Financial Integration, Productivity and Capital Accumulation*

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Abstract

Understanding the mechanism through which financial globalization affects economic performance is crucial for evaluating the costs and benefits of opening financial markets. This paper is a first attempt at disentangling the effects of financial integration on the two main determinants of economic performance: productivity (TFP) and investments. I provide empirical evidence from a sample of 93 countries observed between 1975 and 1999. The results suggest that financial integration has a positive direct effect on productivity, while it spurs capital accumulation only with some delay and indirectly, since capital follows the rise in productivity. I control for indirect effects of financial globalization through banking crises. Such episodes depress both investments and TFP, though they are triggered by financial integration only to a minor extent.

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1 Introduction

Academic economists and practitioners have long debated over the effects of financial globalization on growth.[1] The removal of restrictions on international capital transactions has on some occasions been welcome as a growth opportunity and in others blamed for triggering financial instability and banking crises. Yet, this debate has not addressed empirically the mechanism through which financial liberalization affects growth. How do the main sources of growth - total factor productivity (TFP) and capital accumulation - react to financial globalization? This issue is of particular relevance for at least two reasons. First, understanding how TFP and investments are affected by financial liberalization would allow us to identify which models are more appropriate to analyze and predict the economic effects of financial globalization. Second, answering the question above would greatly help understand the welfare effects of financial integration. Gourinchas and Jeanne (2006) show that, whether capital or TFP react to financial openness, matters significantly for the size of welfare gains (or losses).[2] There are, to my knowledge, no studies that address this important issue. This paper is a first attempt at disentangling the effects of financial globalization on productivity and capital accumulation.

The theoretical literature proposes various mechanisms through which financial globalization may affect economic performance. In a standard neo-classical framework, opening international capital markets generates capital flows from capital-abundant towards capital-scarse countries, thereby affecting growth in the poor countries through an acceleration in the convergence process. This effect however is short-lived, since the steady state (or the balanced growth path) is not affected. This argument would find empirical support if capital accumulation in poor countries accelerated after financial liberalization, and TFP did not react. If credit rationing were added to the neo-classical framework above, also productivity might be expected to increase, to the extent that capital inflows make more productive investments possible by relieving the economy from credit constraints (as in Acemoglu and Zilibotti, 1997). The findings (e.g. in Lucas, 1990) that capital does not flow from rich to poor countries though, seems to make these mechanisms less likely to apply. International capital mobility may also allow investors to diversify risks by holding foreign assets, as suggested by Obstfeld (1994). Better portfolio insurance fosters investments in risky projects with high expected productivity, as well as savings.

[1] Here financial globalization is meant to be the absence of restrictions to international financial transactions. Henceforth, I will equivalently refer to it as (international) financial liberalization, financial integration, or financial openness.

[2] Their quantitative exercise points out that the benefits from an acceleration in capital accumulation along the convergence to the steady state, are way smaller (up to a fiftieth) than the gains from an improvement in productivity, hence in the steady state to which the economy converges.

While higher savings would imply a positive effect on capital accumulation, the outcome of international portfolio reallocation on capital and productivity would vary across countries, hence be undetermined on aggregate. Yet another approach could be considering financial globalization similar to trade in goods. By exerting a pro-competitive effect on the capital markets, financial openness would induce firms of all countries to use capital more efficiently, thereby raising productivity without necessarily causing capital flows across countries. As trade in goods, financial integration might also foster specialization in financial services, which would improve allocative efficiency by allowing good firms to borrow at better conditions through specialized foreign intermediaries. Also, by giving firms access to a wider range of financial services, integration may allow them to use the most appropriate ones, thereby gaining in efficiency. Capital accumulation might eventually follow the increase in productivity.

All of these models support the view that financial integration affects positively economic performance. However, in a world characterized by market imperfections and weak institutions, financial integration could open the door to speculation, misallocation of capital and financial instability (as for instance in Rodrick, 1998 and Stiglitz, 2000), thereby affecting negatively economic performance.

The models above give different predictions on the effects of financial globalization on productivity and capital accumulation. In general, if openness only fosters capital accumulation, accelerating convergence, its positive effect is expected to be short-lived. If instead it raises TFP, it is most likely to spur long-term growth. Understanding what model is supported by the empirical evidence may be of great help to figure out if financial globalization has temporary or long-lasting effects on the wealth of nations.

To investigate the mechanism through which international financial liberalization affects capital accumulation and TFP, I also control for two indirect channels. First, financial globalization may foster financial development (see Klein and Olivei, 1999), i.e. the availability of external finance to the private sector, which Beck et al. (2000) show to affect positively productivity but not investments.[3] Including a measure of financial depth, such as the ratio of credit to the private sector over GDP, allows me to disentangle the importance of this channel.

As another indirect channel, financial liberalization may trigger financial instability and banking crises, as a wide literature points out (see Aizenman, 2001 for a survey on the evidence on financial liberalization and crises). Whatever the mechanism generating

[3]Financial development can be defined as the ability of a financial system to reduce information asymmetries between investors and borrowers, trade and diversify risk, mobilize and pool savings, and ease transactions. Removing restrictions on international financial transactions (financial liberalization) may affect the way a financial system carries over its functions, hence financial development.

banking crises, such events may harm the ability of a financial system to provide the economy with credit. As a consequence, both investments in physical capital and innovation can be expected to slow down. In the worst scenario, TFP might even drop, due to the need for shutting down productive projects. I account for the effects of financial instability by controlling all regressions for an indicator of banking crises. In this way, any indirect effect of liberalization through crises is removed from the estimates for the index of financial liberalization. I also estimate the joint effect of crises and liberalization and I explicitly address the link between financial liberalization and banking crises by means of multinomial logit regressions.

I follow three methodologies to assess the effects of financial liberalization and banking crises on investments and productivity, and a fourth to address the link between liberalization and crises. Using de iure indicators of financial integration, I perform difference in differences estimation of the impact of regime switches, between capital restrictions and openness, and between crises and normal times. To this end, I use a panel data with yearly observations from at most 93 countries over the period 1975-1999. I then turn to the long-run analysis and estimate equations for TFP and capital growth rates as a function of initial productivity and capital stock respectively, financial globalization and the other controls over a period of 25 year in a sample of 85 countries. To overcome problems of unobserved country-specific effects and endogeneity of regressors, typical of cross-sectional estimates, I adopt the system GMM dynamic panel technique proposed by Arellano and Bover (1995) and Blundell and Bond (1998). To assess whether financial liberalization favors the occurrence of banking crises, I estimate on the annual panel dataset a series of linear probability models for an indicator of systemic and borderline crises (see Caprio and Klingebiel, 2002).

The main results are the following. (1) International financial liberalization has a positive direct effect on TFP, while it has no direct effect on capital accumulation. (2) Financial integration has a positive, lagged effect on capital, since investments follow TFP. (3) Banking crises harm both capital accumulation and productivity. However, (4) financial liberalization raises only the probability that minor banking crises occur in developed countries.

This paper is mainly related to three strands of literature. The literature on growth and development accounting has shown that a large share of cross-country differences in economic performance is driven by total factor productivity (TFP) rather than factor accumulation (physical and human capital).[4] Hall and Jones (1999) point out that a

[4]See Caselli (2005) for a survey on the develpment accounting literature, and Easterly and Levine (2001) for the stylized facts on development and growth accounting.

substantial share of the variation in GDP per worker is explained by differences in TFP and provide evidence that productivity is to a large extent determined by institutional factors. Klenow and Rodriguez-Clare (1997) show that also GDP growth differentials are mainly accounted for by differences in the growth rates of TFP. These results suggest that, if financial globalization is to affect the wealth of nations, it is more likely to do it through its impact on TFP, rather than factor accumulation. This is indeed the main empirical result of the paper.

Several authors suggest that financial development spurs GDP growth by fostering productivity growth, not only by raising the funds available for accumulation. Theoretical papers by Acemoglu, Aghion and Zilibotti (2005), Acemoglu and Zilibotti (1997), Aghion, Howitt and Mayer-Foulkes (2005b) among others show that financial development may relieve risky innovators from credit constraints, thereby fostering growth through technological change. While earlier contributions (e.g., Greenwood and Jovanovic, 1990) suggest that financial development fosters growth simply by increasing participation in production and risk pooling, in the later works the relationship is also driven by advances in productivity. King and Levine (1993), and, in more detail, Beck Levine and Loayza (2000) show evidence of a strong effect of financial development on TFP growth, and only a tenuous effect on physical capital accumulation.

Many papers, extensively summarized in Prasad et al. (2003 and 2006) address the effects of financial globalization on economic growth and volatility, from different perspectives and with various datasets and empirical methodologies. Some studies (for instance, Grilli and Milesi-Ferretti, 1995, Kraay, 2000 and Rodrick, 1998) found that financial liberalization does not affect growth, others that the effect is positive (Levine, 2001, Bekaert et al., 2003 and Bonfiglioli and Mendicino, 2004), yet others that it is negative (Eichengreen and Leblang, 2003). These effects are also shown to be heterogeneous across countries at different stages of institutional and economic development (see Bekaert et al, 2003, Chinn and Ito, 2003 and Edwards, 2001) and countries with different macroeconomic frameworks (Arteta Eichengreen and Wyplosz, 2001). Perhaps surprisingly, very little evidence exists on the effects of financial globalization on the main sources of growth: productivity and capital accumulation.[5] Chari and Henry (2002) find significant effects of equity market liberalization on investments and the Tobin's Q of listed firms, and conclude that these must be driven by changes in productivity, which they do not explore directly. A call for studies on the relationship between financial globalization and productivity is in Kose et al. (2006)

[5]Some preliminary evidence on financial integration and productivity is in Kose, Prasad and Terrones (2006).

The remainder of the paper is organized as follows. Section 2 gives a brief overview on growth and development accounting, which leads on to the discussion of my empirical strategy. In section 3, I describe the dataset and the variables I use in the analysis. Section 4 presents the econometric methodologies and reports the results from the estimation of the equations for investments and TFP. Section 5 shows the estimates of the impact of financial integration on the probability that banking crises occur, and derives its indirect effects on productivity and capital accumulation. Section 6 discusses the evidence in the previous sections and proposes an explanation that is in line with the results of other empirical studies. Section 7 concludes.

2 The empirical strategy

The literature on growth and developing accounting takes as starting point the Cobb Douglas specification for the aggregate production function,

$$Y = AK^{\alpha}(HL)^{1-\alpha}, \tag{1}$$

where K is the aggregate capital stock, L the number of workers and H their average human capital. The term A represents the efficiency in the use of factors, and corresponds to the notion of total factor productivity (TFP). Several contributions on development accounting (see Caselli, 2005 for a survey and Hall and Jones, 1999) have shown that a large share of the cross-country variation in GDP per worker, $\frac{Y}{L}$, is explained by differences in A. The works on growth accounting (see Easterly and Levine, 2001 and Klenow and Rodriguez-Clare, 1997), starting from the following decomposition

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + \alpha\frac{\dot{K}}{K} + (1-\alpha)\left(\frac{\dot{H}}{H} + \frac{\dot{L}}{L}\right), \tag{2}$$

have shown that also cross-country differentials in GDP growth are to a large extent generated by differentials in productivity growth ($\frac{\dot{A}}{A}$).

All studies on the impact of financial liberalization on growth have focused on the left hand side of (2), estimating various versions of the equation:

$$dy_{it} = b_0 + b_1 y_{it-1} + b_2' Z_{it} + b_3 IFL_{it} + e_{it}, \tag{3}$$

where $dy_{it} \equiv d\log(Y_{it})$ is the growth rate of GDP in country i, y_{it-1} is the logarithm of lagged GDP, Z_{it} is a vector of control variables, IFL_{it} is an indicator of financial liberalization, and e_{it} is the error term.

This paper instead considers the right hand side of (2) and proposes estimates of the following equation:

$$P_{it} = \beta_0 + \boldsymbol{\beta}_1' \mathbf{X}_{it} + \gamma IFL_{it} + u_{it},$$

where P_{it} represents in turn A, K or their growth rates in country i at time t, $\mathbf{X}$ is a vector of control variables, IFL the indicator of financial integration, and u the error term.

3 The data

I perform the analysis on an unbalanced panel dataset with annual observations for 93 countries, spanning from 1975 to 1999. Depending on the econometric methodology in use, I consider, in turn, the whole yearly panel, a cross-section of 85 countries with data averaged over the sample period, and a panel comprising up to 91 countries with non-overlapping five-year observations over the same period. As Table A shows, the largest sample includes twenty-two developed and seventy-one developing countries from all continents. The following subsections describe the main variables I include in the regressions.

3.1 Capital accumulation

I construct the series of the physical capital stocks, K, applying the perpetual inventory method as in Hall and Jones (1999) on data from the Penn World Tables 6.1. I estimate the initial stock of capital, K_{t_0} as $\frac{I_{t_0}}{g+\delta}$, where g is the average geometric growth rate of total investments between t_0 and $t_0 + 10$.[6] In the paper t_0 is 1960, since I have data on investments dating back to that year for most countries.[7] A depreciation rate δ of 6 per cent in ten years is assumed. The following values of the capital stock are easily computed as $K_t = (1-\delta)K_{t-1} + I_t$.

3.2 Productivity

I construct the series of total factor productivity following the Hall and Jones (1999) approach to the decomposition of output. I assume the production function in country i to be

$$Y_i = K_i^{\alpha} (A_i H_i L_i)^{1-\alpha},$$

where Y_i is the output produced in country i, K_i is the stock of physical capital in use, A_i is labor-augmenting productivity, L_i is the labor in use (rgdpch* pop/ rgdpwok from the PWT 6.1), and H_i is a measure of the average human capital of workers ($H_i L_i$ is therefore

[6] Investments are defined as I = ki*rgdpch*pop from the PWT 6.1.

[7] In the countries which have no data for 1960 t_0 is the first year followed by at least 15 observations.

human capital-augmented labor).[8] The factor share α is assumed constant across countries and equal to 1/3, which matches national account data for developed countries. I adopt the following specification for labor-augmenting human capital as a function of the years of schooling, s_i:

$$H_i = e^{\phi(s_i)}.$$

I rely on the results of Psacharopulos' (1994) survey and specify $\phi(s_i)$ as a piecewise linear function with coefficients 0.134 for the first four years of education, 0.101 for the next four years, and 0.068 for any value of $s_i > 8$.

Equipped with data on capital, output per worker, population and schooling (from Barro and Lee, 2001), I can compute the series of total factor productivity as

$$A_i = \frac{Y_i}{L_i} \frac{1}{H_i} \left(\frac{K_i}{Y_i} \right)^{-\frac{\alpha}{1-\alpha}}.$$

3.3 Financial integration

I proxy financial integration with a 0-1 indicator, which relies on de iure criteria. The variable IFL is a dummy that takes value 0 if a country has held restrictions on capital account transactions during the year, and 1 otherwise. The existence of restrictions is classified on a 0-1 basis by the IMF in its Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER), which is available for a maximum of 212 countries over the period 1967- 1996.[9] Despite its limits, summarized in Edison et al. (2002), this is the most commonly used indicator of international financial liberalization.

For robustness check, I will also use another de iure indicator, that relies on the chronology of official equity market liberalization, available in Bekaert et al. (2003) for 95 countries from 1980 onwards. It takes value 1 if international equity trading is allowed in a given country-year, and 0 otherwise. This dummy variable, EML, differs from IFL because it only accounts for equity market liberalization and not, for instance, credit market liberalization. As opposed to IFL, it does not include policy reversals: it labels a country as open ever since its first year of liberalization.

[8] In Hall and Jones (1999) Y_i is rgdpch*pop from the PWT, net of the value-added of the mining industry. Following Caselli (2005), I simplify and take rgdpch*pop.

[9] Classification methods have changed in 1996, so that there are now 13 separate indexes that can hardly be compared to the previous single indicator. Miniane (2000) harmonized the classifications, though for a limited number of countries, and over a short time span.

3.4 Control variables

When assessing the effects of financial liberalization on capital accumulation and productivity, I control for a number of variables.

- Banking crises. I adopt a zero-one anecdotal indicator of bank crises, proposed by Caprio and Klingebiel (2003), who keep record of 117 systemic and 51 non-systemic crises occurring in 93 and 45 countries respectively, from the late 1970's and onwards. On a yearly base, the variable BC takes value 2 or 1 if the country has experienced a systemic or borderline banking crisis, respectively, and 0 otherwise. Caprio and Kilingebiel label a crisis as systemic if a substancial proportion of banks' capital has been exhausted and borderline if the losses were less severe. To make this definition criterion clearer, I refer to a few episodes. The 1991 crisis in Sweden as well as the 1998-99 crisis in Russia were systemic, since they involved insolvency or serious difficulties for 90 and 45 per cent of the banking system, respectively. The isolated failures of three UK banks between the eighties and the nineties, as well as the solvency problems of Credit Lyonnais in France in 1994-95, are instead labeled as borderline crises.

- Financial depth. I proxy it with the ratio of total credit to the private sector over GDP (privo from Beck and Demirguc-Kunt, 2001) and its growth rate. This variable gives a measure of the external finance available to firms. Klein and Olivei (1999) and Levine (2001) show that financial liberalization promotes financial development, which, according to Beck et al. (2000), may be expected to foster productivity more than capital accumulation. Bonfiglioli and Mendicino (2004) also find that banking crises have a negative effect on privo, mainly where institutions are weak. Controlling for financial depth in the equations for both investments and productivity helps disentangle the direct effect of liberalization and crises from the indirect one through financial development. A recent literature on financial fragility points out that crises may come along as by-products of sustained growth of the financial system (see Ranciere et al., 2004 and Tornell et al., 2004). Feijen and Perotti (2005) suggest that equilibria with financial fragility and high participation in the financial market may arise where political accountability is not very high and wealth inequality is high. Including privo and its growth rate in the logit regressions for banking crises allows me to test a reduced form of these theoretical predictions.

- Initial real per capita GDP (rgdpch from the PWT 6.1) accounts for different stages of economic development. It is often claimed that richer countries are more

likely to have open financial markets, hence the effect of financial liberalization might seem spurious if initial GDP is not controlled for. If adding this variable to the regressions does not take away significance from the coefficient for financial liberalization, the suspects of spuriousness are less sound.

- I include government expenditure as a ratio of GDP (kg from the PWT 6.1) in the regressions for capital accumulation. Several theories predict that government expenditure crowds out private investments. If this is the case, I should expect a negative coefficient in the equation for capital accumulation.

- I control for openness to trade, proxied by import plus export as a ratio of GDP (openk from the PWT 6.1). Trade may affect the efficiency of an economy through several channels, such as specialization according to comparative advantage, access to larger markets with more product variety and increased competition. These effects may in turn stimulate both capital accumulation and productivity growth.

- Intellectual property right protection is expected to enhance productivity by giving incentives for innovation. This is controlled for by using the measure (ipr) by Ginarte and Park (1997), which is available for five-year periods from 1960 to 1990.

- Deposit insurance. Demirguc-Kunt and Detragiache (1997) show that the existence of explicit deposit insurance increases the likelihood of bank runs and thus crises of the banking sector. Hence, I include a measure of deposit insurance (depins) from Demirguc-Kunt and Sobaci (2000) in the logit analysis for banking crises.

- I also control for inflation (from the World Development Indicators) in the logit for banking crises. I take this variable as an indicator of bad macroeconomic policies, which are likely to make a country prone to crises.

- Finally, I use indicators of economic and institutional development to check for heterogeneity in the effects of financial liberalization and banking crises on both investments and productivity. In the cross-sectional estimates for TFP growth I explicitly control for institutional quality using the Government Anti-Diversion Policy index (gadp, from Hall and Jones, 1999) as a proxy. As an indicator of economic development, I construct a dummy (developing) that takes value 1 if the country is defined as low or middle-low income in the World Development Indicators, and 0 otherwise. In the panel regressions, I use these indicators to split the sample and construct interactive terms.

4 The empirical analysis

This section explains the methodologies I follow to assess the effects of financial integration on capital accumulation and productivity, and reports the results. I first present the difference in difference approach applied to yearly panel data, then I turn to the long-run cross-sectional analysis using twenty-five year averages, to conclude with the dynamic panel regressions performed on non-overlapping five-year observations.

4.1 Panel difference in difference

I fully exploit the cross-sectional and time-series information in the annual dataset and estimate

$$P_{it} = \beta_0 + \boldsymbol{\beta}_1' \mathbf{X}_{it-1} + \gamma IFL_{it-1} + \eta_i + \nu_t + \varepsilon_{it}, \tag{4}$$

where P_{it} is a proxy for the outcome variable (either $d\log(K)$, $d\log(A)$ or $log(A)$ in the various specifications) observed in country i at year t, $\mathbf{X}$ are control variables including the indicator of banking crises BC, IFL is a dummy for financial liberalization. To alleviate the simultaneity bias, all regressors enter as lagged values. η_i is a country-specific fixed effect capturing heterogeneity in the determinants of P that are specific to i. Its inclusion in (4) implies that γ is only estimated from the within-country variation around the liberalization date. The fixed year effects (ν_t) allow me to compare the change in P between the pre and post-reform periods in countries that have liberalized with the change in the countries that maintained the restrictions. This means that equation (4) is a "difference in differences" specification, since it implies differencing out the time-mean for each i, and the common trend for all i's at any t. Two main problems may undermine the ability of γ to identify a causal link from financial liberalization to the sources of growth.

First, there may be concerns about the selection of the countries that liberalized. Suppose that fewer episodes of liberalization were observed among countries that share a certain characteristic C, and that the countries with characteristic C experienced particularly low productivity. Then this trend in productivity, specific to countries with characteristic C, may bias the estimated effect of financial integration upwards. To tackle this issue, I first identify the most important factors that influence the decision to liberalize capital account transactions, by estimating the following logit on the annual panel dataset:

$$\Pr(IFL\_r_{it} = 1) = \frac{e^{\beta_o + \boldsymbol{\beta}_1 \mathbf{X}_{it}}}{1 + e^{\beta_o + \boldsymbol{\beta}_1 \mathbf{X}_{it}}}.$$

IFL_r_{it} is an indicator of the reforms observed in country i at time t, and $\mathbf{X}_{it}$ is a

set of covariates.[10] IFL_r equals 0 if there are no reforms, 1 if a switch into capital account liberalization occurs, -1 if the switch is out of it. The estimation is performed with a multinomial logit.[11] All standard errors are robust and clustered by country. The coefficient estimates in Table B indicate geographical dummies among the best predictors of reforms.[12] After finding a geographical pattern in the selection of liberalized countries, I check if there are systematic differences in productivity and investments across areas (Asia, Latin America, Africa, Europe + North America). Table C reports the number of observations with financial liberalization reforms (rows 1-2), the number of country-years with open capital markets (row 3), and the means of TPF growth and capital accumulation across continents. Note from rows 1 and 2 that Africa, accounting for almost half of the sample, has the least number of capital account reforms and a very bad performance in terms of productivity growth. On the other hand, Europe and North America have the highest incidence of unreverted capital account liberalizations, the best performance in terms of productivity and the worst in capital accumulation. This suggest that the difference in difference estimates for γ might be affected by selection bias. To amend this bias, I control the difference in difference regressions for continental trends in both productivity and capital accumulation.

A problem of endogeneity of policy changes may also arise. Suppose a country opens up when experiencing an economic crisis to help the recovery or alternatively when it is already on a sustained growth path. This may attribute a negative or positive effect to financial liberalization which is actually due to a trend, thereby producing biased estimates. As a solution to this problem, I control for a dummy taking value 1 during the three or five years prior to the liberalization and zero otherwise. Comparing the coefficient for this dummy with γ allows me to verify whether the change in P was part of a previous trend or caused by liberalization. As a robustness check, I replace the dummy variable with a trend variable, taking values 1, 2 and 3, respectively three, two and one years before the reform. Moreover, I assess whether both reforms into and out of financial liberalization

[10] Following Bekaert et al. (2003), I include among the covariates a measure of institutional quality (gadp), and the lagged values of real per capita GDP (rgdpch), government expenditure (kg), openness to trade (openk), financial depth (privo), inflation, per capita GDP growth, capital stock (k) and TFP(a). I also control for the occurrence of banking crises in the previous year (BC), economic development (developing) and continental dummies.

[11] All results are robust to the use of logit and probit on separate indicators: IFL_in (1 for switches into capital account liberalization, and 0 otherwise) and IFL_out (1 for switches out of capital account liberalization, and 0 otherwise).

[12] Both inflation and financial development reduce the likelihood that financial restrictions are removed. Neither the initial stock of capital nor the level of productivity are associated to switches into and out of financial liberalization, suggesting that endogeneity of financial integration with respect to capital and productivity may be not a major concern. The occurrence of banking crises does not seem to affect significantly the decision to abandon, nor to adopt, restrictions on international capital transactions.

(opening when a country is closed and closing when a country is open) promote economic performance, to test if countries systematically adopt the reform that fosters growth.

A concern about the consistency of difference in difference estimators may arise if the dependent variable is autocorrelated, as pointed out by Bertrand et al. (2004). In this case, the standard errors of the coefficient γ would be underestimated, thereby biasing the t-statistics towards over-rejection of the null $\gamma = 0$. Bertrand et al. (2004) propose several methods to get around this problem. I will follow their suggestion and estimate equation (4) without IFL, save the residuals only for the countries that experienced a reform, and regress them on IFL.[13] This is equivalent to identifying γ off the difference in the residuals before and after the reform.

4.1.1 Capital accumulation

Table 1 reports the results from the difference in difference regressions of the growth rate of capital, $d\log(K)$, on yearly data.[14] The specification in columns 1 and 2 only includes the indicator of financial liberalization (IFL), whose effects on investments are nil. These coefficients are robust to controlling for trends in investments up to three years prior to liberalization (IFL_switch3) and for time-continent effects, as reported in column 2.[15] Columns 3 and 4 show that banking crises (BC) have a negative effect on capital accumulation, and that financial integration still seems to be irrelevant Column 5 suggests that banking crises have no different effect across financially open and closed countries. When I control for real per capita GDP, government expenditure as a ratio of GDP and credit to the private sector as a ratio of GDP (column 6), IFL remains insignificant, while the negative coefficient for BC becomes only marginally significant (it is different from zero at the ten per cent level). However its significance is fully restored when any of the additional controls is removed from the regression (result not reported). The coefficients in column 6 also show that richer countries accumulate more capital, while government expenditure tends to crowd out investments. Moreover, the growth rate of physical capital is lower where financial intermediation (as proxied by *privo*) is higher and has grown less (the latter result is not reported, but available upon request). This suggests that countries invest more in physical capital when their financial systems are at early stages of development and growing rapidly. Columns 7 and 8 report the estimates for

[13] This procedure is referred to as "ignoring time series information" in Bertrand et al. (2004).

[14] The evidence is robust to the use of investments as a ratio of GDP as a proxy of the dependent variable. The results are availablie upon request.

[15] The results do not change if I use IFL_switch5, which equals 1 for the five years prior to the reform.

the subsamples of developed and developing countries, as defined by the World Bank.[16] Interestingly, capital account liberalization has a positive effect on investments in the developed countries, and no impact in the others. As in column 6, removing any of the additional controls restores the negative coefficient for BC, without affecting the positive estimate for IFL in the developed countries. Finally, the results are robust to the inclusion of openness to trade, whose coefficient always turns out to be insignificant and is thus omitted.

4.1.2 Productivity

Tables 2a and 2b report the results from the difference in difference regressions of TFP levels, $\log(A)$, on yearly data. The coefficients for IFL reported in Table 2a are positive and significant across all specifications in columns 1-6. Columns 7-8 though suggest that the positive effect is more pronounced in the developing countries. Banking crises have a negative and significant effect on TFP under all specifications. Note that when I add intellectual property rights protection (ipr) among the regressors, twenty countries drop out of the sample due to missing observations. Nevertheless, the estimates for IFL and BC in the equations of columns 1-4 do not change if I restrict the sample. Interestingly, the coefficients for $privo$ in columns 6-8 suggest that financial development on average tends to have a positive effect on productivity. However, its effect is positive in the developing countries and negative in the developed ones. This result may support the hypothesis that financial development favors convergence in productivity. Notice that the coefficients for financial liberalization and banking crises remain significant, even after controlling for financial development. This suggest that both have a direct effect on productivity. The coefficient estimates for ipr confirm the expectations of a positive effect on TFP, mainly in the developed countries where R&D capacity is probably higher.

Table 2b reports robustness checks on the difference in differences estimates of Table 2a, column 6. The first two columns refer to the correction proposed by Bertand et al. (2004). In column 1, I report the results from regressing TFP on all control variables but IFL, country and time fixed effects. The coefficients for financial development and intellectual property rights protection do not change with respect to Table 1. I saved the residuals from the estimation in column 1 only for the countries that experienced a regime shift relative to IFL, and regressed them on IFL. The coefficient and its standard error in column 2 confirm that financial integration raises significantly productivity by 8 per cent.

[16] Heterogeneity in the effects of financial liberalization could also be addressed by including an interacted dummy $IFL* developing$ in the full-sample regression. This method, however, may deliver biased estimates if there is heterogeneity in other coefficients.

In columns 3 and 4 I try to identify the effect of a policy change out of financial openness. In column 3, I restrict the attention to those countries that were not closed all the time, and regress productivity on the usual controls plus an indicator that takes value one if there is not financial openness and zero otherwise. In this way, the coefficient compares the change in TFP before and after the adoption of restrictions in the countries that closed their financial markets with the change in TFP in the countries that remained open. The effect is not statistically different from zero. In column 4, I take the full sample and regress TFP on an indicator that equals 0 if a country is open in a given year or if it is closed throughout the entire sample, and 1 otherwise. The negative and significant coefficient for IFL_off suggests that productivity dropped in countries that closed their financial markets compared to the countries that were open or remained closed ever. These results prove that regime switches out of financial liberalization have not the same, positive effect of switches into it. In columns 5-7, I control in alternative ways for the pre-reform trends in TFP. In column 5 I decompose the dummy IFL_switch in two dummies for switches on and off liberalization. In column 6, these dummies are no longer step dummies, but take the form of a three-period linear trend in the three years prior to reforms. In both cases their introduction does not affect the significance of the coefficient for financial openness. Column 7 reports the result from adding a pre-reform trend for each country that has liberalized. Again, no significant changes occur with respect to the other regressions.

4.2 Cross-sectional analysis

To study the effects of financial openness on TFP and capital in the long run, I estimate the following growth regressions:

$$dp_{i(t-25,t)} = \beta_0 + \lambda p_{it-25} + \boldsymbol{\beta}_1' \mathbf{X}_{i(t-25,t)} + \gamma IFL_{i(t-25,t)} + u_{it}, \tag{5}$$

where $dp_{i(t-25,t)} = 100\frac{\log(P_{it})-\log(P_{it-25})}{25}$ with $p = \log(P)$, $P \in \{A, K\}$, and the regressors indexed by $(t-25,\ t)$ are 25-year period averages. A coefficient estimate $\hat{\lambda} < 0$ indicates that there is conditional convergence in productivity. The speed of convergence b can be obtained from $\lambda = -100\frac{1-e^{b25}}{25}$.

Table 3 reports the results for capital accumulation. The coefficients for the capital stock at the beginning of the period (k_25) are always negative and significant, suggesting that, other thing equal, countries that start with a lower stock of capital experience a faster growth of physical capital. While capital account liberalization does not affect capital accumulation, banking crises tend to have a negative impact on it.

The results for the growth rate of TFP in Table 4 support robustly the hypothesis of

conditional convergence in productivity, with an implied speed of convergence between 1 and 2 per cent per year. The effect of banking crises on TFP growth is negative and significant under all specifications. Capital account liberalization has a positive and significant coefficient only under the basic specification (column1), and has no different effect across countries that experienced banking crises and those that did not (column 2). The coefficient for $\mathsf{a\_25} * IFL$, aimed at assessing whether financial liberalization affects the pace of convergence, is nil in column 3. Column 5 suggests that the institutional factors captured by GADP, together with initial productivity, are the most important determinant of TFP growth. None of the other control variables seem to affect productivity growth.

As emphasized by the empirical growth literature, cross-sectional estimates have several limits. They do not allow me to exploit the time-series variation in the data on financial integration, which is important when assessing the effects of the reforms; and cannot control for omitted variables, country-specific effects and endogeneity of the regressors. In this case, addressing endogeneity with an instrumental variable strategy looks rather difficult. Legal origins may be a good instrument for financial development (see La Porta et al, 1997), but do not seem particularly suitable to instrument a variable as IFL, which involves policy changes and perhaps reversals over the sample. Bekaert et al. (2003) address the issue by separately estimating a probit for IFL, and find that the quality of institutions is crucial in determining the choice of liberalization. But as the institutional framework is known to be an important determinant of TFP (see, among others, Hall and Jones, 1999), it does not seem a valid instrument for IFL, in a regression for TFP.

4.3 Dynamic panel analysis

To exploit the time variation in IFL, I could estimate equation (5) on a panel dataset, assuming $u_{it} = \eta_i + \nu_t + \varepsilon_{it}$, but this would generate consistency problems. As the right-hand side of equation (5) includes the lagged dependent variable ($p_{t-\tau}$), even if ε_{it} is not correlated with $p_{t-\tau}$, the estimates are not consistent, given the finite time span. Moreover, consistency may be undermined by the endogeneity of other explanatory variables, as in the cross-sectional estimates. To correct for the bias created by lagged endogenous variables, and the simultaneity of some regressors, I follow the approach proposed by Arellano and Bover (1995) and Blundell and Bond (1998). I estimate the following system with GMM

$$dp_{it} = \beta_0 + \theta dp_{it-5} + \boldsymbol{\beta}_1' d\mathbf{X}_{it} + \gamma dIFL_{it} + d\nu_t + d\varepsilon_{it} \quad (6)$$

$$p_{it} = \beta_0 + \theta p_{it-5} + \boldsymbol{\beta}_1' \mathbf{X}_{i(t-5,t)} + \gamma IFL_{i(t-5,t)} + \eta_i + \nu_t + \varepsilon_{it}, \quad (7)$$

where dp_{it} equals $\log(\frac{P_{it}}{P_{it-5}})$, and the other regressors are the same as in the previous equations. Variables indexed by $(t-5,\ t)$ are averages over the period between t-5 and t. η_i, ν_t and ε_{it} are the unobservable country- and time-specific effects, and the error term, respectively. The presence of country effect in equation (7) corrects the omitted variable bias. The differences in equation (6) and the instrumental variables estimation of the system are aimed at amending inconsistency problems. I instrument differences of the endogenous and predetermined variables with lagged levels in equation (6) and levels with differenced variables in equation (7). For instance, I take a_{it-15} as an instrument for da_{it-5} and IFL_{it-10} for $dIFL_{it}$ in (6) and da_{it-10} as an instrument for a_{it-5} and $dIFL_{it-5}$ for IFL_{it} in (7). I estimate the system by two-step Generalized Method of Moments with moment conditions $E[da_{it-5s}\ (\varepsilon_{it}-\varepsilon_{it-5})] = 0$ for $s \geq 2$, and $E[dz_{it-5s}\ (\varepsilon_{it}-\varepsilon_{it-5})] = 0$ for $s \geq 2$ on the predetermined variables z, for equation (6); $E[da_{i,t-5s}\ (\eta_i + \varepsilon_{i,t})] = 0$ and $E[dz_{i,t-5s}\ (\eta_i + \varepsilon_{i,t})] = 0$ for $s = 1$ for equation (7). I treat all regressors as predetermined. The validity of the instruments is guaranteed under the hypothesis that the residuals from (6) are not second order serially correlated. Coefficient estimates are consistent and efficient if both the moment conditions and the no-serial correlation are satisfied. To validate the estimated model, I apply a Sargan test of overidentifying restrictions, and a test of second-order serial correlation of the residuals.[17] As pointed out by Arellano and Bond (1991), the estimates from the first step are more efficient, while the test statistics from the second step are more robust. Therefore, I will report coefficients and statistics from the first and second step respectively. Note that in this case the speed of convergence b obtains from $\theta = e^{5b}$.

The dynamic panel estimates for k_5 in Table 5 confirm the prediction of the neoclassical growth model, that capital accumulation slows down as capital grows up towards its steady state value, and also that there is conditional convergence across countries. The coefficients for financial liberalization (IFL) confirm the result from the cross-sectional analysis. Banking crises (BC) depress investments, though to a lesser extent in countries with high initial capital stocks.

The estimates for a_5 in Table 6 confirm the cross sectional evidence of conditional convergence in productivity. The implied speed of convergence is now higher than the one in Table 4 and lies between 1.2 and 4.4 per cent per year. Capital account liberalization spurs productivity growth in a robust way, while the negative effect of banking crises is now weaker. Trade does not seem to have a significant effect on TFP growth. Columns

[17] Including too many lags among the instruments can cause the power of the Sargan test to collapse, potentially hiding the invalidity of instruments (see for example Bowsher, 2002). To avoid this problem, I restrict the number of lags to t-10 and t-15.

4-7 report the results for the interactions of financial liberalization with banking crises, and the interaction of both IFL and BC with the level of economic development and the quality of institutions. Column 4 shows that the effects of neither international financial liberalization nor banking crises change with the initial level of productivity. The coefficient on the interaction term in column 5 suggests that countries that were open when experiencing a crisis had a worse performance in terms of TFP than countries that were closed during the crisis. Column 6 shows that BC lowers TFP growth everywhere, while IFL has positive effects in developed and negative effects in the developing countries. The same holds in column 7, where I distinguish between countries with high and low institutional quality, as measured by GADP.

The results above suggest that financial liberalization has a positive direct effect on TFP but not on capital accumulation over a one to five year period. One can wonder whether the effect on capital accumulation takes longer to display, due, for instance to the presence of adjustment costs. Table 7 reports results from estimating the system (6)-(7) for capital, adding a lagged term of capital account liberalization. As reported in column 2, financial integration spurs capital accumulation with one period lag. Is this lagged effect of financial openness a direct one or is it that investments rise as a consequence of the increase in TFP? The estimates in column 3, where I add TFP to the regressors of column 2, suggests that this is the case, since the coefficient for IFL_{t-5} is no longer significant, while the one for TFP is positive and significant.

4.4 Equity market liberalization

Finally, in Tables 8 and 9 I report the main results obtained when considering the indicator of equity market liberalization by Bekaert et al. (2003) instead of the capital account liberalization index. The positive effects on TFP survive, but now also the positive effects on capital accumulation are significant, at least under some specifications. This may justify why the effects of EML on growth are more significant than those of IFL in the estimates by Bekaert et al. (2003).

5 Financial integration and banking crises

The analysis in the last section suggests that banking crises are detrimental for both capital accumulation and productivity. It is often argued that banking crises, and financial instability in general, may be triggered by the removal of restriction on capital account transactions. This section is aimed at evaluating if, and to what extent, the negative effects of banking crises should ultimately be imputed to financial liberalization. To do so,

I estimate on the annual panel dataset the following logit for the probability of a banking crisis:

$$\Pr(BC\_type_{it} = 1) = \frac{e^{\beta_o + \beta_1 X_{it} + \gamma IFL_{it}}}{1 + e^{\beta_o + \beta_1 X_{it} + \gamma IFL_{it}}}.$$

The variable BC_type_{it} takes value one if a banking crisis of a given *type* (systemic, borderline, or any) has occurred in country i at time t. The vector X_{it} includes a series of covariates, and IFL_{it} is the binary indicator of international financial liberalization. To appreciate the effects of all covariates, I also estimate a multinomial logit for BC_{it}, which takes values 1 and 2 in case of borderline and systemic crises respectively, and zero when no crises occur. I cluster the standard errors by country.

The first two columns of Table 10 report the results for BC_all, which equals 1 if any type of crisis has occurred, and 0 otherwise. The indicator of IFL has no significant coefficient estimates on the full sample. The variables raising the likelihood of crises the most are high inflation and the existence of explicit deposit insurance, as already shown by Demirguc-Kunt and Detragiache (1997). High real GDP per capita and growth rate of financial depth significantly reduce the probability of crisis. The first result is in line with the predictions in Martin and Rey (2004), while the second seems to contradict the "bumpy path" hypothesis proposed by Ranciere et al. (2004) and Tornell et al. (2004). Splitting the sample between developed and developing countries, I find that IFL has a positive effect on the likelihood of banking crises in developed countries, while the growth rate of private credit and the existence of deposit insurance are more important in developing countries.

In Table 11, I exploit the classification in Caprio and Klingebiel (2002) and estimate the effects of all covariates on systemic versus borderline banking crises. IFL only has a positive effect on the likelihood of borderline banking crises in developed countries. This positive coefficient is explained by the fact that most banking crises in developed countries are borderline. Deposit insurance, high real per capita GDP and the growth rate of financial depth mainly affect the probability of systemic crises. High inflation has opposite effects on the likelihood of the two types of crises: negative for borderline and positive for systemic crises.

Table 12 reports the marginal effects on the likelihood of banking crises estimated with dprobit. The coefficients in columns 4 and 5 mean that financial liberalization raises by 0.3 to 1.7 per cent the probability that a border line banking crisis arises. Coupled with the coefficient estimates for IFL and BC in Tables 1-7, this means that the overall effect of financial integration on productivity remains largely positive.

6 Discussion

The evidence in section 4 suggests that financial integration is accompanied by an increase in productivity, which is followed only with some lag by capital accumulation. This effect seems at odds with the theoretical predictions that financial liberalization would raise capital accumulation, and eventually raise TFP by relieving the economies from credit constraints.

A plausible way to rationalize this result is to draw a parallel between financial integration and trade openness. In particular, one can interpret financial openness as integration in the market for financial services. In a world with market imperfections, financial services (such as screening, monitoring, debt structuring, etc.) can be seen as an important factor of production for firms that need to raise external capital. Since the quality and varieties of financial services are likely to differ across countries and sectors, financial liberalization, may generate the well known gains from trade. Specialization allows firms in all countries to buy any given financial service at the best price. Moreover, the access to new varieties of services may provide firms with the most appropriate financial instruments, which spurs productivity. This rise in TFP is due to an increase in allocative efficiency, which is empirically documented by Galindo et al. (2005). The increase in TFP is not necessarily accompanied by capital flows across countries, but is most probably followed by capital accumulation, as the evidence in the previous sections suggest. As another consequence of financial liberalization and specialization in financial services, one should observe financial intermediaries enter foreign markets following comparative advantage patterns, as recent evidence from microdata shows. For instance, the results in Focarelli and Pozzolo (2000) suggest that foreign banks entry more often in countries where banks are less efficient, and Clarke et al. (1999) show that they tend to serve the sectors in which they have comparative advantage. Moreover, Claessens et al. (2001) document an overall efficiency gain in the financial intermediation sector.

To the extent that better financial services reduce the volatility in output (for instance through effective selection or monitoring of the borrowers), financial integration may reduce the volatility of aggregate production of a country. On the contrary, in the models that see financial globalization mainly as an international portfolio diversification device (e.g. Obstfeld, 1994), financial integration tends to promote risk taking at each single country level, which raises output volatility. Table 13 reports results from OLS regressions of the 1980-1999 sample standard deviation of log-GDP on the growth rate of GDP and the indicators of IFL and banking crises. The negative and significant coefficients of IFL seem inconsistent with the prediction of financial globalization raising output volatility. The same holds for TFP in columns 5-8.

Financial integration may also generate frictional unemployment due to the reallocation of capital from less to more efficient firms, as a consequence of the improvement in the financial services of screening and selection of borrowers. Looking at data on labor and employment may be an interesting extension of the analysis in the present paper.

7 Conclusions

A wide literature has focused on the effect of financial liberalization on GDP growth, often finding mixed results. To better understand the effect of financial liberalization, however, it is important to know the channels through which it operates. This paper has attempted to probe deeper into the relationship by separately studying the impact of financial openness on two sources of income growth: capital accumulation and productivity. Contrary to the existing literature, I find fairly robust results. In particular, financial liberalization has a positive direct effect on productivity, while it spurs capital accumulation only with some delay and indirectly, since capital follows the rise productivity.

In my analysis I took into account two possible indirect channels through which financial globalization may affect economic performance: financial development and banking crises. The most interesting result applies to the latter factor. As expected, banking crises have a strong negative impact on economic performance, though the likelihood that they occur does not rise much under financial integration. In fact, globalization raises only the probability of minor crises in developed countries. Nevertheless, the positive direct effect of financial liberalization on TFP survives.

Finally, the paper briefly discusses a possible explanation for the positive direct effect of financial integration on productivity. The idea is that removing restrictions to international financial transaction opens the door to trade in financial services, which can be considered as a production factor. As in trade models, openness generates gains from specialization and widening of varieties, which raise efficiency in the allocation of capital in each and every country, thereby fostering TFP growth. This mechanism is supported by some existing evidence on the pattern of internationalization of financial intermediaries, and on the allocative efficiency of investments. Developing a theoretical foundation of comparative advantage and differentiation in financial services, and testing it seem interesting directions for future research.

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Table A

Countries, samples and financial liberalization dates

Country	Panel	Cross	CAL_on	CAL_off	EML_on	Country	Panel	Cross	CAL_on	CAL_off	EML_on
Algeria	x					Denmark	x	x	1988		
Angola	x					Ecuador	x	x	1971-1988-1995	1970-1986-1993	1994
Argentina	x	x	1967-1993	1970	1989	Egypt	x	x			1992
Australia	x	x	1984			El Salvador	x	x			
Austria	x	x	1991			Equatorial Guinea	x				
Bangladesh	x	x			1991	Ethiopia	x	x			
Benin	x	x	1967	1968		Finland	x	x	1991		
Bolivia	x	x	1986	1981		France	x	x	1990	1968	
Botswana	x	x			1990	Gabon	x	x	1967	1968	
Brasil	x	x			1991	Gambia	x	x	1991		
Burkina Faso	x	x	1967	1969		Germany	x				
Burundi	x	x				Ghana	x	x			1993
Cameroon	x	x	1967	1968		Greece	x	x			1987
Canada	x	x				Guatemala	x	x	1973-1989	1980	
Cape Verde	x	x				Guinea	x	x			
Central Africa	x	x	1967	1968		Guinea Bissau	x	x			
Chad	x	x	1967	1968		Hong Kong	x	x			
Chile	x	x			1992	Iceland	x	x			1991
Colombia	x	x			1991	India	x	x			1992
Congo	x	x	1967	1968		Indonesia	x	x	1969		1989
Costa Rica	x	x	1980-1995	1974-1982		Israel	x	x			1993
Cote d'Ivoire	x	x	1967	1968	1995	Italy	x	x	1990		

Note. CAL_on and CAL_off report the dates of removal and adoption, respectively, of restrictions on capital account transactions. EML_on reports the dates of official liberalization of the equity market.

Table A

Countries, samples and financial liberalization dates

Country	Panel	Cross	CAL_on	CAL_off	EML_on	Country	Panel	Cross	CAL_on	CAL_off	EML_on
Jamaica	x	x			1991	Philippines	x	x		1969	1991
Japan	x	x	1979	1995	1983	Portugal	x	x	1993		1986
Jordan	x	x			1995	Rwanda	x	x			
Kenia	x	x			1995	Senegal	x	x	1967	1968	
Korea	x	x			1992	Sierra Leone	x				
Lesotho	x	x				Singapore	x		1978		
Madagascar	x	x	1967	1968		South Africa	x	x			1996
Malaysia	x	x	1973		1988	Spain	x	x	1994		1985
Mali	x	x				Sri Lanka	x	x			1991
Mauritania	x	x	1967	1968		Sweden	x	x	1993		
Mauritius	x				1994	Switzerland	x	x			
Mexico	x	x		1982	1989	Tanzania	x	x			
Morocco	x	x			1988	Thailand	x	x			1987
Mozambique	x	x				Togo	x	x	1967	1968	
Nepal	x	x				Trinidad and Tobago	x	x	1994		1997
Netherlands	x	x				Tunisia	x	x			1995
New Zealand	x	x	1984		1987	Turkey	x	x			1989
Nicaragua	x	x		1978		Uganda	x	x			
Niger	x	x	1967-1995	1968		United Kingdom	x	x	1979		
Nigeria	x	x			1995	United States	x	x			
Norway	x	x	1995			Uruguay	x	x	1978	1968-1993	
Panama	x	x				Venezuela	x	x		1984	1990
Papua New Guinea	x	x				Zambia	x	x			
Paraguay	x	x	1982	1984		Zimbabwe	x	x			1993
Peru	x	x	1978-1993	1970-1984	1992						

Note. CAL_on and CAL_off report the dates of removal and adoption, respectively, of restrictions on capital account transactions. EML_on reports the dates of official liberalization of the equity market.

Table B
Financial liberalization - yearly panel

	m-logit	
	IFL_in	IFL_out
Asia	-0.121	19.156 ***
	0.735	7.348
Latin America	1.825 ***	21.934 ***
	0.588	7.580
Europe & N. America	-0.105	-14.776 ***
	0.891	8.107
developing	0.467	-0.305
	0.453	1.111
gadp	2.745	0.147
	2.309	3.380
growth	-0.027	-7.073
	5.614	5.288
inflation	-1.555 ***	-0.357 *
	0.598	0.187
kg	0.077	-0.555
	0.424	0.529
openk	0.284	0.707
	0.297	0.549
privo	-0.611 **	0.059
	0.256	0.541
rgdpch	1.099	1.112
	0.798	0.839
BC	-0.357	0.202
	0.331	0.459
log(A)	-1.039	-0.047
	0.742	1.022
log(K)	0.027	-0.061
	0.077	0.098
Observations	1240	1240

Note. IFL_in and IFL_out indicate switches on and off capital account liberalization, respectively. The coefficients in theese columns are estimated with multinomial logit. Asia, Latin America and Europe & N. America are continental dummies. Developing is a dummy for developing countries as defined by the World Bank. The variables growth, inflation, gov, open, privo, rgdp and bc enter as lagged values. A constant is included in all regressions. The robust standard errors are clustered by country. *, ** and *** indicate that a coefficiant is significant at 10, 5 and 1 per cent level, respectively.

Table C
IFL and economic performance across continents

	Asia	Africa	Latin America	Europe & N. America
IFL_in	4	3	9	7
IFL_out	1	0	9	0
IFL	121	9	81	104
TFP growth	0.009	-0.014	-0.012	0.001
Capital accumulation	0.069	0.044	0.032	0.032
Observations	315	841	378	280
Countries	15	42	18	15

Note. Rows 1 and 2 report the number of switches into and out of capital account liberalization (IFL_in and IFL_out). Line 3 reports the number of country-years with IFL=1. The other lines report subsample means of TFP growth and capital accumulation.

Table 1
Capital account liberalization and capital accumulation - yearly panel - difference in difference

	1	2	3	4	5	6	7 Developed	8 Developing
IFL	0.735	0.380	0.700	0.412	0.273	0.528	1.956 **	0.099
	0.625	0.762	0.623	0.761	0.802	0.955	0.779	1.340
BC			-0.782 ***	-0.702 ***	-0.754 ***	-0.500 *	-0.473	-0.496
			0.217	0.224	0.243	0.305	0.304	0.403
IFL*BC					0.326			
					0.599			
lgov						-2.528 ***	-1.673 **	-3.700 ***
						0.840	0.744	1.227
lprivo						-1.021 *	-1.239 **	-1.343 *
						0.610	0.566	0.831
lrgdpch						5.036 ***	2.573	5.426 **
						1.668	1.691	2.189
IFL_switch3		-0.350		-0.319	-0.314	0.043	-0.060	-0.113
		0.709		0.707	0.707	0.891	0.874	1.174
Time-continent	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Obs	1900	1900	1900	1900	1900	1385	361	1024
Countries	93	93	93	93	93	79	20	59

Note. The dependent variable is the annual growth rate of physical capital stock (dlog(K)). All regressors are in lagged values. The variable IFL_switch3 equals 1 in the 3 years prior to capital account reforms, zero elsewhere. The sample spans between 1975 and 1999. All regressions include a constant. Standard errors are clustered by country. *, ** and *** indicate that a coefficient is significant at 10, 5 and 1 per cent, respectively.

Table 2a
Capital account liberalization and TFP - yearly panel - difference in difference

	1	2	3	4	5	6	7 Developed	8 Developing
IFL	0.105 ***	0.053 **	0.102 ***	0.033 *	0.026	0.076 ***	0.063	0.100 ***
	0.019	0.022	0.019	0.020	0.022	0.022	0.044	0.028
BC			-0.060 ***	-0.053 ***	-0.055 ***	-0.055 ***	-0.097 ***	-0.047 ***
			0.007	0.006	0.007	0.007	0.016	0.008
IFL*BC					0.017			
					0.017			
lprivo						0.029 **	-0.066 **	0.065 ***
						0.014	0.029	0.018
lopenk						-0.018	0.055	-0.023
						0.021	0.095	0.022
ipr						0.013 *	0.039 **	0.002
						0.008	0.018	0.010
IFL_switch3		-0.005		-0.008	-0.008	0.019	-0.027	0.032
		0.021		0.190	0.020	0.018	0.044	0.021
Time-continent	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Obs	1844	1844	1844	1844	1844	1119	309	810
Countries	93	93	93	93	93	73	18	55

Note. The dependent variable is the logaritm of TFP (log(A)). All regressors are in lagged values. The variable IFL_switch3 equals 1 in the 3 years prior to capital account reforms, zero elsewhere. The sample spans between 1975 and 1999. All regressions include a constant. Standard errors are clustered by country. *, ** and *** indicate that a coefficient is significant at 10, 5 and 1 per cent, respectively.

Table 2b

Capital account liberalization and TFP - yearly panel - difference in difference

	Bertrand et al. (2004) correction		No closed countries	Full Sample	Full Sample	Full Sample	Full Sample
IFL		0.083 ***			0.068 ***	0.069 ***	0.055 **
		0.019			0.023	0.023	0.024
IFL_off			-0.038	-0.048 **			
			0.026	0.025			
BC	-0.055 ***		-0.059 ***	-0.054 ***	-0.049 ***	-0.049 ***	-0.049 ***
	0.006		0.009	0.006	0.006	0.007	0.007
lprivo	0.032 ***		0.070 ***	0.031 **	0.028 **	0.028 **	0.032 **
	0.014		0.021	0.013	0.014	0.014	0.014
lopenk	-0.016		0.005	-0.014	-0.007	-0.007	-0.002
	0.021		0.035	0.020	0.021	0.021	0.022
ipr	0.015 *		-0.013	0.015 *	0.013 *	0.013 *	0.013 *
	0.008		0.013	0.008	0.007	0.007	0.008
IFL_switch_on3					0.013		
					0.020		
IFL_switch_off3					-0.013		
					-0.031		
IFL_switch_on_trend						0.005	
						0.009	
IFL_switch_off_trend						0.0002	
						0.014	
Time-continent	Yes	No	Yes	Yes	Yes	Yes	Yes
Country pre-IFL trend	No	No	No	No	No	No	Yes
Obs	1122	332	514	1119	976	976	976
Countries	73	20	40	73	70	70	70

Note. The dependent variable is the logaritm of TFP level (log(A)). All regressors are in lagged values. The indicator IFL_off takes value 1 if the country is financially closed aa a result of a closing reform. The variables IFL_switch_on3 and IFL_switch_off3 equal 1 in the 3 years prior to capital account opening and closing, respectively. The same variables with _trend termination take value 1, 2 and 3 respectively 3, 2 and 1 year prior to reform. The sample spans between 1975 and 1999. All regressions include a constant. Standard errors are clustered by country. *, ** and *** indicate that a coefficient is significant at 10, 5 and 1 per cent, respectively.

Table 3
Capital account liberalization and Capital accumulation - cross-section

	1	2	3	4	5	6
k_25	-0.364 ***	-0.371 ***	-0.373 ***	-0.391 ***	-0.638 ***	-1.218 ***
	0.116	0.115	0.116	0.128	0.152	0.406
IFL	1.109	0.896	0.466	-2.145	0.018	-0.015
	0.739	0.746	0.996	6.680	0.736	0.371
BC		-1.498 **	-1.670 **	-1.511 **	-0.638	-1.151
		0.745	0.803	0.754	0.934	0.711
IFL*BC			1.315			
			1.983			
k_25*IFL				0.130		
				0.277		
gadp						3.680 ***
						1.183
lprivo					1.272 ***	0.307
					0.407	0.304
lopenk					-0.513	-0.165
					0.493	0.276
lgov					-0.286	0.155
					0.583	0.291
R2	0.094	0.127	0.130	0.128	0.228	0.243
Obs	92	92	92	92	84	84

Note. The dependent variable is the 25-year average annual growth rate of capital (dlog(K)/25). All regressors are expressed as period average, except for the logaritm of the initial TFP level. The sample spans between 1975 and 1999. All regressions include a constant. Robust standard errors are reported below the coefficients. *, ** and *** indicate that a coefficient is significant at 10, 5 and 1 per cent, respectively.

Table 4
Capital account liberalization and TFP Growth - cross-section

	1	2	3	4	5	6
a_25	-0.746 *	-0.559 *	-0.560 *	-0.573 *	-1.008 ***	-1.218 ***
	0.438	0.321	0.324	0.328	0.403	0.406
IFL	1.739 **	0.836 **	0.588	-1.546	-0.110	-0.015
	0.709	0.389	0.557	5.865	0.339	0.371
BC		-1.369 *	-0.148 *	-1.350 *	-1.264 *	-1.151
		0.749	0.841	0.755	0.798	0.711
IFL*BC			0.696			
			1.507			
a_25*IFL				0.366		
				0.882		
gadp						3.680 ***
						1.183
lprivo					0.862 ***	0.307
					0.232	0.304
lopenk					-0.198	-0.165
					0.296	0.276
ipr					0.315	0.155
					0.282	0.291
R2	0.079	0.096	0.098	0.097	0.279	0.193
Obs	85	85	85	85	73	73

Note. The dependent variable is the 25-year average annual growth rate of TFP (dlog(A)/25). All regressors are expressed as period average, except for the logaritm of the initial TFP level. The sample spans between 1975 and 1999. All regressions include a constant. Robust standard errors are reported below the coefficients. *, ** and *** indicate that a coefficient is significant at 10, 5 and 1 per cent, respectively.

Table 5

Capital account liberalization and Capital accumulation - Dynamic Panel Data - System GMM

	1	2	3	4	5	6	7
k_5	0.900 ***	0.851 ***	0.892 ***	0.919 ***	0.913 ***	0.899 ***	0.897 ***
	0.034	0.047	0.023	0.019	0.025	0.029	0.029
IFL	0.116	0.225 **	0.005	-1.300 **	0.113	0.126	0.153
	0.082	0.104	0.040	0.526	0.077	0.138	0.162
BC	-0.154 ***		-0.076 ***	-1.090 ***	-0.127 ***	-0.146 ***	-0.376 **
	0.033		0.028	0.310	0.026	0.031	0.167
lgov			0.010				
			0.066				
lprivo			0.169 ***				
			0.046				
lopenk			-0.034				
			0.081				
k_5*IFL				0.057 **			
				0.023			
k_5*BC				0.043 ***			
				0.013			
IFL*BC					-0.092		
					0.108		
IFL*dev'ing						-0.003	
						0.236	
BC*dev'ed						0.088	
						0.087	
IFL*(1-gadp)							-0.145
							0.522
BC*gadp							0.428
							0.283
Sargan (p-val)	0.396	0.565	0.522	0.233	0.169	0.195	0.230
m2 (p-val)	0.204	0.622	0.337	0.153	0.11	0.131	0.152
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	449	449	341	449	449	449	449
Countries	91	91	77	91	91	91	308

Note. The dependent variables are the 5-year log-difference and the end-of-period level of capital stock. All regressors are log differences and levels of 5-year period averages. The sample spans between 1975 and 1999. All regressions include a constant. The estimation is performed with the two-step system-GMM procedure. Coefficients and standard errors are reported from the first step. *, ** and *** indicate that a coefficient is significant at 10, 5 and 1 per cent, respectively. The p-values for the Sargan overidentification test and the second order serial correlation (m2) test are reported from the second step.

Table 6

Capital account liberalization and TFP - Dynamic Panel Data - System GMM

	1	2	3	4	5	6	7
a_5	0.761 ***	0.747 ***	0.708 ***	0.785 ***	0.799 ***	0.759 ***	0.766 ***
	0.078	0.083	0.074	0.101	0.076	0.078	0.081
IFL	0.148 **	0.184 ***	0.138 **	-1.048	0.169 ***	0.298 ***	0.350 ***
	0.064	0.067	0.064	2.121	0.060	0.086	0.122
BC	-0.088 *		-0.104 ***	0.398	-0.065	-0.088 *	-0.094
	0.047		0.039	0.600	0.047	0.051	0.232
lopenk			-0.054				
			0.081				
lprivo			0.060				
			0.038				
a_5*IFL				0.181			
				0.323			
a_5*BC				-0.083			
				0.101			
IFL*BC					-0.296 ***		
					0.109		
IFL*dev'ing						-0.405 *	
						0.225	
BC*dev'ed						0.014	
						0.129	
IFL*(1-gadp)							-0.915
							0.584
BC*gadp							0.009
							0.386
Sargan (p-val)	0.495	0.15	0.509	0.382	0.749	0.508	0.548
m2 (p-val)	0.695	0.98	0.840	0.512	0.627	0.642	0.659
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	433	433	329	433	433	433	433
Countries	89	89	75	89	89	89	89

Note. The dependent variables are the 5-year log-difference and the end-of-period level of TFP. All regressors are log differences and levels of 5-year period averages. The sample spans between 1975 and 1999. All regressions include a constant. The estimation is performed with the two-step system-GMM procedure. Coefficients and standard errors are reported from the first step. *, ** and *** indicate that a coefficient is significant at 10, 5 and 1 per cent, respectively. The p-values for the Sargan overidentification test and the second order serial correlation (m2) test are reported from the second step.

Table 7

Capital account liberalization and Capital accumulation - Dynamic Panel Data - System GMM

	1	2	3
k_5	0.900 ***	0.834 ***	0.907 ***
	0.034	0.055	0.023
IFL	0.116	-0.020	-0.068
	0.082	0.119	0.060
BC	-0.154 ***	-0.159 ***	-0.045
	0.033	0.071	0.039
IFL_5		0.285 ***	0.087
		0.135	0.059
a			0.304 ***
			0.076
Sargan (p-val)	0.396	0.968	0.577
m2 (p-val)	0.204	0.839	0.580
Time FE	Yes	Yes	Yes
Obs	449	436	428
Countries	91	90	89

Note. The dependent variables are the 5-year log-difference and the end-of-period level of capital stock. All regressors are log differences and levels of 5-year period averages. The sample spans between 1975 and 1999. All regressions include a constant. The estimation is performed with the two-step system-GMM procedure. Coefficients and standard errors are reported from the first step. *, ** and *** indicate that a coefficient is significant at 10, 5 and 1 per cent, respectively. The p-values for the Sargan overidentification test and the second order serial correlation (m2) test are reported from the second step.

Table 8

Equity market liberalization and Capital accumulation

	Panel D-i-D	Cross section	DPD
k_t		-0.709 ***	0.870 ***
		0.233	0.037
EML	0.629 *	2.049 *	0.258 ***
	0.339	1.172	0.099
BC	-0.341 ***	-0.667	-0.015
	0.107	0.925	0.035
lgov	-1.007 ***	-0.225	0.102
	0.338	0.629	0.097
lprivo	-0.501 **	1.958 ***	0.118 **
	0.254	0.597	0.051
lrgdpch	3.511 ***		
	0.777		
EML_switch3	0.422		
	0.298		
lopenk		-0.375	-0.084
		0.479	0.091
GADP		-5.909 **	
		2.423	
Sargan (p-val)			0.352
m2 (p-val)			0.449
Time FE	Yes	No	Yes
Time-Continent	Yes	No	No
Obs	1026	72	260
Countries	69	72	68

Note: the regressions in this table replicate those of Table 1 col. 6, Table 3 col. 5, and Table 5 col. 3, replacing capital account liberalization with equity market liberalization. For all the other respect, refer to the originary tables.

Table 9

Equity market liberalization and TFP

	Panel D-i-D	Cross section	DPD
a_t		-1.004 ***	0.708 ***
		0.384	0.074
EML	0.055 ***	1.304 *	-0.058
	0.021	0.830	0.119
BC	-0.051 ***	-1.150 *	-0.093 **
	0.007	0.720	0.045
lopenk	-0.012	0.022	-0.098
	0.026	0.255	0.078
lprivo	0.011	0.587	0.051
	0.017	0.309	0.047
ipr	0.009	-0.222	
	0.008	0.324	
EML_switch3	0.005		
	0.017		
Sargan (p-val)			0.883
m2 (p-val)			0.312
Time FE	Yes	No	Yes
Time-Continent	Yes	No	No
Obs	814	65	253
Countries	67	65	67

Note: the regressions in this table replicate those of Table 2a col. 6, Table 4 col. 5, and Table 6 col. 3, replacing capital account liberalization with equity market liberalization. For all the other respect, refer to the originary tables.

Table 10
Financial liberalization and banking crises - yearly panel - logit

	1	2	3	4
			Developed	Developing
IFL	0.213	0.202	1.587 ***	-0.125
	0.269	0.266	0.365	0.308
depins	0.640 **	0.577 *	0.732	0.807 **
	0.307	0.305	0.523	0.415
rrgdpch	-0.410	-0.659 **	-0.907 *	-0.941 **
	0.304	0.283	0.524	0.451
inflation	0.000 *	0.001 *	0.007 ***	0.000 **
	0.000	0.000	0.003	0.000
openk	0.001	0.002	0.016 *	0.000
	0.003	0.003	0.009	0.004
privo	-0.737			
	0.699			
grprivo		-1.817 ***	0.970	-2.926 ***
		0.515	1.647	0.717
Obs	1117	283	961	830

Note. The dependent variable is a binary indicator of banking crises (*BC_all*), that equals 1 if a crisis occurs and 0 otherwise. All regressors are in lagged values. Standard errors are clustered by country. *, ** and *** indicate that a coefficient is significant at 10, 5 and 1 per cent respectively.

Table 11
Capital account liberalization and banking crises - yearly panel - mlogit

	1	2	3	4	5	6
			Developed		Developing	
	BL	SYS	BL	SYS	BL	SYS
IFL	0.716 *	-0.187	1.921 **	0.641	0.335	-0.330
	0.406	0.366	0.804	0.791	0.577	0.399
depins	-0.200	0.767 *	2.397 ***	-0.844	-1.151	1.216 ***
	0.495	0.428	0.674	1.630	1.025	0.447
rrgdpch	0.204	-1.168 **	0.033	-2.442 **	0.013	-1.143 **
	0.410	0.496	0.446	1.029	0.752	0.575
inflation	-0.025 *	0.001 **	-0.015	0.009 ***	-0.018	0.000 **
	0.013	0.000	0.029	0.003	0.012	0.000
openk	0.007	0.000	0.040 ***	0.014	0.008	-0.001
	0.005	0.005	0.013	0.016	0.006	0.005
grprivo	-1.423	-2.013 ***	3.642 **	0.925	-2.118 **	-3.261 ***
	1.126	0.538	1.769	2.166	1.074	0.788

Note. The dependent variable is an indicator of banking crises (*BC*), that equals 2 if a systemic crisis (SYS) occurs, 1 if the crisis is borderline (BL), and 0 otherwise. All regressors are in lagged values. The estimation is performed with multinomial logit. Standard errors are clustered by country. *, ** and *** indicate that a coefficient is significant at 10, 5 and 1 per cent respectively.

Table 12

Financial integration and banking crises - yearly panel - dprobit

	ALL			BL			SYS		
	1	2	3	4	5	6	7	8	9
	Full Sample	Developed	Developing	Full Sample	Developed	Developing	Full Sample	Developed	Developing
IFL	0.060	0.399 ***	-0.015	0.017 **	0.003 ***	0.006	-0.031	0.029	-0.035
	0.055	0.079	0.060	0.018	0.024	0.019	0.046	0.120	0.054
depins	0.096 *	0.078	0.131 *	-0.003	0.003 **	-0.034 **	0.099	-0.113	0.218 ***
	0.060	0.121	0.071	0.006	0.025	0.019	0.070	0.152	0.072
rgdpch	-0.084 ***	-0.129 **	-0.100 ***	0.001	0.000	0.002	-0.850 ***	-0.131 **	-0.099 ***
	0.031	0.062	0.039	0.003	0.001	0.009	0.033	0.055	0.039
inflation	0.011 ***	0.166 ***	0.005 **	-0.038 **	-0.001	-0.048	0.010 ***	0.165 ***	0.006 **
	0.004	0.055	0.002	0.019	0.009	0.016	0.003	0.071	0.002
openk	0.039	0.209 ***	0.001	0.009	0.001	0.009	0.003	0.006	-0.005
	0.036	0.081	0.045	0.009	0.014	0.011	0.039	0.071	0.490
grprivo	-0.325 ***	0.209	-0.573 ***	-0.015	0.002	-0.036	-0.275 ***	0.085	-0.476 ***
	0.095	0.352	0.130	0.019	0.015	0.034	0.077	0.281	0.122
Obs	1077	283	794	1077	283	794	1077	283	794

Note. The dependent variable is an indicator of banking crises (*BC_X*), that equals 1 if a crisis of type X occurs, 0 otherwise. Type ALL refers to any banking crisis, BL to borderline and SYS to systemic crises. All regressors are in lagged values. The estimation is performed with probit, and the coefficients quantify marginal effects. Standard errors are clustered by country. *, ** and *** indicate that a coefficient is significant at 10, 5 and 1 per cent respectively, based on a z-statistics. Since IFL and depins are dummies, the significance of their coefficients refer to the test on the null that the underlying coefficient is zero.

Table 13

Financial integration and volatility - Cross-section (1980-2000)

	sd(logGDP)				sd(logTFP)			
	1	2	3	4	5	6	7	8
IFL	-0.050 **	-0.055 *			-0.061 **	-0.042 *		
	0.023	0.029			0.029	0.023		
EML			-0.066 ***	-0.081 ***			-0.024 ***	0.002
			0.004	0.018			0.006	0.023
BC		0.058 **		0.043 ***		0.034		0.037
		0.029		0.015		0.022		0.25
dlog(GDP)	3.013 ***	4.024 ***	3.749 ***	4.691 ***				
	1.200	1.377	0.138	0.436				
dlog(a)					-1.147	-1.819 **	-0.001	-0.021 ***
					0.764	0.810	0.024	0.006
R2	0.387	0.508	0.535	0.659	0.102	0.252	0.38	0.405
Obs	121	96	92	79	114	93	70	70

Note: OLS regressions of the standard deviation of log-real GDP per capita on the means of IFL, EML, BC and GDP growth over the period 1980-1999. Standard errors are reported in parenthesis. ***, ** and * indicate that coefficients are significant at 1, 5 and 10 per cent, respectively.