for

$EI_t^P$ ). In the first set of columns we use *Libdummy1*, to divide the 90's, i.e. the pre-liberalization (post-liberalization) period is the one for which the value of the overall index is less than five (equal to five or more). In the second set of columns, we use *Libdummy2*, so that the pre-liberalization period is the one up to and including the year in which both interest rate and credit controls are removed. Looking at the sales based index, using *Libdummy1*, there are large and positive increases in its mean value in the post-reform period in six countries (Argentina, Brazil, India, Pakistan, Thailand and even Korea). In three cases (Malaysia, Mexico and the Philippines) the means are virtually unchanged. In one case (Taiwan) one observes a decrease. When the interest rate and credit control dummy is used to partition the period, one observes an increase in the mean value of the efficiency index for Argentina, Brazil, India, Mexico and Pakistan, while there is basically no change for Korea. Note that for some countries, such as Chile, the difference in mean is not available, since the major changes in the financial deregulation process had already occurred by the beginning of the 90's. These results are strongly supportive of an improvement in the allocation of resources for the majority of countries, after financial reform. The results for the profit-based index confirm this overall pattern, but are not as strong as the ones based on sales. For instance, using *Libdummy2*, one observes an improvement in Brazil, India, Mexico and Pakistan, but the increase is smaller than before.

### **III.3. Econometric evidence**

We now provide more formal econometric evidence on the effect of financial liberalization on the efficiency of resource allocation by utilizing the entire panel of firm-year observations. More specifically we regress our efficiency index on different measures of liberalization, allowing for country specific constants. Results are reported in Table2. In

Part 1, column I, we regress  $EI_t^S$  on the Leaven (2000) index. The results are very supportive of the idea that financial liberalization leads to an improvement in resource allocation: The coefficient of the liberalization index is positive and significant at the 5% level. Moreover the quantitative effects are quite large: the coefficient estimate suggest that going from a financially repressed index ( $fli_t = 0$ ) to a fully liberalized system ( $fli_t = 6$ ) leads to an increase in  $EI_t^S$  of approximately 18%.<sup>12</sup> In column II and III, the explanatory variables are *Libdummy1* and *Libdummy2*, respectively. The coefficients on the liberalization dummies are positive and significant, at the 5% for *Libdummy1* and at the 1% level for *Libdummy2*. Again the effects are quantitatively significant. For instance the efficiency index increases by approximately 14%.

The results presented in Table 1 on country level changes in the mean value of the efficiency index between the pre and post liberalization period suggest that liberalization may have had a different effect across countries. For this reason we have experimented in allowing to coefficient on the various measures of financial liberalization to differ, according to country characteristics. For instance, one may think that the effect of financial reform may be more beneficial in countries with a well-developed legal system that affords a better protection to creditor rights. For this reason we have interacted our liberalization measures with several institutional variables, such as rule of law and creditor rights as defined in La Porta et al. (1998). Although the coefficients on the liberalization measures was somewhat larger in countries with more developed legal systems or better protection of creditor rights, the difference was not statistically significant.

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<sup>12</sup> If we include in the calculation of the liberalization index also a dummy for stock market liberalization, the results are virtually unchanged. The coefficient of the liberalization index goes from 0.032 to 0.030



One may legitimately wonder whether what we are capturing in these regressions is not only the effect of financial reform, but also the effect of other liberalization measures, such as trade liberalization. Actually the main steps in trade liberalization were undertaken before the period we use for estimation.<sup>13</sup> However, in order to address these concerns, in the last three columns of Table 2 we add to each specification a measure of the degree of trade barriers, measured by an index that captures the mean tariff and the dispersion of tariffs, and denoted by *Tradelib* (an increase in *Tradelib* denotes a more liberalized trade regime). The trade liberalization measure coefficient is positive, but never significant. Most importantly, from our point of view, the coefficient on financial liberalization remains positive and statistically and economically significant.

Table 2, Part 2 contains the results for the profit-based index,  $EI_t^P$ . The pattern we have already discussed repeats itself: using  $EI_t^P$  to measure the efficiency of resource allocation still leads to the conclusion that financial liberalization improves efficiency, but the effect is not as strong as the one observed using  $EI_t^S$ . In the basic specifications (see columns I, II, and III), the coefficients of the liberalization dummies are always positive, but somewhat smaller now, and significant only in two specifications, but only at the 10% level. The trade liberalization index now tends to be significant, and actually it leads to an increase in the significance and size of the coefficients for financial liberalization.  $fli_t$  is now significant at the 5% level, while *libdummy2* is significant at the 1% level<sup>14</sup>. Our

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and it remains significant.

<sup>13</sup> See Lora (1997) for a discussion on trade liberalization in Latin America.

<sup>14</sup> Regressions using the efficiency index based on profits, suggest that there is a significant impact of trade liberalization over investment efficiency.

sample covers mostly the mid and late nineties, hence there is little correlation between the trade and financial liberalization measures.

In assessing the effect of financial liberalization one may want to attribute more weights to those observations on the country-year efficiency index, when the latter is based on a larger number of firm-level observations, since in this case efficiency is measured more accurately. This could be achieved by weighting each country year observations of the variables included in the regression by the square root of the number of firm level observations available in each year in each country. However, this means attributing, *de facto*, greater weight to larger countries, which may be undesirable if the question to be addressed is whether liberalization works at the country level. Be as it may, in Table 3 we report the results for the weighted least square regressions for  $EI_t^S$ . Our conclusion is largely unchanged, with the variables capturing liberalization exerting a positive and significant effect on the value of the efficiency index.

In order to check the robustness of our results we have conducted four other experiments. First, we have included in the panel regression the real exchange rate (an increase denotes an appreciation). Movement in this variable captures, among other factors, the years of financial and currency crisis that have occurred in the 90's. Moreover, its inclusion controls for changes in markups that may occur unevenly in the tradable and non-tradable sectors in conjunction with exchange rates movements. Adding the real exchange rate as a regressor does not alter our basic results. For instance, in Table 4, in columns I, II, and III, we report the results for  $EI_t^S$ : the coefficient in all three measures of financial liberalization remain significant at the 5% level, while the real exchange rate variable is never significant. Second we have included as an additional regressor the

inflation rate as a different proxy for macroeconomic instability. During periods of macroeconomic instability it may be more difficult to identify where the good investment opportunities are and this may adversely affect the efficiency of allocation of investment funds.<sup>15</sup> The inflation rate, indeed, enters with a negative sign in the regression, but it is not significant at conventional levels. More importantly, for the purpose of this paper, *fli*, and *libdummy1* remain significant at the 5% level, and *libdummy2* at the 10% level (see Table 4, columns IV,V, and VI). Finally we include GDP growth in the equation to control for the effect of business cycles on the efficiency of resource allocation. It is not clear what the sign of the GDP growth coefficient should be. For instance, during recession credit risk increases and banks may become more careful in selecting the projects to be financed. At the same time uncertainty may be greater during recession, making it more difficult to identify good investment opportunities. Results are reported in columns VII, VIII and IX. The significance of the liberalization measures remains. The coefficient of the growth rate of GDP has a negative sign, but is not significant.

Finally, one may wonder whether the results obtained so far are robust to changes in the definition of the capital stock. In Table 5 we report the regression results for  $EI_t^S$ , for a definition of the capital stock, identical to the one used in Love (2000). In this case beginning of period capital is measured as end of period capital minus investment plus depreciation. As Love suggests, this measure may be a better measure, in those years in which firms undergo mergers or acquisitions. However, it may exacerbate measurement problems in years in which firms are allowed to revalue their capital stock in order to take

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<sup>15</sup> See Beaudry, Caglayan and Schiantarelli (2000) for an analysis of the effects of monetary uncertainty on the allocation of investment, using a different approach.

account of inflation. The coefficients on the various measures of financial liberalization become now somewhat smaller in the unweighted regressions, but somewhat larger in the weighted regression, compared with the corresponding results obtained using the previous definition of beginning of period capital.  $fli_t$  is always significant at the 1% level. *Libdummy1* is significant at the 10% and 1% levels and *Libdummy2* at the 10% and 5% in the unweighted and weighted regressions. The fundamental conclusions we have reached so far are, therefore, robust to changes in the definition of the beginning of period capital stock.

An interesting question one may ask is whether the changes in the efficiency index are due to a intra or inter-sectorial reallocation of investment, that is a reallocation of investment funds between firms in the same sector or in different sectors. Our data set includes publicly traded firms in agriculture, mineral industries, manufacturing, construction, transportation, communication and utilities, wholesale and retail trade. However, only for the manufacturing sector there are sufficient observations in the various countries to make the construction of the efficiency index meaningful. For the other sectors the coverage is quite spotty and makes comparisons across time or countries a very dubious exercise. As a result it is not empirically possible to give a full answer to the question posed at the beginning of this section. However, we can construct our efficiency index at least for manufacturing and we can investigate whether there has been an increase in allocative efficiency within that sector. The results of regressing the efficiency index for manufacturing on the various liberalization variables are reported in Table 6. The coefficient estimates in most cases support the conclusion that financial liberalization has had a positive and significant effect on the allocation of investment funds within

manufacturing (particularly when  $fli_t$  and  $Libdummy2$  are used as explanatory variables). Comparison with the results for the entire panel of firms reported in Table 2 suggest that the size of the effect is very similar for the index based on sales, and actually larger for the index based on profits.

#### **IV. CONCLUSIONS**

The results presented in this paper provide empirical support for the idea that financial liberalization has led to an improvement in the efficiency with which investment funds have been allocated. Both the informal "ocular econometric" exercise and the comparison of mean values of our efficiency index in the pre- and post- liberalization regimes suggests that the index has improved for many (although not for all) countries, following the introduction of financial reform. Moreover, the econometric results on the panel of country-years observations strongly supports a positive, significant and strong effect of financial liberalization on the efficiency with which investment funds are allocated. This result is robust with respect to alternative measures of marginal returns and of financial liberalization, to the definition of fixed capital, and to the estimation methods chosen. Our conclusions hold both for the total sample of non-financial publicly traded firms and for those in the manufacturing sector, and are not affected by allowing for other potential determinants of the efficiency of resource allocation.

Obviously more works needs to be done. One could gain additional insights on this issue by conducting a similar analysis on larger data sets for individual countries that contain also observations on smaller establishments. The use of larger data sets would allow one to assess more fully whether the improvement in the efficiency in the allocation of investment funds is due to an intra-industry or inter-industry reallocation. Finally, it would be useful to compare our results with those that can be obtained using other approaches. This is the research agenda we are pursuing at the moment. Still, the results presented here provide the first comprehensive micro-based answer concerning the

positive effect of financial liberalization on the allocation of investment for a significant number of developing countries.

## DATA APPENDIX

### Variable definitions

#### Firm level variables

$K_t$ : Beginning of period capital stock, measured as the lagged value of end of period value of property plant and equipment, net of depreciation.

$I_t$ : Capital expenditure.

$S_t$ : Gross sales and other operating revenue during the period, less discounts, returns and allowances.

$cogs_t$ : cost of goods sold.

$p_t$ : operating profits =  $S_t - cogs_t$ .

#### Country level variables

$fli_t$ : Financial liberalization index, based on Leaven (2000), see Table 1 his Appendix and Annex 1. It is calculated as the sum of zero-one dummies representing six dimensions of liberalization (interest rate deregulation, reduction of entry barriers, reduction of reserve requirements, reduction of credit controls, privatization of state banks, strengthening of prudential regulation). One (zero) denotes the post (pre) reform regime.

$libdummy1$ : A dummy variable that equals one (zero), when  $fli_t$  equals or exceeds five (is less than five).

$libdummy2$ : A dummy variable that equals one in the year following the introduction of interest rate liberalization and the removal of credit controls. It is zero otherwise.

$Tradelib$ : A measure averaging two dimensions: i) average tariffs, ii) the dispersion of the tariff structure. For each of these dimensions indexes are constructed such that higher values indicate lower tariffs and dispersion.  $Tradelib$  averages these two indexes. Source: Updated version of Lora (1997).

*Real exchange rate*: domestic prices divided by US prices multiplied by the exchange rate (in units of domestic currency per US Dollar). Source: International Financial Statistics.



*Inflation:* CPI inflation rate. Source: International Financial Statistics.

*Real GDP Growth:* Real GDP growth rate. Source: World Development Indicators

## Appendix

### Sample selection criteria

We deleted the following observations:

- Financial sector firms, that is firms with SIC codes 60 and higher.
- Years with less than 15 firms
- Firms with less than 3 years of observations.
- Observations without investment, capital stock, profits or sales data.
- Observations with  $I \leq 0$
- Observations with  $S/K \leq 0$
- Observations with  $K \leq 0$
- Observations with cost of goods sold  $\leq 0$
- Observations where  $S/K > 20$
- Observations where Cost of goods sold  $> 20$
- Observations where  $I/K > 2.5$
- Observations where Profits/ $K > 5$

**Table A1: Descriptive Statistics**

| Variable  | Observations | Mean  | Median | Std.Dev | Min    | Max    |
|-----------|--------------|-------|--------|---------|--------|--------|
| I/K       | 9495         | 0.257 | 0.164  | 0.294   | 0.000  | 2.482  |
| S/K       | 9495         | 2.988 | 1.934  | 3.082   | 0.000  | 19.968 |
| Profits/K | 9495         | 0.654 | 0.434  | 0.715   | -2.925 | 5.000  |

**Table A2: Number of Firms, by Country**

| Country     | Total Non - financial Firms <sup>a</sup> | Manufacturing Firms <sup>b</sup> |
|-------------|--|----------------------------------|
| Argentina   | 40                                       | 31                               |
| Brazil      | 141                                      | 120                              |
| Chile       | 73                                       | 58                               |
| India       | 296                                      | 284                              |
| Indonesia   | 115                                      | 91                               |
| Korea       | 256                                      | 195                              |
| Malaysia    | 287                                      | 204                              |
| Mexico      | 74                                       | 55                               |
| Pakistan    | 87                                       | 83                               |
| Philippines | 67                                       | 47                               |
| Taiwan      | 202                                      | 173                              |
| Thailand    | 184                                      | 139                              |

Notes: <sup>a</sup> Total number of firms excluding those with SIC codes greater than 60. <sup>b</sup> Firms with SIC codes between 20 and 50.

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## Tables

**Table 1 : Differences in Mean Value of  $EI^S$  and  $EI^P$   
Between Pre and Post liberalization Periods.**

| Country     | Libdummy1 <sup>a</sup>                                    |                     |            | Libdummy <sup>b</sup> |                     |            |
|-------------|---|---------------------|------------|-----------------------|---------------------|------------|
|             | Pre Liberalization  | Post Liberalization | Difference | Pre Liberalization    | Post Liberalization | Difference |
|             | <b>Part 1: <math>EI^S</math> [Index Based on Sales]</b>   |                     |            |                       |                     |            |
| Argentina   | 0.996   | 1.105               | 0.109      | 0.996                 | 1.105               | 0.109      |
| Brazil      | 1.101   | 1.357               | 0.257      | 0.975                 | 1.323               | 0.348      |
| Chile       |   |                     |            |                       |                     |            |
| India       | 1.072   | 1.247               | 0.175      | 1.101                 | 1.261               | 0.159      |
| Indonesia   |   |                     |            |                       |                     |            |
| Korea       | 0.985   | 1.033               | 0.048      | 1.000                 | 1.005               | 0.005      |
| Malaysia    | 1.096   | 1.064               | -0.032     | 1.213                 | 1.056               | -0.157     |
| Mexico      | 1.208   | 1.185               | -0.023     | 1.050                 | 1.211               | 0.160      |
| Pakistan    | 0.859   | 1.077               | 0.217      | 0.886                 | 0.968               | 0.081      |
| Philippines | 1.071   | 1.063               | -0.008     |                       |                     | 0.000      |
| Taiwan      |   |                     |            |                       |                     |            |
| Thailand    | 0.973   | 1.174               | 0.202      | 0.883                 | 1.137               | 0.254      |
|             | <b>Part 2: <math>EI^P</math> [Index Based on Profits]</b> |                     |            |                       |                     |            |
| Argentina   | 1.124   | 1.063               | -0.061     | 1.124                 | 1.063               | -0.061     |
| Brazil      | 1.080   | 1.273               | 0.193      | 0.974                 | 1.256               | 0.282      |
| Chile       |   |                     |            |                       |                     |            |
| India       | 1.056   | 1.080               | 0.024      | 1.064                 | 1.073               | 0.008      |
| Indonesia   | 0.941   | 1.116               | 0.175      |                       |                     |            |
| Korea       | 1.074   | 1.040               | -0.034     | 1.082                 | 0.996               | -0.086     |
| Malaysia    | 1.046   | 1.017               | -0.029     | 1.031                 | 1.027               | -0.004     |
| Mexico      | 1.292   | 1.165               | -0.127     | 1.147                 | 1.203               | 0.056      |
| Pakistan    | 0.817   | 1.045               | 0.227      | 0.848                 | 0.927               | 0.079      |
| Philippines | 1.121   | 1.137               | 0.016      |                       |                     |            |
| Taiwan      |   |                     |            |                       |                     |            |
| Thailand    | 0.938   | 1.182               | 0.244      | 0.880                 | 1.120               | 0.239      |

Notes: <sup>a</sup> Libdummy1 = 1 (0) when at least 5 of the following requirements were met (not met): interest rate deregulation, entry barriers removed, reserve requirements reduced, credit controls eliminated, privatization, prudential regulation adopted. <sup>b</sup> Libdummy2 = 1 starting from the year after the liberalization of interest rates and the removal of credit controls (0 otherwise). Source: Laeven (2000).

**Table 2: Panel Regression for  $EI^S$  and  $EI^P$ : Basic Specification <sup>a</sup>**

| <b>Part 1: Dependent Variable: <math>EI^S</math> [Index based on sales]</b>   |                          |                          |                           |                          |                         |                          |
|---|--------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|
|   | I                        | II                       | III                       | IV                       | V                       | VI                       |
| <b><math>FLI(t-1)^b</math></b>  | 0.032 **<br><i>0.013</i> |                          |                           | 0.038 **<br><i>0.016</i> |                         |                          |
| <b><math>Libdummy1^c</math></b>   |                          | 0.103 **<br><i>0.046</i> |                           |                          | 0.092 *<br><i>0.054</i> |                          |
| <b><math>Libdummy2^d</math></b>   |                          |                          | 0.138 ***<br><i>0.053</i> |                          |                         | 0.155 **<br><i>0.063</i> |
| <b><math>Tradelib^e</math></b>  |                          |                          |                           | 0.787<br><i>0.759</i>    | 0.795<br><i>0.791</i>   | 0.682<br><i>0.746</i>    |
| <b>R2</b>   | 0.33                     | 0.32                     | 0.34                      | 0.34                     | 0.31                    | 0.35                     |
| <b>Obs</b>  | 89                       | 89                       | 89                        | 66                       | 66                      | 66                       |
| <b>Part 2: Dependent Variable: <math>EI^P</math> [Index based on Profits]</b> |                          |                          |                           |                          |                         |                          |
|   | I                        | II                       | III                       | IV                       | V                       | VI                       |
| <b><math>FLI(t-1)^b</math></b>  | 0.020 *<br><i>0.012</i>  |                          |                           | 0.029 **<br><i>0.015</i> |                         |                          |
| <b><math>Libdummy1^c</math></b>   |                          | 0.056<br><i>0.041</i>    |                           |                          | 0.064<br><i>0.049</i>   |                          |
| <b><math>Libdummy2^d</math></b>   |                          |                          | 0.081 *<br><i>0.047</i>   |                          |                         | 0.111 *<br><i>0.058</i>  |
| <b><math>Tradelib^e</math></b>  |                          |                          |                           | 1.350 **<br><i>0.693</i> | 1.325 *<br><i>0.721</i> | 1.253 *<br><i>0.687</i>  |
| <b>R2</b>   | 0.35                     | 0.34                     | 0.35                      | 0.30                     | 0.28                    | 0.30                     |
| <b>Obs</b>  | 89                       | 89                       | 89                        | 66                       | 66                      | 66                       |

Notes: <sup>a</sup> i) All specifications include country dummies; ii) Standard errors reported in *italics*; iii) \*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%. <sup>b</sup> Source: Laeven(2000). <sup>c</sup> Libdummy1 = 1 (0) when at least 5 of the following requirements were met (not met): interest rate deregulation, entry barriers removed, reserve requirements reduced, credit controls eliminated, privatization, prudential regulation adopted. Source: Laeven(2000). <sup>d</sup> Libdummy2 = 1 starting from the year after the liberalization of interest rates and the removal of credit controls (0 otherwise). Source: Laeven (2000). <sup>e</sup> Tradelib is an index averaging mean tariffs and tariff dispersion. Source: Lora(1997).

**Table 3: Panel Regression for  $EI^S$ : Weighted Least Squares<sup>a</sup>**

| Dependent Variable: $EI^S$ [Index based on sales]. |                           |                          |                          |                       |                           |                         |
|--|---------------------------|--------------------------|--------------------------|-----------------------|---------------------------|-------------------------|
|  | I                         | II                       | III                      | IV                    | V                         | VI                      |
| $FLI (t-1)^b$                                      | 0.036 ***<br><i>0.012</i> |                          |                          |                       | 0.049 ***<br><i>0.017</i> |                         |
| $Libdummy1^c$                                      |                           | 0.090 **<br><i>0.037</i> |                          |                       |                           | 0.095 *<br><i>0.054</i> |
| $Libdummy2^d$                                      |                           |                          | 0.092 **<br><i>0.046</i> |                       |                           | 0.104<br><i>0.071</i>   |
| $Tradelib^e$                                       |                           |                          |                          | 0.771<br><i>0.649</i> | 0.683<br><i>0.719</i>     | 0.469<br><i>0.690</i>   |
| R2   | 0.41                      | 0.38                     | 0.37                     | 0.39                  | 0.39                      | 0.32                    |
| Obs  | 89                        | 89                       | 89                       | 66                    | 66                        | 66                      |

Notes: <sup>a</sup> i) All specifications include country dummies; ii) Standard errors reported in *italics*; iii) \*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%; iv) The square root of the number of firms in each country-year is used as weight. <sup>b</sup> Source: Laeven(2000) <sup>c</sup> Libdummy1 = 1 (0) when at least 5 of the following requirements were met (not met): interest rate deregulation, entry barriers removed, reserve requirements reduced, credit controls eliminated, privatization, prudential regulation adopted. Source: Laeven(2000). <sup>d</sup> Libdummy2 = 1 starting from the year after the liberalization of interest rates and the removal of credit controls (0 otherwise). Source: Laeven(2000) <sup>e</sup> Tradelib is an index averaging mean tariffs and tariff dispersion. Source: Lora(1997).

**Table 4 : Panel Regression for  $EI^S$ :  
Controlling for the Real Exchange Rate, Inflation and GDP Growth<sup>a</sup>**

| Dependent Variable: $EI^S$ [Index based on sales]. |                             |                             |                             |                          |                          |                         |                          |                          |                          |
|--|-----------------------------|-----------------------------|-----------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|
|  | I                           | II                          | III                         | IV                       | V                        | VI                      | VII                      | VIII                     | IX                       |
| $FLI (t-1)^b$                                      | 0.033 **<br><i>0.013</i>    |                             |                             | 0.029 **<br><i>0.012</i> |                          |                         | 0.033 **<br><i>0.013</i> |                          |                          |
| $Libdummy1^c$                                      |                             | 0.093 **<br><i>0.043</i>    |                             |                          | 0.083 **<br><i>0.042</i> |                         |                          | 0.092 **<br><i>0.046</i> |                          |
| $Libdummy2^d$                                      |                             |                             | 0.115 **<br><i>0.052</i>    |                          |                          | 0.093 *<br><i>0.053</i> |                          |                          | 0.127 **<br><i>0.053</i> |
| $Real Exchange Rate^e$                             | 1.01E-03<br><i>1.71E-03</i> | 3.91E-04<br><i>1.69E-03</i> | 2.67E-04<br><i>1.68E-03</i> |                          |                          |                         |                          |                          |                          |
| $Inflation^f$                                      |                             |                             |                             | -0.011<br><i>0.008</i>   | -0.011<br><i>0.008</i>   | -0.008<br><i>0.008</i>  |                          |                          |                          |
| $GDP Growth^g$                                     |                             |                             |                             |                          |                          |                         | -0.296<br><i>0.451</i>   | -0.394<br><i>0.453</i>   | -0.388<br><i>0.443</i>   |
| R2   | 0.42                        | 0.40                        | 0.40                        | 0.43                     | 0.42                     | 0.41                    | 0.38                     | 0.36                     | 0.37                     |
| Obs  | 80                          | 80                          | 80                          | 80                       | 80                       | 80                      | 80                       | 80                       | 80                       |

Notes: <sup>a</sup> i) All specifications include country dummies; ii) Standard errors reported in *italics*; iii) \*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%. <sup>b</sup> Source: Laeven(2000) <sup>c</sup> Libdummy1 = 1 (0) when at least 5 of the following requirements were met (not met): interest rate deregulation, entry barriers removed, reserve requirements reduced, credit controls eliminated, privatization, prudential regulation adopted. Source: Laeven(2000). <sup>d</sup> Libdummy2 = 1 starting from the year after the liberalization of interest rates and the removal of credit controls (0 otherwise). Source: Laeven(2000) <sup>e</sup> Real exchange rate against US dollar. Source: IFS/IMF. <sup>f</sup> Inflation is defined as the rate of change of CPI. Source: IFS/IMF. <sup>g</sup> GDP growth is defined as the rate of change of real GDP. Source: WDI/World Bank.

**Table 5: Panel Regression for  $EF^S$ : Alternative definition of the capital stock <sup>a</sup>**

| <b>Dependent Variable: <math>EI^S</math> [Index based on sales].</b> |                           |                           |                          |
|--|---------------------------|---------------------------|--------------------------|
| <b>Part 1: Unweighted</b>  |                           |                           |                          |
|  | I                         | II                        | III                      |
| <b><math>FLI(t-1)^b</math></b>                                       | 0.023 ***<br><i>0.011</i> |                           |                          |
| <b><math>Libdummy1^c</math></b>                                      |                           | 0.076 *<br><i>0.040</i>   |                          |
| <b><math>Libdummy2^d</math></b>                                      |                           |                           | 0.079 *<br><i>0.046</i>  |
| <b>R2</b>  | 0.51                      | 0.38                      | 0.37                     |
| <b>Obs</b>   | 100                       | 100                       | 100                      |
| <b>Part 2: Weighted</b>  |                           |                           |                          |
|  | I                         | II                        | III                      |
| <b><math>FLI(t-1)^b</math></b>                                       | 0.030 ***<br><i>0.011</i> |                           |                          |
| <b><math>Libdummy1^c</math></b>                                      |                           | 0.097 ***<br><i>0.033</i> |                          |
| <b><math>Libdummy2^d</math></b>                                      |                           |                           | 0.084 **<br><i>0.040</i> |
| <b>R2</b>  | 0.47                      | 0.41                      | 0.38                     |
| <b>Obs</b>   | 100                       | 100                       | 100                      |

Notes: <sup>a</sup> i) All specifications include country dummies; ii) Standard errors reported in *italics*; iii) \*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%; iv) The square root of the number of firms in each country-year is used as weight; v) The capital stock is defined as in Love(2000). <sup>b</sup>

Source: Laeven(2000) <sup>c</sup>  $Libdummy1 = 1$  (0) when at least 5 of the following requirements were met (not met): interest rate deregulation, entry barriers removed, reserve requirements reduced, credit controls eliminated, privatization, prudential regulation adopted. Source: Laeven(2000). <sup>d</sup>  $Libdummy2 = 1$  starting from the year after the liberalization of interest rates and the removal of credit controls (0 otherwise). Source: Laeven(2000)



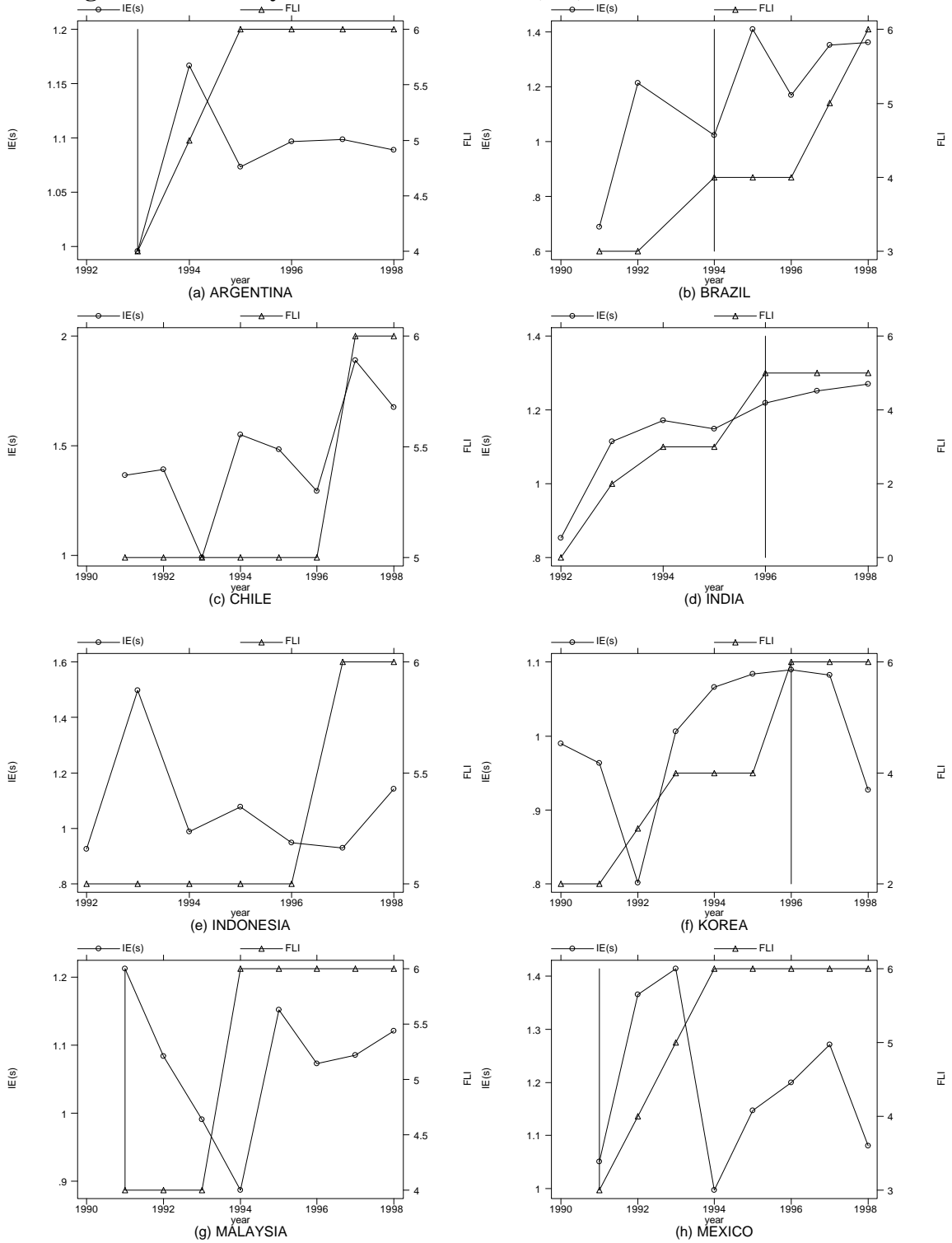
**Table 6: Panel Regression for  $EI^S$  and  $EI^P$ : Manufacturing Firms <sup>a</sup>**

| Part 1: Dependent Variable: $EI^S$ [Index based on sales]   |                          |                       |                          |                          |                         |                          |
|---|--------------------------|-----------------------|--------------------------|--------------------------|-------------------------|--------------------------|
|   | I                        | II                    | III                      | IV                       | V                       | VI                       |
| $FLI(t-1)^b$  | 0.028 *<br><i>0.016</i>  |                       |                          | 0.034 *<br><i>0.021</i>  |                         |                          |
| $Libdummy1^c$   |                          | 0.078<br><i>0.055</i> |                          |                          | 0.072<br><i>0.068</i>   |                          |
| $Libdummy2^d$   |                          |                       | 0.137 **<br><i>0.063</i> |                          |                         | 0.159 **<br><i>0.078</i> |
| $Tradelib^e$  |                          |                       |                          | 1.154<br><i>0.920</i>    | 1.119<br><i>0.945</i>   | 1.014<br><i>0.896</i>    |
| R2  | 0.36                     | 0.36                  | 0.38                     | 0.36                     | 0.34                    | 0.37                     |
| Obs   | 89                       | 89                    | 89                       | 66                       | 66                      | 66                       |
| Part 2: Dependent Variable: $EI^P$ [Index based on Profits] |                          |                       |                          |                          |                         |                          |
|   | I                        | II                    | III                      | IV                       | V                       | VI                       |
| $FLI(t-1)^b$  | 0.030 **<br><i>0.015</i> |                       |                          | 0.040 **<br><i>0.020</i> |                         |                          |
| $Libdummy1^c$   |                          | 0.079<br><i>0.053</i> |                          |                          | 0.088<br><i>0.066</i>   |                          |
| $Libdummy2^d$   |                          |                       | 0.123 **<br><i>0.060</i> |                          |                         | 0.151 **<br><i>0.076</i> |
| $Tradelib^e$  |                          |                       |                          | 1.752 **<br><i>0.882</i> | 1.726 *<br><i>0.911</i> | 1.559 *<br><i>0.870</i>  |
| R2  | 0.34                     | 0.32                  | 0.34                     | 0.29                     | 0.26                    | 0.29                     |
| Obs   | 89                       | 89                    | 89                       | 66                       | 66                      | 66                       |

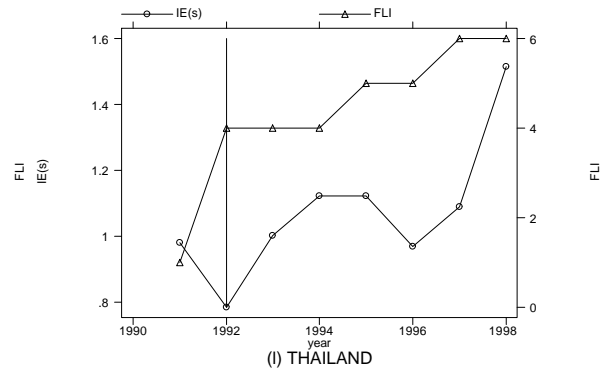
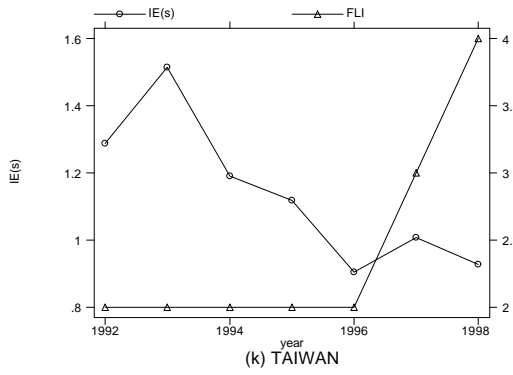
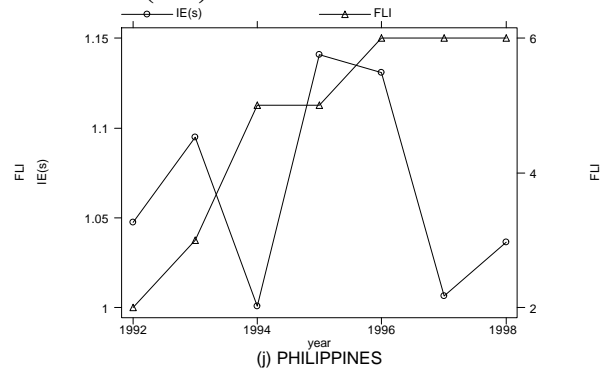
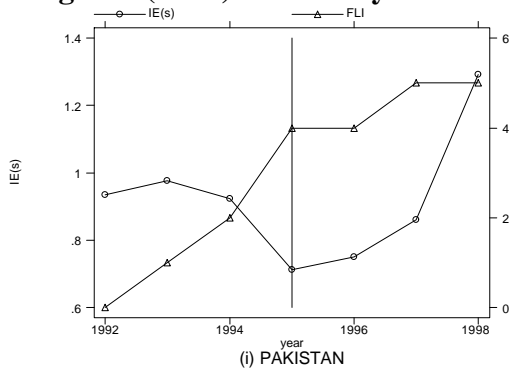
Notes: <sup>a</sup> i) All specifications include country dummies; ii) Standard errors reported in *italics*; iii) \*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%. iv) Observations with less than ten firms per country are eliminated. <sup>b</sup> Source: Laeven(2000) <sup>c</sup> Libdummy1 = 1 (0) when at least 5 of the following requirements were met (not met): interest rate deregulation, entry barriers removed, reserve requirements reduced, credit controls eliminated, privatization, prudential regulation adopted. Source: Laeven(2000). <sup>d</sup> Libdummy2 = 1 starting from the year after the liberalization of interest rates and the removal of credit controls (0 otherwise). Source: Laeven(2000) <sup>e</sup> Tradelib is an index averaging mean tariffs and tariff dispersion. Source: Lora(1997).

## Figures

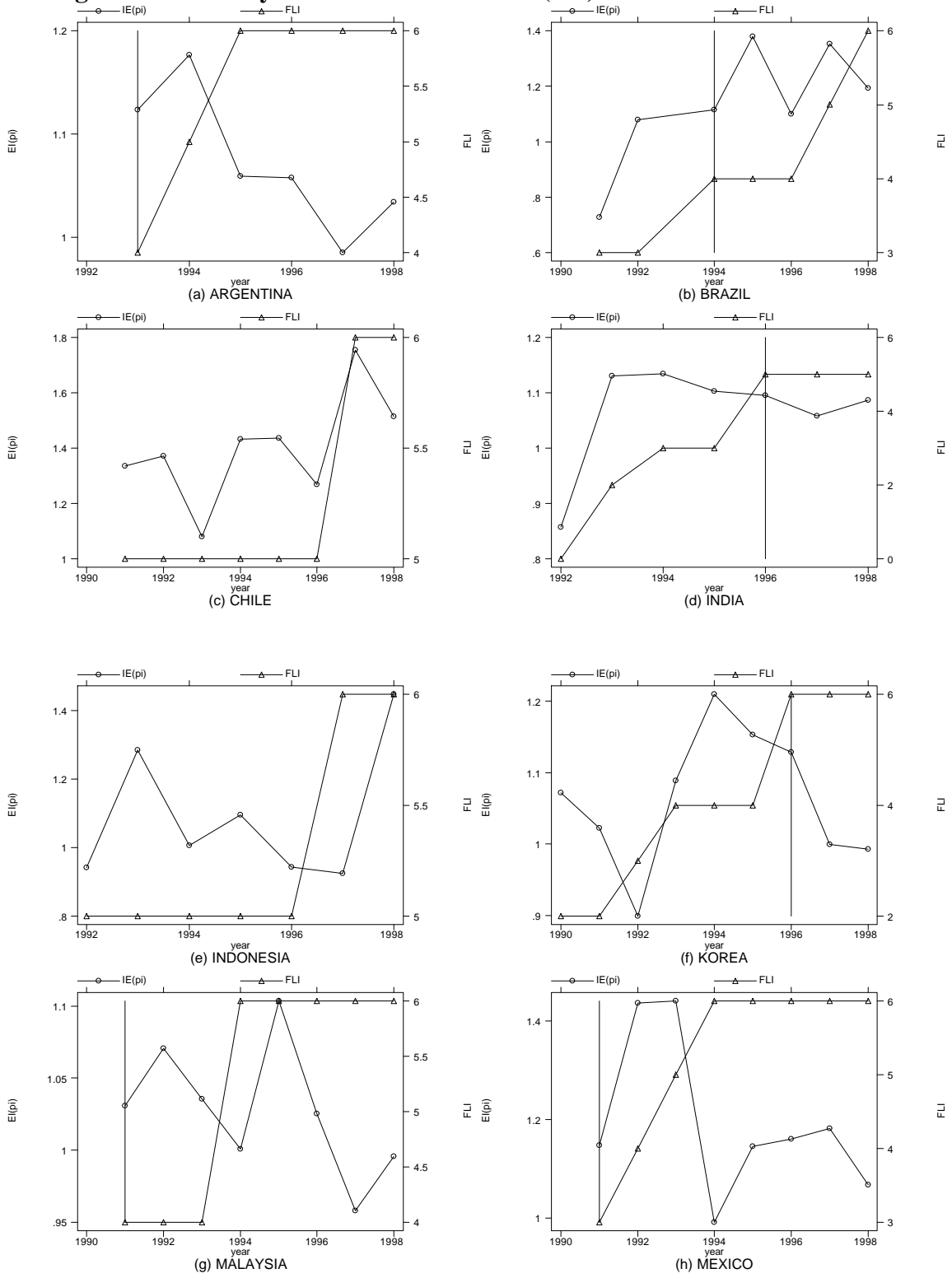
**Figure 1: Efficiency Index Based on Sales ( $IE^S$ ) vs Financial Liberalization**



**Figure 1(cont.): Efficiency Index Based on Sales ( $IE^S$ ) vs Financial Liberalization**



**Figure 2: Efficiency Index Based on Profits ( $IE^P$ ) vs Financial Liberalization**



**Figure 2(Cont.): Efficiency Index Based on Profits ( $IE^P$ ) vs Financial Liberalization**

