Capital Account Liberalization, Financial Development and Industry Growth: A Synthetic View

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Capital account liberalization, financial development and industry growth: A synthetic view

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Abstract

This paper synthesizes studies analyzing the effects of capital account liberalization on industry growth while controlling for financial crises, domestic financial development and the strength of institutions. We find evidence that financial openness has positive effects on the growth of financially dependent industries, although these growth-enhancing effects evaporate during financial crises. Further analysis indicates that the positive effects of capital account liberalization are limited to countries with relatively well-developed financial systems, good accounting standards, strong creditor rights and rule of law. It suggests that countries must reach a certain threshold in terms of institutional and economic development before they can expect to benefit from capital account liberalization.

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1. Introduction

The growth effects of capital account liberalization are an issue that will not go away. Since the turn of the century additional countries have moved to relax and remove restrictions on capital flows (Fig. 1). The subsequent decade then saw the fastest global growth in more than 30 years, an outcome in which many low- and middle-income countries shared. This coincidence of timing encouraged...
causal arguments that capital mobility was contributing to growth. Indeed some explanations made the connection explicit, such as the so-called Bretton Woods II model which portrays capital mobility as an essential element of high global growth in recent years.1

The crisis of 2007–2008 then turned these arguments on their head. It is now argued that an open capital account, combined with high savings in countries like China, fueled the capital flows that inflated housing markets and asset valuations in the United States. Openness to capital flows, it is further argued, allowed current account deficits to widen unsustainably in Central and Eastern Europe and encouraged the development of dangerous currency and maturity mismatches everywhere from Hungary to South Korea.2 A movement to reimpose restrictions on capital flows may now be getting underway in response. Recent experience thus highlights the fact that the debate over the growth effects of capital account liberalization remains fundamentally unresolved.

Since Rodrik (1998), who found no correlation between capital account liberalization and growth, large amounts of computer time have been consumed in attempts to identify or discredit the existence of an effect.3 It is of course possible to find no evidence of an effect when one exists; this can result from noisy data, omitted variables or other forms of model misspecification.4 But it is equally possible to find evidence of an effect when none exists owing to reverse causality running from growth and higher incomes to capital account liberalization.

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1 The locus classicus of Bretton Woods II is Dooley et al. (2003).
2 The idea that the costs and benefits of capital mobility leave a different impression in crisis and non-crisis periods is hardly novel. Thus, Eichengreen and Leblang (2003) distinguish crisis and non-crisis periods using the standard model of the macroeconomic effects of capital account liberalization.
3 Recent surveys of this literature are Eichengreen (2001), Kose et al. (2006), Henry (2007), and Rodrik and Subramanian (2008).
4 As one economist once put it, the secret of successful research is to define one’s null so that failure to estimate a significant coefficient can be claimed as success.
These problems are likely to be acute in studies using national growth rates as the dependent variable. Economy-wide growth and capital account liberalization are simultaneously determined. Growth leads to higher incomes, and with higher incomes come the stronger institutions and policies needed to manage capital flows and heighten the likelihood that the benefits of an open capital account exceed the costs. But those stronger policies and institutions which influence the decision to open the capital account also affect growth directly. In other words, they do not satisfy the exclusion restriction for a valid instrument for capital account liberalization. This renders identification problematic in regressions involving aggregate growth and a measure of capital account liberalization.

The same endogeneity confounds attempts to identify the impact of financial development on growth. In response investigators have moved to the analysis of firm and industry data. In an influential contribution, Rajan and Zingales (1998) asked whether firms and sectors that depend more on external finance benefit more from the presence of deep and liquid domestic financial markets. Specifically, they ask whether the value added of such sectors grows more quickly in countries with better developed financial markets. They found for the period 1980–1990 strong evidence that financial development mattered in this sense.

This approach has two advantages relative to the earlier literature. It gets around the reverse causality problem insofar as there is no reason why the growth of a specific industry, defined at the three- or four-digit level, should affect financial development in the country as a whole. And it tests a specific mechanism through which financial development matters, namely by relaxing financing constraints.

Extending this approach to the growth effects of capital account liberalization is straightforward. In principle firms can tap foreign as well as domestic financial markets. The question then becomes whether firms that depend more on external finance grow more quickly in countries with an open capital account. It is whether the answer depends on the strength of policies and institutions in the country.

We know of five studies posing this question: Galindo et al. (2002), Vanassche (2004), Vlachos and Waldenstrom (2005), Prasad et al. (2007), and Levchenko et al. (2009). But Galindo et al. (2002), while considering various measures of financial liberalization, do not at the same time consider financial development. And unlike recent work focusing on the effects of financial development they do not distinguish crisis and non-crisis periods, where there is a presumption that the effects of an open capital account will differ between such periods. Vanassche (2004) similarly does not distinguish crisis and non-crisis periods, and her findings for whether domestic financial development or international financial liberalization matters for industry growth are sensitive to how these variables are measured. Vlachos and Waldenstrom (2005) utilize data only through 1990 and again do not distinguish crisis and non-crisis periods. Prasad et al. (2007) use more recent data and split their sample across types of countries but they also do not separate crisis periods from normal times. Finally Levchenko et al. (2009) consider the effect of liberalization on both output growth and volatility, but they do not explicitly separate crisis and non-crisis periods. Nor do they check whether the growth effect of capital account liberalization varies across countries.5

So what is the message of studies adopting this approach? At this point there is none. In other words, there is still no synthetic analysis that controls for other factors also plausibly influencing industry growth, such as the development of domestic financial markets and the strength of institutions, and which at the same time distinguishes crisis and non-crisis periods.

5 Several other studies have attempted to distinguish the effects of financial development in crisis periods as distinct from more normal times and in countries with stronger and weaker institutions but, in contrast to our work, do not distinguish countries with open and closed capital accounts. Kroszner et al. (2007) postulate that the financial development-growth link for more financially dependent sectors should operate in normal times but not crisis periods. As their measure of crises they use the Caprio and Klingebiel (2002) index of systemic banking crises. (They do not also consider currency crises.) They find that more financially dependent sectors experience sharper contractions in crisis periods in countries with well-developed financial systems. The external dependence/financial development interaction has a significantly positive coefficient in pre-crisis periods but no effect in crisis periods. Dell’Aringa et al. (2008) do consider this relationship indirectly. Their conjecture is that when the capital account is open and financially dependent firms can tap foreign finance even if the domestic banking system seizes up, financially dependent sectors should suffer less. Their proxy for capital account openness is the flow of foreign loans and bonds to the private sector. They confirm that the impact of banking crises on financially dependent sectors is less when the capital account is open.
It is that synthetic view that we attempt to provide in this paper. We find evidence that capital account openness has positive effects on the growth of financially dependent industries. But those effects are eliminated by crises: the growth of financially dependent sectors is no faster in financially open than financially closed economies in decades marked by crises. But neither is the growth of financially dependent sectors slower in crisis periods. This suggests that countries that have succeeded in avoiding crises have benefited from capital account liberalization while countries that have not so succeeded have neither benefited nor suffered on average.

But these results are driven mainly by the high-income countries. Probing deeper, we find that the positive effects of capital account openness are limited to countries with well-developed financial systems, good accounting standards, strong creditor rights, and rule of law. The same is true of the crisis period offset: just as there is no evidence for low- and middle-income countries of an additional boost from capital account liberalization in financially dependent sectors in normal times, there is no evidence of smaller benefits (or of those benefits disappearing entirely) in crisis periods, whether underdevelopment is measured by low incomes, shallow financial markets or weak institutions. This provides an explanation for why so many other earlier studies did not find a consistent effect – namely, they failed to probe for such threshold effects. It is a reminder of the importance of sequencing capital account liberalization with other policies associated with this larger process of economic and institutional development.

2. Specification

We start by estimating the baseline equation:

$$\text{VAGR}_{c,i,d} = \beta_0 + \alpha \text{SHARE}_{c,i,d} + \beta_1 \text{EF}_{i,d} + \beta_2 \text{FD}_{c,d} + \gamma \text{LIB}_{c,d} + \delta \text{LIB}_{c,d} \cdot \text{CR}_{c,d} + \epsilon_{c,i,d}$$ (1)

Here VAGR is the value added of industry $i$, in country $c$, in decade $d$; $\beta_0$ and $\alpha$ are country-decade and industry-decade fixed effects; SHARE is the share of value added of industry $i$ on total industrial value added in country $c$; EF is the index of external financial dependence of industry $i$, decade $d$; FD measures financial development in country $c$ during decade $d$; LIB measures capital account liberalization in country $c$ and decade $d$; and CR is a dummy variables that takes value one if country $c$ suffered a crisis in decade $d$.6 Following prevailing practice, we combine annual observations into decade averages in order to filter out short-term noise. Since our data end in 2004, we estimate the model using two decades (1980–1989 and 1990–1999) and a half decade (2000–2004) using methods appropriate for panel data.7

$\beta$ and $\gamma$ are the now standard coefficients measuring the extent to which financial development and capital account liberalization favor sectors that are depend more on external finance. Our first innovation is to introduce the interaction between capital account liberalization and crises. If financial integration is good for more externally dependent industries in tranquil period but not during crisis periods is correct, then $\gamma$ should be positive and $\delta$ negative. This specification and argument run in parallel with those of Kroszner et al. (2007), who introduce an interaction between banking crises and domestic financial development and hypothesize that financial development should be good for more externally dependent industries in tranquil times but it should render them more vulnerable to setbacks in crisis periods.

Eq. (1) yields unbiased estimates of our parameters of interest even if there is a causal link from financial liberalization to crises.8 Assume, for instance, that $\text{CR}_{c,d} = \Psi \text{LIB}_{c,d} + u_{c,d}$, we can then rewrite Eq. (1) as:

$$\text{VAGR}_{c,i,d} = \beta_0 + \alpha \text{SHARE}_{c,i,d} + \beta_1 \text{EF}_{i,d} + \beta_2 \text{FD}_{c,d} + \gamma \text{LIB}_{c,d} + \lambda \text{LIB}_{c,d}^2 + \epsilon_{c,i,d}$$ (2)

6 The model could also include a set of country-industry fixed effects, but the inclusion of these fixed effects generates multicollinearity problems and yields unstable estimates.

7 The results do not change substantially when we exclude the 2000–2004 period.

8 We would like to thank an anonymous referee for making us think about these issues.
With $\lambda = \delta \Psi$; $u_{cd}$ being fully absorbed by the country-decade fixed effects, it is not part of the error term of model (2).\(^9\) But while a potential causal effect running from liberalization to crises is not a source of bias, it has two potential implications for our findings. The first is multicollinearity: a strong correlation between crises and financial liberalization could lead to unbiased but unstable estimates. The second implication has to do with the interpretation of the parameters of model (1). If it is true that high levels of financial globalization increase the probability of a crisis (i.e., $\Psi > 0$) and if we were to find (as we do) that $\gamma$ is positive and $\delta$ negative, then there would be a range of parameters for which growth is maximized at intermediate levels of liberalization (in Eq. (2) $\gamma > 0$ and $\lambda < 0$). In fact Eq. (2) shows that, for any industry with a positive value of EF and with $\gamma > 0$ and $\lambda < 0$, growth reaches a maximum when $\text{LIB} = \gamma/2\lambda$.\(^10\)

3. Data and sample\(^11\)

To calculate the growth of value added, we draw annual observations from UNIDO’s Industrial Statistics Data Base 2006. This data base covers manufacturing firms at the three-digit and four-digit International Standard Industrial Classification (ISIC) level. Data from both revisions 2 and 3 were matched to the three and four-digit ISIC codes in revision 2. We matched sector codes in the two revisions using the official correspondence table available in the website of the UN statistical division. When the correspondence table did not provide a perfect match we manually matched the various sectors by using our own judgment based on the qualitative description of the ISIC sectors provided by the two revisions.\(^12\) We calculate the growth of real value added in the periods 1980–1989, 1990–1999, and 2000–2004 for same the three-digit and four-digit ISIC sectors used by Rajan and Zingales.\(^13\)

Rajan and Zingales create their index of external financial dependence (EF) at the ISIC industry-level for a sample of US firms for the 1980–1990 decade. EF is computed as capital expenditures minus cash flow from operations, divided by capital expenditures. Rajan–Zingales compute these variables over a ten-year period to smooth fluctuations. They then use the median value of this industry-specific variable as the measure of EF. We combined the original Rajan–Zingales indices for 1980–1990 with new indices for 1990–2000 and 2000–2004 generated using Worldscope data.\(^14\) The correlation between the 1980–1990 Rajan–Zingales index and that for 1990–2000 is 0.68, while the correlation between the 1980–1990 Rajan–Zingales index and that for 2000–2004 lses index computed with Worldscope data is 0.74.\(^15\)

We measure financial development (FD) as private credit scaled by GDP. The numerator and denominator are both obtained from the International Financial Statistics.\(^16\)

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\(^{9}\) Even if it where, it would not bias our model because $u_{cd}$ is not correlated with the other variables.

\(^{10}\) While much casual commentary has attributed the East Asian crisis of 1997–1998 to capital account liberalization, several statistical studies find no evidence of a causal link (see for instance Kose et al., 2006). In our data there is a positive but statistically insignificant correlation between capital account liberalization and crises. (Estimating the direction of the causal link between these two variables is beyond the scope of this paper.) If we estimate model (2), we find some evidence of a concave relationship between capital account liberalization and industry growth, but none of the parameters is statistically significant. In particular, if we estimate Eq. (2) using the data of Table 4 (to estimate Eq. (2), we need a continuous measure of capital account liberalization), we find that $\gamma=0.13$ and $\lambda=0.025$. If $EF > 0$, these point estimates suggest that industry growth reaches a maximum when the index of capital account openness is 2.6 (in our data the index of capital account openness ranges between –1.8 and 2.6 with an average value of 0.7).

\(^{11}\) Table A1 in the Appendix lists all the variables used in the empirical analysis with their sources and definitions.

\(^{12}\) The official correspondence table is available at http://unstats.un.org/unsd/crregistry/regso.asp?C1=1&Lg=1.

\(^{13}\) To deflate value added we use consumer price index (CPI) data from the International Financial Statistics (IFS) of the International Monetary Fund.

\(^{14}\) For the 1980s, we used the original Rajan and Zingales data because Worldscope has limited coverage for this decade. The Worldscope database is managed by Thomson Reuters and includes balance-sheet information in a standardized format. Worldscope covers more than 90% of the world’s market value and covers more than 60 developed and emerging countries. The main problem with Worldscope that information starts in the mid 1980s. Unfortunately, we cannot, instead use Compustat for the 1990s and 2000s because we do not have access to this database. Note that Kroszner et al. (2007) and Dell’Ariccia et al. (2008) also use Compustat data for the 1980s and Worldscope data for the 1990s.

\(^{15}\) The correlation between the 1990–2000 index and the 2000–2004 index is 0.96.

\(^{16}\) Private credit is the default option in most previous research. However, some studies as noted above use alternative measures of financial development, stock market capitalization for example. We consider some of these alternatives in our sensitivity analysis.
To capture capital account openness (LIB) we utilize Lane and Milesi-Ferretti’s (2007) measure of external capital stock as a share of GDP. The authors estimate external assets and liabilities for 145 industrial and developing countries using the international-investment-position figures published by national central banks and governments. We set LIB to be equal to one for all countries for which this index is above the cross-country average in a given decade. An alternative is to use the de jure measure of capital account liberalization or openness as assessed by the IMF and published in its Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). Chinn and Ito (2006) have tabulated these data for 182 countries for the period 1970–2006 and created a measure of financial openness. Up until 1996 the measure is based on a set of four proxies for government restrictions on capital mobility viz. (a) openness of the capital account, (b) openness of the current account, (c) the stringency of requirements for the repatriation and/or surrender of export proceeds, and (d) the existence of multiple exchange rates for capital account transactions. These binary variables are set equal to one when restrictions are non-existent, and zero otherwise. Since 1997 the classification in AREAER for proxy (a) has been disaggregated, allowing Chinn–Ito use binary variables for each of the sub-categories as well. For controls on the capital account they use a five-year moving average of the capital controls (for the current year and four previous years). Yet another KAOPEN measure is based on the first principal component of the four categories. This index has a higher value for countries that are more open to cross-border financial transactions. The index is constructed such that the series has a mean of zero. Country values range from 2.603 to −1.767.

For banking crises we use the Honohan and Laeven (2005) database, which updates Caprio and Klingebiel (2002). This covers systemic and non-systemic banking crisis episodes in the period 1974–2002. For 2003 and 2004, we used publications of the IMF, World Bank, Moody’s and Fitch Ratings to identify crisis episodes. A binary measure is used for the annual banking crisis variable (1 = banking crisis in a particular year in a country, 0 = no crisis). The resulting variable takes value one if a country suffered a crisis in a given decade.

Currency crisis dates are obtained from the Glick–Hutchison database. Glick and Hutchison first construct a measure of exchange market pressure as a weighted average of monthly real exchange rate changes and monthly percentage reserve losses. They identify a currency crisis when (i) exchange market pressure is more than two standard deviations than the country-specific mean over the sample period and (ii) the change in pressure is greater than 5%. The currency crisis variable is also entered in binary form (1 if there was a currency crisis in a given decade and 0 otherwise).

In order to ensure sufficient representativeness and that results for a country or industry are not driven by a few influential observations, we dropped countries with fewer than ten industries in any given decade and all the industries with fewer than 5 observations per country-decade. Since industry-level data tend to be noisy, we also dropped some extreme outliers. We first estimated a standard Rajan–Zingales regression (i.e., a model that does not include the interaction between external financial dependence and capital account liberalization). We then recovered the regression’s residuals and computed their standard deviation. Last we dropped all the observations which had residuals with an absolute value greater that three standard deviations. After cleaning the data using the steps described above, we were left with a dataset that includes 36 industries and up to 49 countries or a total of 3979 observations.

Table 1 reports summary statistics for the main variables. Average real industry value added growth in the sample is 1.2% and ranges from −100% to 145%. The index of external financial dependence has an average value of 0.02 and ranges between −3.2 and 10.8. Financial development has an average value of

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17 We obtain similar results when we use a continuous measure of capital account liberalization (see below). However, the results are easier to interpret with the discrete version of the index.
18 2006 update of database originally constructed in Glick et al. (2006).
19 For the 2000–2004 period we dropped all industries that had fewer than 3 observations per country.
20 The dataset is almost balanced across periods, we have 1042 observations for the 1989–1989 decade, 1495 observations for the 1990–1999 decade, and 1442 observations for the 2000–2004 period. By cleaning our data we lose nearly 100 observations (the full sample would have 4060 observations). Our results are robust to using a sample that includes all observations.
58% and ranges between 2% and 190%. About 7% of our observations include a currency crisis, while almost one-third of our observations include a banking crisis.21

### 4. Results

Table 2 reports the baseline results. It pools the three cross-sections and winsorizes the dependent variable at 100%. The basic Rajan–Zingales interaction (EF_FD) is always positive over this period but it is rarely significant at standard confidence levels. Other authors extending Rajan and Zingales’s (1998) results for the 1980s to a longer period and adding additional controls, such as Levchenko et al. (2009), have found similar results.

The next coefficient of interest is that on the EF_LIB interaction (\( \gamma \)) in Eq. (1). \( \gamma \) captures whether capital account liberalization stimulates faster growth of value added in industries that rely more on external finance. The coefficients on this interaction are uniformly positive. In four of the six columns of Table 2 they are statistically significant at conventional confidence levels. The point estimates imply that in countries with an open capital account a one standard deviation difference in external financial dependence is associated with additional value added growth of slightly more than 1% per annum (1.56 /C20.679 = 1.06). Alternatively, in countries with an open capital account, the difference between the industry at the 25th percentile of the distribution of external financial dependence (0.26) and the industry at the 75 percentile of external financial dependence (0.01) is associated with a growth differential in real value added of approximately 0.5% per annum.

The other parameter of interest (\( \delta \)) captures the extent to which more externally dependent industries in countries with an open capital account suffer relatively more at times of crisis. In column 1 we let the crisis dummy take on a value one for all types of crises (banking and currency crises alike). \( \delta \) is negative and statistically significant and of the same order of magnitude as \( \gamma \). This indicates that the positive effect of capital account liberalization is eliminated in crisis periods (\( \gamma + \delta = 0 \)). That is, while both \( \gamma \) and \( \delta \) are significantly different from zero, their sum is not significantly different from zero (if we test the null \( \gamma + \delta = 0 \) we do not reject with a p value of 0.86).22 More externally dependent industries, it would appear, grow more rapidly with liberalization in normal times but they do not grow more slowly in crisis periods. This is analogous to what Kroszner et al. (2007) find for banking crises and the effects of domestic financial development. On balance, then, there is no evidence that countries experiencing crises are worse off on average as a result of either financial development or capital account liberalization. They just forego the benefits.

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21 The fact that almost one-third of our observations are associated with a banking crisis should not be interpreted as meaning that the countries were in a banking crisis for one-third of the years covered in our sample because the crisis dummy takes value one if a country had at least one crisis year in a given decade.

22 Note that both the interaction of external financial dependence and capital account liberalization and the further interaction of these variables with a crisis are statistically significant at conventional confidence levels.
### Table 2

All countries, decade panel, Winsorized at 100%, FINLIB is KSTOCK.

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
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<td>COEFFICIENT</td>
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<td>GRVA</td>
<td>GRVA</td>
<td>GRVA</td>
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<td>GRVA</td>
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<tr>
<td>SHARE</td>
<td>$-9.49^{**}$ (3.836)</td>
<td>$-9.49^{**}$ (3.842)</td>
<td>$-9.36^{**}$ (3.828)</td>
<td>$-9.37^{**}$ (3.828)</td>
<td>$-9.47^{**}$ (3.838)</td>
<td>$-9.47^{**}$ (3.84)</td>
</tr>
<tr>
<td>EF_FD</td>
<td>0.0820 (0.195)</td>
<td>0.0917 (0.198)</td>
<td>0.452* (0.244)</td>
<td>0.260 (0.227)</td>
<td>0.222 (0.221)</td>
<td>0.222 (0.221)</td>
</tr>
<tr>
<td>EF_LIB</td>
<td>0.679** (0.275)</td>
<td>0.598** (0.235)</td>
<td>0.277 (0.188)</td>
<td>0.275 (0.191)</td>
<td>0.567** (0.227)</td>
<td>0.717*** (0.26)</td>
</tr>
<tr>
<td>EF_LIB_AC</td>
<td>$-0.64^{**}$ (0.282)</td>
<td>$-0.75^{***}$ (0.276)</td>
<td>$-0.76^{***}$ (0.268)</td>
<td>$-0.652^{**}$ (0.28)</td>
<td>$-0.763^{***}$ (0.28)</td>
<td>$-0.763^{***}$ (0.28)</td>
</tr>
<tr>
<td>EF_LIB_CC</td>
<td>$-0.60^{***}$ (0.217)</td>
<td>$-0.311$ (0.206)</td>
<td>$-0.316^{*}$ (0.187)</td>
<td>$-0.316^{*}$ (0.187)</td>
<td>$-0.316^{*}$ (0.187)</td>
<td>$-0.316^{*}$ (0.187)</td>
</tr>
<tr>
<td>Constant</td>
<td>$-1.167$ (1.530)</td>
<td>$-1.170$ (1.541)</td>
<td>$-1.203$ (1.518)</td>
<td>$-1.496$ (1.517)</td>
<td>$-0.969$ (1.538)</td>
<td>$-2.202$ (1.29)</td>
</tr>
<tr>
<td>Observations</td>
<td>3979</td>
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<td>3979</td>
<td>3979</td>
<td>3979</td>
<td>3979</td>
</tr>
<tr>
<td>$R$-squared</td>
<td>0.813</td>
<td>0.813</td>
<td>0.813</td>
<td>0.813</td>
<td>0.813</td>
<td>0.81</td>
</tr>
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</table>

This table estimates a model in which the dependent variable is value added growth (GRVA) for industry $i$, country $c$, decade $d$. The controls include country-decade fixed effects and industry-decade fixed effects (the coefficients are not reported). SHARE is the initially share of value added; EF_FD is the interaction between the Rajan–Zingales index of external financial dependence in industry $i$, decade $d$ and financial development in country $c$ decade $d$, EF_LIB is the interaction between the Rajan–Zingales index of external financial dependence in industry $i$, decade $d$ and financial openness (proxied by the Lane and Milesi-Ferretti, 2007, measure of external capital stock) in country $c$ decade $d$, EF_LIB_AC is the interaction among the Rajan–Zingales index of external financial dependence, financial openness and a dummy variable that takes value one if a country suffered either banking or currency crisis in the decade (EF_LIB_BC is similar to EF_LIB_AC but with the dummy variable taking value one if a country suffered a banking crisis in the decade), EF_FD_AC and EF_FD_BC are triple interactions between the index of external financial dependence, financial development, and crisis dummies. Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. 

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In column 2 we consider only currency crises. We still find that $\gamma$ is positive and statistically significant and that $\delta$ is negative and statistically significant. If anything, the crisis effect is now stronger. That is, the total effect on more externally-finance-dependent industries in crisis periods is negative ($\gamma + \delta = -0.15$), although the difference from zero is still not statistically significant.

In columns 3 and 4 we follow an approach similar to that of Dell’Ariccia et al. (2008) and Kroszner et al. (2007) and interact the crisis dummy with the country-level measure of financial development. When we consider all crises (column 3) we find that the main effect of financial development (EF_FD) is positive and statistically significant, the liberalization interaction (EF_LIB) is positive but not statistically significant, and the crisis triple interaction (EF_FD_AC) is negative and statistically significant. This parallels the results of Kroszner et al. (2007). But when we focus on banking crises (column 4) as in their study, we find that while all coefficients have the right sign they are no longer significant (individually nor jointly).

In column 5 we include both the interaction between the banking crisis dummy and financial development (EF_FD_BC) and the interaction between currency crisis and capital account liberalization (EF_LIB_CC). The coefficient on the capital account liberalization–currency crisis interaction remains large and statistically significant at the 1% confidence level, while the financial development–banking crisis interaction is only marginally significant. Importantly, the two triple interactions picking up differences between crisis and non-crisis periods are jointly significant (the $p$ value is 0.009).

Some of the benefits of capital account liberalization could conceivably go through the creation of a larger domestic financial sector, as argued by inter alia Vanasse (2004). In the last two columns of Table 2 we therefore re-estimate the models of columns 1 and 2 but without the EF_FD interaction. Any induced impact on FD will now be fully captured by the interaction terms in AC. The results are basically identical to those of columns 1 and 2. This confirms that controlling for the level of financial development does not disguise the benefits (or cost) of capital account liberalization.

The bottom line is that domestic financial development and capital account liberalization both benefit the growth of financially dependent sectors in countries that are able to avoid the crisis problem. But when banking and currency crises intervene, those benefits are neutralized. Still, there is no evidence that countries experiencing crises are worse off on balance as a result of financial development and capital account liberalization.

5. Sensitivity analysis

In Table 3, we estimate the same model as in Table 2 but replace de facto capital account liberalization with de jure liberalization. The results go in the same direction as those in Table 2, although the estimates are somewhat less precise. In Table 4 we replace our discrete measures of liberalization with a continuous measure based on the Chinn and Ito (2006) de jure index of capital account liberalization (KAOPEN) and the Lane and Milesi-Ferretti (2007) de facto measure of external capital stock as a share of GDP (KSTOCK). When we use KAOPEN we fully reproduce our baseline results, but when we use KSTOCK we find that the coefficients are often insignificant and that the crisis–liberalization interaction tends to be positive and insignificant.

Next, we estimate the same model as in Table 2 using a robust regression estimator to check whether the results are driven by outliers.23 Controlling for outliers in fact only strengthens the results.24 We also check whether our results depend on the Winsorization used in Table 2. Including all observations does not affect our result of a positive impact on more financially dependent sectors of external financial liberalization in normal periods that is neutralized in periods of currency crisis. As a further robustness analysis, we augment our model with the interaction between the index of

---

23 This is important insofar as outliers can be particularly problematic with interacted variables. To check for outliers we use the robust regression routine in STATA. This starts by estimating and OLS regression and dropping observations which have a Cook’s distance of greater than 1. Next, it re-estimates the model by weighing observations with the inverse of the absolute value of the residuals. The process then continues until the differences in weights before and after the regression converges to zero.

24 For a full set of results (including those listed below) see the working paper version of the paper (Eichengreen et al., 2009).
Table 3
All countries, decade panel, Winsorized at 100%, FINLIB is KAOPEN.

<table>
<thead>
<tr>
<th>COEFFICIENT</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EF_FD</td>
<td>0.217 (0.208)</td>
<td>0.170 (0.206)</td>
<td>0.519** (0.255)</td>
<td>0.337 (0.242)</td>
<td>0.293 (0.235)</td>
</tr>
<tr>
<td>EF_LIB</td>
<td>0.412 (0.251)</td>
<td>0.409* (0.238)</td>
<td>0.132 (0.199)</td>
<td>0.109 (0.206)</td>
<td>0.364 (0.234)</td>
</tr>
<tr>
<td>EF_LIB_AC</td>
<td>-0.533* (0.276)</td>
<td>-0.595** (0.258)</td>
<td>-0.615*** (0.225)</td>
<td>-0.334 (0.214)</td>
<td>-0.290 (0.200)</td>
</tr>
<tr>
<td>EF_LIB_CC</td>
<td>-1.178 (1.522)</td>
<td>-1.143 (1.524)</td>
<td>-1.097 (1.520)</td>
<td>-1.370 (1.517)</td>
<td>-0.979 (1.521)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.979</td>
<td>0.979</td>
<td>0.979</td>
<td>0.979</td>
<td>0.979</td>
</tr>
<tr>
<td>Observations</td>
<td>3979</td>
<td>3979</td>
<td>3979</td>
<td>3979</td>
<td>3979</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.813</td>
<td>0.813</td>
<td>0.813</td>
<td>0.813</td>
<td>0.813</td>
</tr>
</tbody>
</table>

This table estimates a model in which the dependent variable is value added growth (GRVA) for industry of external dependence, the initially share of value added; EF_FD is the interaction between the Rajan Zingales index of external financial dependence in industry, decade and financial development in country c decade d, EF_LIB is the interaction between the Rajan Zingales index of external financial dependence in industry, decade d and financial openness (proxied by the Chinn and Ito, 2006 measure of de jure openness) in country c decade d, EF_LIB_AC is the interaction among the Rajan–Zingales index of external financial dependence, financial openness and a dummy variable that takes value one if a country suffered either banking or currency crisis in the decade (EF_LIB_BC is similar to EF_LIB_AC but with the dummy variable taking value one if a country suffered a banking crisis in the decade), EF_FD_AC and EF_FD_BC are triple interactions between the index of external financial dependence, financial development and crisis dummies.

Robust standard errors in parentheses, **p < 0.01, *p < 0.05, *p < 0.1.

external finance and the percentage change of the real exchange rate (where we measure real appreciation as an increase in the real exchange rate). The rationale for including this term is that industries relying more on external finance may be more export oriented than other industries and thus benefit from a currency depreciation associated with currency crises. Consistent with this hypothesis, we find that the EF_DRER interaction is always positive; however, it is never statistically significant, and adding it to the model does not change the baseline results.

To check whether our results are sensitive to treating crises as discrete events, with the crisis variable taking value one if a country suffered a crisis in a given decade and zero otherwise, we re-estimate the regression of Table 2 using a continuous definition of the crisis variables. In this case, the crisis variables range from zero to one and measure the share of years in the relevant sub-period marked by either a banking or currency crisis. The results are again similar to those of Table 2, the main exception being that the external finance–financial development–banking crisis triple interaction is never statistically significant.

As a final robustness check, we experimented with alternative measures of financial development. In particular, we substitute credit to the private sector with either bank deposits over GDP or stock market capitalization over GDP and find results which are similar to those of Table 2, the exception being that when we use stock market capitalization we lose about 140 observations and find that that the interaction between crisis and financial development is never statistically significant.

6. Which countries benefit from capital account liberalization?

The Rajan and Zingales (1998) methodology is rarely used to test whether the effect of financial development differs across different classes of countries. In this section, we reproduce the analysis of the previous section but allow the effects of financial development and capital account liberalization to vary across country groupings.

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25 This is a possible interpretation of the effect of real depreciation in the Dell’Ariccia et al. (2008) study (see above).

26 An exception is Prasad et al. (2007) who look at whether the level of financial development affects the way in which capital account liberalization affects the performance of more financially dependent industries.
Table 4
All countries, decade panel, Winsorized at 100%, FINLIB is the continuous measure of capital account liberalization.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>De jure index (KAOPEN)</td>
<td>De facto index (KSTOCK)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EF_FD</td>
<td>0.114 (0.198)</td>
<td>0.0876 (0.193)</td>
<td>0.372 (0.237)</td>
<td>0.203 (0.19)</td>
<td>0.201 (0.19)</td>
<td>0.500** (0.23)</td>
</tr>
<tr>
<td>EF_LIB</td>
<td>0.170** (0.0834)</td>
<td>0.172** (0.0749)</td>
<td>0.0838 (0.0564)</td>
<td>0.489 (0.31)</td>
<td>0.464 (0.30)</td>
<td>0.509** (0.21)</td>
</tr>
<tr>
<td>EF_LIB_AC</td>
<td>-0.176* (0.103)</td>
<td>-0.237** (0.0965)</td>
<td>0.0844 (0.49)</td>
<td>0.168 (0.51)</td>
<td>0.166 (0.51)</td>
<td>0.165 (0.51)</td>
</tr>
<tr>
<td>EF_FD_AC</td>
<td>-3.130** (1.375)</td>
<td>-3.067** (1.378)</td>
<td>-2.873** (1.387)</td>
<td>-2.900** (1.36)</td>
<td>-2.882** (1.36)</td>
<td>-2.795** (1.33)</td>
</tr>
<tr>
<td>Observations</td>
<td>3852</td>
<td>3852</td>
<td>3852</td>
<td>3742</td>
<td>3742</td>
<td>3742</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.815</td>
<td>0.815</td>
<td>0.815</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
</tr>
</tbody>
</table>

This table estimates a model in which the dependent variable is value added growth (GRVA) for industry \( i \), country \( c \), decade \( d \). The controls include country-decade fixed effects and industry-decade fixed effects (the coefficients are not reported). SHARE is the initial share of value added; EF_FD is the interaction between the Rajan–Zingales index of external financial dependence in industry \( i \), decade \( d \) and financial development in country \( c \), decade \( d \); EF_LIB is the interaction between the Rajan–Zingales index of external financial dependence in industry \( i \), decade \( d \) and financial openness (proxied by FINLIB to be equal to one for all countries for which this index is above the cross-country average in a given decade) in country \( c \), decade \( d \); EF_LIB_AC is the interaction among the Rajan–Zingales index of external financial dependence, financial openness and a dummy variable that takes value one if a country suffered either banking or currency crisis in the decade, EF_FD_AC is a triple interaction between the index of external financial dependence, financial development, and crisis dummies.

Robust standard errors in parentheses, **\( p < 0.01 \), *\( p < 0.05 \), *\( p < 0.1 \).

We start by interacting all of our variables of interest with a dummy that takes value one for developing countries.27 We thus estimate the following model:

\[
VAGR_{c,1,d} = cd + id + \alpha SHARE_{c,1,d} + EF_{c,d} (\beta FD_{c,d} + \gamma LIB_{c,d} + \delta LIB_{c,d} \ast \text{CR}_{c,d}) + \text{DEV}_i
\]

\[
\ast EF_{c,d} (b FD_{c,d} + g LIB_{c,d} + d LIB_{c,d} \ast \text{CR}_{c,d}) + \varepsilon_{c,i,d}
\]

\( \beta, \gamma, \) and \( \delta \) now measure the effect of financial development, capital account liberalization, and crisis in the industrial countries, and \( \beta + b, \gamma + g, \) and \( \delta + d \) measure the effect of financial development, capital account liberalization, and crisis in developing countries (\( b, g, \) and \( d \) measure the difference between developing and industrial countries).

Table 5 shows that \( \beta \) and \( b \) are always positive but rarely statistically significant. Their sum is marginally significant (with a \( p \) value of 0.09) in only one equation (column 3, see the F-test on EF_FD + EF_FD_DEV at the bottom of the table). In contrast, capital account liberalization always has a positive and statistically significantly impact in the industrial countries (this is the \( \gamma \) coefficient), but the coefficient for the developing countries is always negative (albeit not statistically significant), and \( \gamma + g \) is never close to being statistically significant (see the EF_LIB + EF_LIB_DEV F-test at the bottom of Table 5). The interaction between crisis and liberalization is negative and statistically significant in the industrial countries but never significant in developing countries. Like Kroszner et al. (2007) and Dell’Ariccia et al. (2008), we find that banking and, in the case of our results, currency crises are particularly costly for more financially dependent industries. However, this result is mostly driven by the developing countries (see columns 3–5). The effect, albeit still negative, is smaller (and, in most cases, not statistically significant) in the industrial countries.

In Table 6 we interact our variables of interest with a dummy variable that takes on a value of one in countries with high levels of financial development. We so classify all country-decades with a value of FD which is above the sample median. \( \beta, \gamma, \) and \( \delta \) now measure the effect of financial development, capital account liberalization, and crisis in countries with low levels of financial development, while \( \beta + b, \gamma + g, \) and \( \delta + d \) measure the effect of financial development, capital account liberalization, and crisis in low financial development countries.
<table>
<thead>
<tr>
<th>COEFFICIENT</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHARE</td>
<td>-9.523** (3.84)</td>
<td>-9.558** (3.84)</td>
<td>-9.399** (3.83)</td>
<td>-9.395** (3.83)</td>
<td>-9.517** (3.83)</td>
<td>-9.505** (3.84)</td>
<td>-9.537** (3.84)</td>
</tr>
<tr>
<td>EF_FD</td>
<td>0.0114 (0.20)</td>
<td>-0.0479 (0.20)</td>
<td>0.251 (0.24)</td>
<td>0.0796 (0.24)</td>
<td>0.0281 (0.23)</td>
<td>0.0479 (0.20)</td>
<td>0.251 (0.24)</td>
</tr>
<tr>
<td>EF_LIB</td>
<td>0.793*** (0.30)</td>
<td>0.848*** (0.28)</td>
<td>0.579** (0.26)</td>
<td>0.521** (0.27)</td>
<td>0.921** (0.28)</td>
<td>0.760*** (0.25)</td>
<td>0.750*** (0.21)</td>
</tr>
<tr>
<td>EF_LIB_AC</td>
<td>-0.648** (0.28)</td>
<td>0.108 (0.45)</td>
<td>0.191 (0.47)</td>
<td>1.075* (0.64)</td>
<td>0.753 (0.62)</td>
<td>0.901 (0.59)</td>
<td>0.140 (0.92)</td>
</tr>
<tr>
<td>EF_LIB_CCR</td>
<td>0.161 (0.90)</td>
<td>-0.890*** (0.29)</td>
<td>-0.494 (0.35)</td>
<td>-0.376 (0.35)</td>
<td>-0.674 (0.45)</td>
<td>-0.269 (0.87)</td>
<td>-0.439 (0.51)</td>
</tr>
<tr>
<td>EF_LIB_CC</td>
<td>0.436 (0.62)</td>
<td>-0.514** (0.22)</td>
<td>0.684 (0.54)</td>
<td>0.431 (0.63)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EF_FD_AC</td>
<td>0.141 (0.21)</td>
<td>-0.876 (0.58)</td>
<td>-1.027* (0.55)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EF_FD_BC</td>
<td>0.436 (0.62)</td>
<td>-0.514** (0.22)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EF_FD_BC_DEV</td>
<td>-0.926 (0.60)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-3.661*** (1.29)</td>
<td>-3.527*** (1.32)</td>
<td>-3.723*** (1.26)</td>
<td>-3.953*** (1.25)</td>
<td>-3.251** (1.29)</td>
<td>-2.213* (1.29)</td>
<td>-2.196* (1.29)</td>
</tr>
</tbody>
</table>

Observations: 3979

R-squared: 0.81

EF_FD + EF_FD_DEV = 0
Prob > F: 0.06 0.08 4.04 1.64 2.22

EF_LIB + EF_LIB_DEV = 0
Prob > F: 0.32 0.40 0.05 0.24 0.38 0.33 0.40

EF_LIB_CR + EF_LIB_CR_DEV = 0
Prob > F: 0.57 0.42 0.76 0.62 0.52 0.57 0.43

EF_FD_CR + EF_FD_CR_DEV = 0
Prob > F: 0.57 0.53 6.06 3.20 4.71

This table estimates a model in which the dependent variable is value added growth (GRVA) for industry $i$, country $c$, decade $d$. The controls include country-decade fixed effects and industry-decade fixed effects (the coefficients are not reported). SHARE is the initially share of value added; EF_FD is the interaction between the Rajan–Zingales index of external financial dependence in industry $i$, decade $d$ and financial development in country $c$ decade $d$, EF_LIB is the interaction between the Rajan–Zingales index of external financial dependence in industry $i$, decade $d$ and financial openness (proxied by the Lane and Milesi-Ferretti, 2007, measure of external capital stock) in country $c$ decade $d$, EF_LIB_AC is the interaction among the Rajan–Zingales index of external financial dependence, financial openness and a dummy variable that takes value one if a country suffered either banking or currency crisis in the decade (EF_LIB_BC is similar to EF_LIB_AC but with the dummy variable taking value one if a country suffered a banking crisis in the decade), EF_FD_AC and EF_FD_BC are triple interactions between the index of external financial dependence, financial development, and crisis dummies. EF_LIB_AC_DEV is the interaction between the index of external dependence, financial openness and two dummy variables- the first dummy is one if any financial crises have occurred in country $I$ during that decade and the other dummy is one for developing countries. It is a quadruple interaction. The other quadruple interactions can be defined accordingly. The last few rows show the results of $F$-tests for the variable coefficients specified in the first column. Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. 

Table 5
All countries, decade panel, developing versus industrial countries, Winsorized at 100%, FINLIB is KSTOCK.
Table 6
All countries, decade panel, high versus low financial development, Winsorized at 100%, FINLIB is KSTOCK

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHARE</td>
<td>−9.485** (3.84)</td>
<td>−9.525** (3.84)</td>
<td>−9.348** (3.83)</td>
<td>−9.372** (3.83)</td>
<td>−9.523** (3.83)</td>
<td>−9.484** (3.84)</td>
<td>−9.538** (3.84)</td>
</tr>
<tr>
<td>EF_FD</td>
<td>−0.164 (0.97)</td>
<td>−0.297 (0.98)</td>
<td>0.726 (1.19)</td>
<td>0.303 (1.02)</td>
<td>0.225 (1.00)</td>
<td>0.229 (0.40)</td>
<td>0.0893 (0.59)</td>
</tr>
<tr>
<td>EF_LIB</td>
<td>0.113 (0.62)</td>
<td>0.216 (0.41)</td>
<td>0.225 (0.32)</td>
<td>0.225 (0.32)</td>
<td>0.229 (0.40)</td>
<td>0.0893 (0.59)</td>
<td>0.203 (0.39)</td>
</tr>
<tr>
<td>EF_LIB_AC</td>
<td>−0.161 (0.66)</td>
<td>0.195 (0.88)</td>
<td>0.267 (0.88)</td>
<td>−0.308 (1.10)</td>
<td>−0.0734 (0.92)</td>
<td>−0.133 (0.91)</td>
<td>0.160 (0.65)</td>
</tr>
<tr>
<td>EF_FB_HFD</td>
<td>0.161 (0.66)</td>
<td>0.195 (0.88)</td>
<td>0.267 (0.88)</td>
<td>−0.308 (1.10)</td>
<td>−0.0734 (0.92)</td>
<td>−0.133 (0.91)</td>
<td>0.160 (0.65)</td>
</tr>
<tr>
<td>EF_LIB_HFD</td>
<td>0.667 (0.68)</td>
<td>0.517 (0.49)</td>
<td>0.0833 (0.39)</td>
<td>0.0391 (0.40)</td>
<td>0.476 (0.47)</td>
<td>0.738 (0.62)</td>
<td>0.552 (0.41)</td>
</tr>
<tr>
<td>EF_LIB_AC_HFD</td>
<td>−0.984 (0.69)</td>
<td>−0.0168 (0.50)</td>
<td>−0.956* (0.54)</td>
<td>−0.945* (0.52)</td>
<td>−0.943* (0.54)</td>
<td>0.160 (0.65)</td>
<td></td>
</tr>
<tr>
<td>EF_LIB_CC</td>
<td>0.161 (0.66)</td>
<td>0.195 (0.88)</td>
<td>0.267 (0.88)</td>
<td>−0.308 (1.10)</td>
<td>−0.0734 (0.92)</td>
<td>−0.133 (0.91)</td>
<td>0.160 (0.65)</td>
</tr>
<tr>
<td>EF_LIB_CC_HFD</td>
<td>0.161 (0.66)</td>
<td>0.195 (0.88)</td>
<td>0.267 (0.88)</td>
<td>−0.308 (1.10)</td>
<td>−0.0734 (0.92)</td>
<td>−0.133 (0.91)</td>
<td>0.160 (0.65)</td>
</tr>
<tr>
<td>EF_FB_AC</td>
<td>−1.121 (1.08)</td>
<td>−1.121 (1.08)</td>
<td>−1.121 (1.08)</td>
<td>−1.121 (1.08)</td>
<td>−1.121 (1.08)</td>
<td>−1.121 (1.08)</td>
<td>−1.121 (1.08)</td>
</tr>
<tr>
<td>EF_FB_BC</td>
<td>−0.595 (1.04)</td>
<td>−0.595 (1.04)</td>
<td>−0.800 (1.05)</td>
<td>−0.800 (1.05)</td>
<td>−0.800 (1.05)</td>
<td>−0.800 (1.05)</td>
<td>−0.800 (1.05)</td>
</tr>
<tr>
<td>EF_FB_HFD</td>
<td>0.296 (1.10)</td>
<td>0.296 (1.10)</td>
<td>0.296 (1.10)</td>
<td>0.296 (1.10)</td>
<td>0.296 (1.10)</td>
<td>0.296 (1.10)</td>
<td>0.296 (1.10)</td>
</tr>
<tr>
<td>EF_FB_AC_HFD</td>
<td>0.052 (1.08)</td>
<td>0.052 (1.08)</td>
<td>0.052 (1.08)</td>
<td>0.052 (1.08)</td>
<td>0.052 (1.08)</td>
<td>0.052 (1.08)</td>
<td>0.052 (1.08)</td>
</tr>
<tr>
<td>Constant</td>
<td>−3.562*** (1.29)</td>
<td>−3.400** (1.33)</td>
<td>−3.555*** (1.27)</td>
<td>−3.915*** (1.27)</td>
<td>−3.165** (1.32)</td>
<td>−2.225* (1.29)</td>
<td>−2.228* (1.30)</td>
</tr>
<tr>
<td>Observations</td>
<td>3979</td>
<td>3979</td>
<td>3979</td>
<td>3979</td>
<td>3979</td>
<td>3979</td>
<td>3979</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
</tr>
</tbody>
</table>

This table estimates a model in which the dependent variable is value added growth (GRVA) for industry $i$, country $c$, decade $d$. The controls include country-decade fixed effects and industry-decade fixed effects (the coefficients are not reported). SHARE is the initially share of value added; EF_FD is the interaction between the Rajan–Zingales index of external financial dependence in industry $i$, decade $d$ and financial development in country $c$, decade $d$; EF_LIB is the interaction between the Rajan–Zingales index of external financial dependence in industry $i$, decade $d$ and financial openness (proxied by the Lane and Milesi-Ferretti, 2007, measure of external capital stock) in country $c$, decade $d$; EF_LIB_AC is the interaction among the Rajan–Zingales index of external financial dependence, financial openness and a dummy variable that takes value one if a country suffered either banking or currency crisis in the decade (EF_LIB_BC is similar to EF_LIB_AC but with the dummy variable taking value one if a country suffered a banking crisis in the decade); EF_FB_AC and EF_FB_BC are triple interactions between the index of external financial dependence, financial development, and crisis dummies. EF_LIB_AC_HFD is the interaction between the index of external dependence, financial openness and two dummy variables – the first dummy is one if any financial crises have occurred in country $i$ during that decade and the other dummy is one for countries with above-median level of financial development. It is a quadruple interaction. The other quadruple interactions can be defined accordingly. The last few rows show the results of F-tests for the variable coefficients specified in the first column.

Robust standard errors in parentheses, **$p < 0.01$, *$p < 0.05$, *$p < 0.1$. 
This table estimates a model in which the dependent variable is value added growth (GRVA) for industry \( i \), country \( c \), decade \( d \). The controls include country-decade fixed effects and industry-decade fixed effects (the coefficients are not reported). \textit{SHARE} is the initially share of value added; \textit{EF_FD} is the interaction between the Rajan–Zingales index of external financial dependence in industry \( i \), decade \( d \) and financial development in country \( c \) decade \( d \), \textit{EF_LIB} is the interaction between the Rajan–Zingales index of external financial dependence in industry \( i \), decade \( d \) and financial openness (proxied by the Lane and Milesi-Ferretti, 2007, measure of external capital stock) in country \( c \) decade \( d \), \textit{EF_LIB_AC} is the interaction among the Rajan–Zingales index of external dependence, financial openness and a dummy variable that takes value one if a country suffered either banking or currency crisis in the decade (\textit{EF_LIB_BC} is similar to \textit{EF_LIB_AC} but with the dummy variable taking value one if a country suffered a banking crisis in the decade), \textit{EF_FD_AC} and \textit{EF_FD_BC} are triple interactions between the index of external financial dependence, financial development, and crisis dummies. \textit{EF_LIB_AC_GAS} is the interaction between the index of external dependence, financial openness and two dummy variables – the first dummy is one if any financial crises have occurred in country \( I \) during that decade and the other dummy is one for countries with good accounting standards. It is a quadruple interaction. The other quadruple interactions can be defined accordingly. The last few rows show the results of \( F \)-tests for the variable coefficients specified in the first column. Robust standard errors in parentheses, \(*p < 0.01, **p < 0.05, *p < 0.1\).
crisis in countries with high levels of financial development (b, g, and d measure the difference between the two groups of countries).

The results suggest that capital account liberalization has no statistically significant effect in countries with low levels of financial development (consistent with the findings of Prasad et al., 2007), but it has a positive effect in countries with high levels of financial development. Consider, for instance, column 1 of Table 6 which shows that $\gamma = 0.11$ (not statistically significant) and $\gamma + g = 0.77$ (and statistically significant, see the $I_{EF\_LIB} + I_{EF\_LIB\_HFD}$ F-test in the bottom part of Table 6). We also find that the negative effect of crises is statistically significant in countries with high levels of financial development but not in countries with a poorly developed financial sector.

Probing further, we interact our variables of interest with proxies for the strength of macroeconomic policies and institutions. We start by computing the country-by-country mean and standard deviation of inflation and budget deficits for the 1980–1989, 1990–1999, and 2000–2004 periods. We then construct a measure of (poor) macroeconomic policies by extracting the first principal component of these four measures of macroeconomic policies. Next, we consider the distribution of our measure of macroeconomic polices within our sample of developed countries and label as having good macro policies all countries with policies at least as good as those of the country at bottom 25th percentile of this distribution. Finally, we interact the resulting dummy variables using the same procedure as in Table 6. The results indicate that the effect of capital account liberalization is negative in countries with poor policies but positive in countries with good policies. However, neither the individual coefficients nor their sums are statistically significant. This may reflect the fact that we define a country as having good policies if it is above a certain percentile in a given decade. If the quality of policies has improved over time, our method would lead us to include too many countries in the good-policy category in earlier periods and too few countries in the good policies category in later periods. If we address this issue by replacing our discrete measure of good policies with the original continuous measure, we still find that the good-policy interaction is never statistically significant. Another problem may be that lower deficits (or lower inflation) are not fully capturing the strength of macroeconomic policies.

Next we focus on accounting standards. Countries are placed in the “good standards” category (GAS) if the quality of their accounting standards is above the sample median. We find that capital account liberalization has a positive and statistically significant effect in countries with good accounting standards but no effect in those with poor standards (Table 7). It would appear that countries with good accounting standards can benefit from capital account liberalization even in times of crisis (column 1 of Table 7, the total effect, measured by $EF\_LIB + EF\_LIB\_AC + EF\_LIB\_GAS + EF\_LIB + EF\_LIB\_GAS\_AC$, is about 0.4 and close to being statistically significant with a $p$ value of 0.16).

We repeat the exercise in Table 7, substituting rule of law and creditor rights for accounting standards. The results are similar; capital account liberalization mostly befits countries with high rule of law and strong creditor rights. However, we no longer find that good institutions (measured by rule of law or creditor rights) guarantee benefits from capital account liberalization in crisis periods.

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28 We deal with outliers by capping inflation at 100% and budget deficit at 35%.

29 See Eichengreen et al. (2009) for details. A possible interpretation is that our measure of policies does not capture well the differential effect of capital account liberalization. Another possible reason explanation is that our measure of policies is highly correlated with the crisis variables (thus, in a sense, it captures very well the probability of a crisis) and that our unstable estimates are due to multicollinearity.

30 We would like to thank an anonymous referee for pointing us this potential problem.

31 Results available upon request.

32 Ideally, we would like to have a measure of the cyclicality of macroeconomic policies, but building such a measure is far from being trivial (see Jaimovich and Panizza, 2007) and it goes well beyond the scope of this paper.

33 We obtain data on accounting standard from Rajan and Zingales (1998). Since they only report data for the mid 1980s and mid 1990s, we use the 1990s data to measure accounting standard in the 2000–2004 period. We do not think that this is a serious issue because accounting standard does not vary much over time.

34 Both the total effect (measured by $EF\_LIB + EF\_LIB\_GAS$) and the difference between good and bad account standards (measured by $EF\_LIB\_GAS$) are statistically significant.

35 This result, however, only holds for the regression of column 1 and it is not robust to the specifications of columns 2–7.

36 Again see Eichengreen et al. (2009) for details.
7. Conclusion

In this paper we have synthesized previous studies examining the effects of capital account liberalization on industry growth, controlling for financial crises, domestic financial development and institutional strength. While a large number of robustness checks inevitably produce a large number of somewhat different point estimates, the result is, nonetheless, a coherent picture. Our findings suggest that while capital account openness has positive effects on the growth of financially dependent industries, those effects are neutralized by crises; that is, the growth of financially dependent sectors is no faster in financially open than financially closed economies in decades punctuated by crises. But neither is their growth slower in crisis periods. This suggests that on average countries that have succeeded in avoiding crises have benefited from capital account liberalization while countries that have not so succeeded have neither benefited nor suffered.

Disaggregating country subgroups shows that these results are driven mainly by the high-income countries. Among low-income developing countries, there is neither further impetus to growth from financial openness in normal times nor it is opposite in times of crisis. Probing deeper, we find that the positive effects of capital account openness are limited to countries with relatively well-developed financial systems, good accounting standards, strong creditor rights and rule of law – and its disappearance in crisis periods is similarly limited to the high-income world. This result is consistent with other recent work (e.g. Klein, 2005; Prasad et al., 2007) suggesting the existence of threshold effects – that countries must reach a certain threshold in terms of economic and institutional development before they can expect to benefit from capital account liberalization. This explains why many earlier studies failed to find a consistent effect – namely, they failed to probe for threshold effects. And it is a reminder of the importance of carefully sequencing capital account liberalization with other policies associated with this larger process of economic and institutional development.

Acknowledgments

We would like to thank Raghuram Rajan for sharing his data on external financial dependence and the editor, an anonymous referee, Luc Laeven, Andy Powell and seminar participants at the Bank of England and LACEA in Buenos Aires for helpful comments and suggestions.

Appendix

Table A1
Variables sources and definitions.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRVA</td>
<td>Real value added growth in industry i, country, c, decade d. Real value added is computed by deflating value added data by the CPI index</td>
<td>UNIDO Industrial Statistics Database, 2006 (INDSTAT 2006); Revisions 2 and 3. CPI data from International Finance Statistics, IMF</td>
</tr>
<tr>
<td>INITSHARE or SHARE EFD</td>
<td>Share of sector's value added in total manufacturing value-added of the country in the start year of sample</td>
<td>INSTAT 2007</td>
</tr>
<tr>
<td>FD</td>
<td>Financial Development measured as ratio of private credit to GDP</td>
<td>Rajan and Zingales (1998); Worldscope Database</td>
</tr>
<tr>
<td>LIB de facto</td>
<td>Capital Account Openness measured by External capital stock as a proportion of GDP (KSTOCK)</td>
<td>Lane and Milesi-Ferretti (2007) database</td>
</tr>
<tr>
<td>LIB de jure</td>
<td>Capital Account Openness (KOPEN)</td>
<td>Chinn and Ito (2006) database</td>
</tr>
<tr>
<td>CC</td>
<td>Currency Crisis dummy</td>
<td>Glick–Hutchison database</td>
</tr>
<tr>
<td>BC</td>
<td>Banking crisis dummy</td>
<td>Laeven–Honohan database</td>
</tr>
<tr>
<td>AC</td>
<td>All crisis dummy</td>
<td>From currency and banking crises databases</td>
</tr>
</tbody>
</table>
Table A1. (continued)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>Dummy for crisis in decade d</td>
<td>From the currency and banking crises databases</td>
</tr>
<tr>
<td>DEV</td>
<td>Developing country dummy. All countries that are not classified as high-income or industrialized in the WDI database.</td>
<td>World Bank, World Development Indicators (WDI)</td>
</tr>
<tr>
<td>HFD</td>
<td>High financial development dummy. Countries with level of financial development higher than the median level</td>
<td>FD data from IFS (see row above)</td>
</tr>
<tr>
<td>GAS</td>
<td>Countries with level of accounting standards higher than the median level. Data on accounting standard from Rajan and Zingales (1998). Since they only report data for the mid 1980s and mid 1990s, we use the 1990s data to measure accounting standard in the 2000–2004 period.</td>
<td>Rajan and Zingales (1998)</td>
</tr>
<tr>
<td>HRL</td>
<td>High rule of law dummy</td>
<td>La Porta et al. (1998)</td>
</tr>
<tr>
<td>GCR</td>
<td>Good creditor rights dummy</td>
<td>La Porta et al. (1998)</td>
</tr>
</tbody>
</table>

References


