

# Addressing Causality in the Effect of Capital Account Liberalization on Growth

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## Abstract

Evidence supporting the positive effects of capital account liberalization on growth is mixed at best. Even after conditioning on the quality of domestic financial institutions, a significant number of studies still find no effect. One possible explanation is reverse causation. If low growth countries liberalize in order to spur growth, the observed correlation between growth and liberalization will underestimate the impact of capital account openness. To eliminate this bias, I instrument capital account liberalization with the average level of openness of other countries to capture the “fad” element in financial liberalization. IV estimates indicate a significant positive effect of liberalization on growth, confirming the predictions of economic theory.

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## 1. Introduction

The effect of capital account liberalization on economic growth has received considerable attention, due in part to the potential welfare-enhancing effects for developing countries and emerging markets. The benefits of capital mobility are clear: a more efficient allocation of resources, including an additional source of funding for domestic investment projects in poorer countries with low savings, possibilities for risk diversification, and the promotion of financial development.<sup>1</sup> The empirical evidence on the positive effects of liberalization on growth, however, is mixed at best.<sup>2</sup> One explanation is an increased probability that countries will experience financial crises when they open up their financial markets to foreign capital. In addition, good institutions may be needed to ensure that countries enjoy the benefits of financial globalization.

For these reasons, the literature has moved toward conditioning the effect of liberalization on the quality of institutions. Klein (2005) finds that capital account liberalization in countries with better institutions does promote growth.<sup>3</sup> Arteta et al. (2001) find that countries eliminating large macroeconomic imbalances benefit the most from open capital accounts, although they find only limited evidence of a positive growth effect when capital account openness is conditioned on law and order. Edison et al. (2002) do not find any evidence of a growth effect, even when controlling for institutional characteristics or the level of financial development. Thus there is still only limited evidence of a growth effect of liberalization, even in countries with good institutions.

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<sup>1</sup> Prasad et al. (2004) provide a longer list of benefits, dividing them into direct effects (augmentation of domestic savings, reduction in the cost of capital, transfer of technology from advanced to developing countries, and development of domestic financial sectors) and indirect effects (increased production specialization due to better risk management, and improvements in both macroeconomic policies and institutions induced by the competitive pressures or the “discipline effect” of globalization.

<sup>2</sup> See Prasad et al. (2004) for a summary of the literature.

<sup>3</sup> Most studies find no effect or a mixed effect of liberalization in developing countries with weaker institutions (for example, Klein and Olivei, 1999).

Assuming that removing capital account restrictions should promote growth, a possible explanation for the weak results is reverse causality from growth to capital account openness. It is possible that countries with low growth decide to liberalize because of the assumed growth-enhancing effects, resulting in a weaker correlation between liberalization and higher growth. In theory, however, the bias could work in the opposite direction. Perhaps faster growing countries are more eager to liberalize their capital accounts, while slow growing countries are more prone to adopt capital controls. Thus endogeneity is an issue, and while it might explain why some studies do not find a positive effect of liberalization, it could, on the other hand, also explain why others have, depending on the direction of the bias. Clearly an instrument is needed to resolve the nature of the bias and shed more light on the effects of capital account liberalization.

Grilli and Milesi-Ferretti (1995) and Kraay (1998) use lagged values of financial openness indicators as instruments and also find little evidence of an effect of liberalization. Edison et al. (2002) use legal origin and distance from the equator as instruments. English common law evolved to protect private property owners and prevent expropriation by the ruling class, whereas French and German law was constructed to protect the power of the state (La Porta et al., 1999). Countries with greater state power tend to limit the openness of markets. Similarly, countries near the equator that tend to have high rates of disease and poor agricultural yields are more likely to create political institutions that restrict free markets so that the elite can exploit the rest of the population (Acemoglu et al., 2001; Easterly and Levine, 2002). As mentioned, these studies find no effect of liberalization on growth. Edwards (2001) finds a stronger effect of openness in richer countries. Arteta et al. (2001), however, use a set of instruments to replicate those used by Edwards: whether the capital account was open or closed in 1973, the ratio of liquid liabilities to GDP in 1970 and 1975, distance to the equator, and a

dummy variable for OECD countries, and find that his results are sensitive to the choice of instrumental variables. They also use a second set of instruments: distance from the equator, dummy variables for whether the country is landlocked or an island, the share of the population speaking English, and the share of the population speaking a major European language. Their IV estimates of the effects of capital account liberalization are insignificant. They conclude: "...while these instruments are plausibly exogenous, either they are not usefully correlated with capital account liberalization or the latter in fact has no independent impact on growth." Thus IV estimation has for the most part not yielded a positive effect of capital account liberalization on growth.

A number of potential problems with these instruments, however, have been noted by Arteta et al. (2001). Geographic variables are unlikely to be sufficiently correlated with capital account liberalization. Specifically, the instruments used in Edison et al. (2002), legal origin and distance from the equator, by themselves only explain approximately 5% of the variation in capital account openness. In addition, lagged capital account openness is unlikely to be exogenous. The reason is that openness does not display significant times series variation, implying that lagged values are very similar to current values. Therefore, if openness is endogenous, lagged openness is likely to be endogenous as well.

In this paper, I use the average level of capital account openness for all countries in a particular region as an instrument for liberalization in a particular country in that region. The logic behind the choice of this instrument follows the arguments given in Demirgüç-Kunt and Detragiache (2002), who use the proportion of countries that have adopted explicit deposit insurance as an instrument for deposit insurance in a given country. When deciding whether to implement a particular policy, whether it is deposit insurance or capital account liberalization,

policymakers are influenced by the choices of policymakers in other countries. As more and more countries adopt a particular policy, other countries are more likely to follow as it “becomes enshrined as a...universal best practice” (Demirgüç-Kunt and Detragiache, 2002). One could think of the adoption of inflation targeting as a monetary policy strategy as a current example of this process.

Average regional capital account openness represents an improvement over previous instruments. It is much more highly correlated with capital account openness than are geographic variables and legal origin, in part because it displays at least some variation over time, unlike the latter variables. Moreover, average openness is more likely to be exogenous than lagged capital account openness since the latter relies on exogeneity over time that is unlikely to exist.

Using this instrument to correct for endogeneity, I find that capital account liberalization does promote growth. The IV coefficient is larger and more significant than the OLS coefficient, implying that the bias discussed above leads to underestimation of the effect of liberalization. This result differs from the majority of previous results that find only limited evidence of a growth effect of capital account liberalization using IV estimation. I find little evidence, however, that this effect is larger in countries with better institutions. This finding matches a majority of studies that use IV estimation. The results imply that even countries with weak institutions can benefit from more open capital accounts, despite the increased risk of financial crises.<sup>4</sup>

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<sup>4</sup> Of course when considering the welfare implications, higher average growth rates need to be weighed against the possible increase in output and consumption volatility.

The rest of the paper is organized as follows. Section 2 describes the data and presents summary statistics. Section 3 presents the empirical methodology. Section 4 discusses the results of the estimation. Section 5 concludes.

## **2. Data and Summary Statistics**

To estimate the effect of capital account liberalization on growth, it has become standard practice to augment a growth regression (see, for example, Levine and Renelt's, 1992) with a measure of capital account openness. The dependent variable, *Growth*, is real per capita GDP growth. The vector of control variables includes initial GDP per capita to control for convergence effects, the secondary schooling enrollment rate (representing investment in human capital) and investment as a share of GDP (representing investment in physical capital).

### **2.1 Capital Account Liberalization Variables**

I use five different measures of capital account openness. The IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER)* indicates countries with an open capital account using a simple binary indicator. A value of one indicates an open capital account. After 1995, however, the format changed and the index now assumes values between 0 and 1. This variable has been used in a number of papers exploring the effects of capital account liberalization on growth (see Grilli and Milesi-Ferretti, 1995; Rodrik, 1998; Klein and Olivei, 1999). The main drawback of the IMF measure is that the scope and effectiveness of these restrictions are unknown. For this reason, a number of modifications have been made to the IMF measure. Quinn (1997) develops a finer, albeit more subjective, classification, using narrative descriptions from the *AREAER* to measure the intensity of capital controls.<sup>5</sup> I convert his

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<sup>5</sup> Annual data, ending in 1999, are available for only 22 OECD countries; the other 71 countries have observations only in 1959, 1973, 1982, 1988, and 1997.

measure to a (0-1) index to facilitate comparison with the IMF variable.<sup>6</sup> Chinn and Ito (2007) also construct an index of capital account openness based on the intensity of controls reported in the IMF's *AREAER*. The assumption behind this index is that the intensity of capital controls is correlated with the existence of other restrictions on international transactions. The minimum sample correlation between these variables is 0.65 and the maximum is 0.84.

Finally, Levine et al. (2002) introduce two additional measures: total capital inflows, which include FDI and portfolio flows, and total capital flows (inflows plus outflows). Greater capital flows as a share of GDP indicate greater capital account openness, both because domestic residents can borrow from abroad, but also because they can diversify their portfolio by purchasing foreign assets. These two variables have a correlation of 0.95 with each other and a correlation of roughly 0.25 with the three IMF measures. Unlike the indices mentioned above, measures of the extent of capital flows are not subjective. The disadvantage, however, is that capital flows may be influenced by other factors, including growth, implying that they too suffer from a simultaneity problem. There can also be an omitted variable bias since policy changes might influence both growth and capital flows, producing a spurious positive correlation between the two. Thus, as with the other indicators of capital account openness, there is a need to address endogeneity.

## **2.2 Interaction Variables**

A number of interaction variables have been used to measure the right circumstances in which capital account liberalization can lead to growth. First and foremost are variables that measure general institutional quality, such as indicators of corruption and law and order. To account for institutional quality, I use a composite government quality variable, *GovQual*, which

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<sup>6</sup> Edison et al. (2004) compare the IMF measure to Quinn's indicator and find that if Quinn's measure is converted into a binary variable where the midpoint of the range of his measure is used as the cutoff for whether the capital account is open or closed, there is a high correlation between the two measures.

is based on several variables from the *International Country Risk Guide*. These variables were chosen as reasonable proxies for aspects of government quality that might affect the impact of liberalization on growth. They proxy for the degree to which contracts are enforced, corruption, risk of expropriation, and government effectiveness. The composite variable is a simple average of these variables. *Bureaucracy Quality* (range 0-4) measures institutional strength and quality of the bureaucracy as well as autonomy from political pressure. *Corruption* (range 0-6) within the political system measures the extent to which government officials are able to assume positions of power through patronage rather than ability and to which they can be influenced by illegal payments. Finally, *Law and Order* (range 0-6) assesses the strength and impartiality of the legal system and popular observance of the law. Higher scores also indicate well functioning political institutions.

As an alternative to *GovQual*, which is a measure of general institutional quality, I also include variables that capture the quality of financial institutions. More developed financial markets should channel resources more efficiently, leading to a greater effect of liberalization on growth.<sup>7</sup> I use a number of alternative measures of the development of the banking sector. These include the ratio of M2 to GDP, domestic credit to the private sector as a percent of GDP, and credit provided by the banking sector as a percent of GDP.

Summary statistics are provided in Table 1. The sample period is 1970-2005 and includes data on 122 countries. About 30% of the countries had open capital accounts based on the IMF measure. According to the Quinn measure, average levels of capital account liberalization are higher although there is a greater percentage of OECD countries in his sample.

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<sup>7</sup> The direct effect of financial market depth on growth is well established (Levine, 2003).



### 3. Empirical Methodology

#### 3.1 OLS Estimation

I first estimate the effect of capital account liberalization on growth using OLS with heteroskedasticity-consistent standard errors:

$$Growth_{it} = \beta_0 + \beta_1 \cdot CapLib_{it} + Controls_{it} \cdot \delta + \varepsilon_{it} \quad (1)$$

where *Growth* is real per capita GDP growth, *CapLib* is an index of capital account liberalization, either the IMF binary indicator, the Quinn measure, the Chinn-Ito measure, flows of capital, or inflows of capital. The vector of control variables includes initial GDP per capita, the secondary schooling enrollment and investment as a share of GDP. To allow for different effects of liberalization depending on the institutional context or the development of financial markets, I interact capital openness with a measure of institutional quality or financial market development.

$$Growth_{it} = \beta_0 + \beta_1 \cdot CapLib_{it} + \beta_2 \cdot CapLib_{it} * Institutions_{it} + Controls_{it} \cdot \delta + \varepsilon_{it} \quad (2)$$

The standard approach is to average the variables over the sample period to mitigate business cycle effects leaving one observation per country.<sup>8</sup> For example, if *CapLib* is the IMF binary variable indicating an open capital account, then its average over the sample period is the proportion of years with an open capital account.<sup>9</sup> For reasons described in the next section, I

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<sup>8</sup> Some authors use initial schooling as opposed to an average over the sample period. I choose the latter approach since none of the countries in the sample had data for 1970, the first year in the sample. Since schooling rates should be fairly time-invariant, taking averages over time does not seem to be problematic, especially since, as we will see, I break up the sample into 12 three-year periods.

<sup>9</sup> As Edison et al. (2004) point out; a potential problem with this approach is that an average of 0.5 is consistent with a situation where a country had open capital markets for the first five years of a decade, for the last five years of a decade or for every other year of a decade.

split the sample period, 1970-2005, into 12 non-overlapping, three-year periods and then average the data within each period so that there are 12 observations per country.<sup>10</sup>

### 3.2 Instrumental Variables Estimation

As a result of potential problems with instruments that have been used in the past to deal with simultaneity issues, this paper introduces the proportion of countries that have already financially liberalized as an instrument for capital account liberalization in a particular country. This variable captures the “fad” element in the movements towards liberalization (Demirgüç-Kunt and Detragiache, 2002). Of course, the instrument must be consistent with the measure of capital account openness used. For example, if the ratio of inflows of capital to GDP is used as a measure of liberalization, as opposed to the IMF measure, then the average of inflows is used as an instrument, as opposed to an average of the IMF measure.

One issue that needs to be addressed is that in a typical growth regression, the data are often averaged over time yielding one observation per country. This presents a problem for the proposed instrument since averaging capital account openness over all countries and then over the entire sample period yields the same value for all countries. The resulting instrument is thus perfectly collinear with the constant term. I therefore divide the sample period into 12 three-year periods resulting in 12 observations per country (as discussed on the next page, I allow the instrument to vary by region, which also avoids the collinearity problem well). Specifically, for the first sample period, 1970 to 1972, I first take the *yearly* average of the IMF measure for all countries, yielding one observation per year and three observations for the period. I then average the three observations for all *years*, yielding one observation for this sample period. The

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<sup>10</sup> As mentioned previously, Quinn only makes yearly data available for 22 OECD countries; the other 71 countries only have observations in 1959, 1973, 1982, 1988, and 1997. For these 71 countries, I fill in the missing years, using the 1973 value for 1970 to 1977, the 1982 value for 1978 to 1985, the 1988 value for 1986 to 1992 and the 1997 value for 1993 to 1999. The sample is then divided into the 12 periods.

resulting value is used to predict for each country the average of the IMF measure during this sample period.

It is important to choose a relatively short sub-sample period to maximize the number of different values that the instrument can assume, given that there are approximately 1,200 sub-sample liberalization values for the 122 countries in the sample. However, 12 values for the instrument are still insufficient. In order to generate more variation in the instrument, I break the sample into five regional sub-groups: the western hemisphere, Europe, Asia, Africa, and Middle East. This also adds intuition since it is reasonable that countries are more influenced by other countries in the same region. The instrument now assumes 60 different values. Doing this also increases the predictive power of the first stage regression.

This instrument provides information about the endogenous variable that is not contained in previous instruments. Specifically, in an unreported regression I regress capital account openness on the exogenous regressors, average capital account openness, time dummy variables, and previous instruments used in the literature (lagged capital account openness, distance from the equator, and legal origin). Average capital account openness remains significant at the 1% level.

Table 2 presents first stage IV estimation results of equation (1) using a pooled estimation of the 12 periods. In all five specifications, average openness is highly significant in predicting capital account openness. Table 2 also compares the partial correlation of average openness and openness with the partial correlations of existing instruments and openness.<sup>11</sup> As discussed previously, Edison et al. (2002) use distance from the equator and legal origin (English Common Law, French Civil Law, German Civil Law, Scandinavian Civil Code, and Socialist/Communist

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<sup>11</sup> Large t-statistics indicate that the slope coefficients are estimated precisely and so I just compare the partial correlations.

law) as instruments. Grilli and Milesi-Ferretti (1995) and Kraay (1998) use lagged values of financial openness. Average capital account openness is far more correlated with openness than are distance from the equator and legal origin. For the three IMF measures of liberalization, however, it is not as correlated with openness as is lagged openness, although for the two measures based on the size of capital flows it is more correlated. The bottom panel, which displays the raw sample correlations, tells a similar story.

Average capital account openness has the additional advantage that it is tailored to the particular measure of openness used. For example, the average of the IMF measure is used as an instrument for the IMF measure, while the average of the Quinn indicator is used as an instrument for the Quinn indicator. Distance from the equator and legal origin, on the other hand, are “one size fits all” instruments. This could in part explain why they are far less correlated with openness. Moreover, average openness displays at least some variation over time, unlike distance from the equator and legal origin, which could also explain the greater correlation with openness.

Finally, although average capital account openness is an inferior instrument to lagged openness in terms of less correlation with the endogenous variable (for three out of the five measures of openness), I argue that it is more likely to be exogenous. Lagged capital account openness does not display significant variation over time implying that lagged values are similar to current values. If openness is endogenous, then lagged openness is likely to be endogenous as well. In contrast, the exogeneity of average openness relies on exogeneity *across* time.

To summarize, average openness is preferable to existing instruments. It is more highly correlated with capital account liberalization than are distance from the equator and legal origin.

While it is not as correlated with openness as is lagged openness, it is also more likely to be exogenous.

There are a number of potential issues with average openness as an instrument, however, that must be addressed. First, there may be unobserved common elements that make liberalization more desirable in all countries over time. I therefore introduce a time trend as an additional instrument in the first stage of the estimation as a robustness check. I also include period dummies as additional instruments. Neither of these changes had a significant effect on first nor second stage results. Moreover, if the instrument affects growth through channels other than the control variables, i.e. after controlling for the regressors, then it violates the exclusion restriction. One could imagine that the more other countries liberalize, the greater the trade in goods and financial assets for a particular country, yielding the potential for higher growth. As a robustness check, I therefore include the ratio of trade to GDP as an additional regressor to reduce the probability that the instrument has an independent effect on growth. This did also not affect the results.

#### **4. Empirical Results**

Table 3 presents results of OLS estimation of equation (1) using a pooled estimation of the 12 periods. I do this so as to facilitate a comparison with IV estimation, which must be performed using 12 observations per country. There are five alternative measures of capital account openness: the IMF measure, the Quinn index, the Chinn-Ito index, the ratio of gross capital flows to GDP, and the ratio of inflows to GDP. The coefficient of the IMF measure is significant at the 1% level and suggests that countries with open capital accounts have on average a 0.90 percentage point higher growth rate than countries with closed capital accounts.

The more refined Quinn measure of capital restrictions suggests an even larger and more significant effect, although there are fewer observations and a greater percentage of OECD countries. The Chinn-Ito measure ranges from -1.77 to 2.60 and has a standard deviation of 1.57. A coefficient of 0.21 therefore implies that a standard deviation increase in capital account openness increases growth by 0.32 percentage points. The coefficients of total capital flows and total capital inflows imply that a standard deviation increase in each variable leads to a 0.40 and .35 percentage point increase in growth, respectively. Results were similar using fixed effects and random effects estimation. The standard growth regressors have the expected coefficients and are always significant.

Table 4 presents results of OLS estimation of equation (2) using a pooled estimation of the 12 periods. The interaction variables are *GovQual* and the three measures of financial development. The five measures of capital account openness are interacted with these four variables. None of the interaction terms with *GovQual* are significantly positive; some are even significantly negative. This counter-intuitive result has been found in other studies as well (Edison et al., 2002; Kraay, 1998). The coefficients of the liberalization variables by themselves are still significant as in Table 3. The only exception is total capital inflows, although in this case the loss of significance is a result of the reduced sample size and not the inclusion of the interaction term.

When the liberalization measures are interacted with the three measures of financial development, the interaction terms are either insignificant or significant but not large enough to generate a sizeable effect of liberalization on growth. The liberalization variables themselves remain significant for the most part.

To summarize, the OLS results in Tables 3 and 4 indicate a positive effect of liberalization on growth, although there is little evidence that this effect stronger in countries with better institutions.

As discussed above, there is a possible upward or downward bias in the OLS coefficients of the capital account openness measures. Table 5 presents second stage results of IV estimation of equation (1) using pooled estimation of the 12 periods where capital account openness is instrumented by the degree to which other countries in the same region have liberalized their capital accounts. All measures of capital account openness are positive and highly significant with the IV estimate showing a larger effect than the OLS estimates in Table 3. Using the IMF measure for example, countries with open capital accounts experience approximately two percentage point higher growth rates. These results suggest that in fact there is a downward bias in the coefficients under OLS estimation and that low growth spurs capital account liberalization. Results were similar using fixed and random effects estimation with instrumental variables.

Table 6 presents results of IV estimation of equation (2) using a pooled estimation of the 12 periods. Except for the Quinn measure, all indicators of capital account openness themselves are significant regardless of the measure of institutional quality used in the interaction term. The coefficients are in general larger and more significant than the OLS coefficients in Table 4. However, the interaction terms often have a negative sign and in some cases are both economically and statistically significant. Specifically, for the last three measures of openness, the interaction with *GovQual* implies that countries with lower levels of government quality benefit more from capital account liberalization. As mentioned before, this counterintuitive result has been found in previous studies.

To summarize, the IV coefficients of capital account openness are economically and statistically significant, while there is hardly any evidence of a positive interaction effect. The latter result matches a large share of previous studies that use IV estimation. However, the first result represents a departure from the majority of previous results that find only limited evidence of a growth effect of liberalization using IV estimation.

#### **4.1 Robustness Tests**

In this section, I perform a number of additional tests to check the robustness of these results. The results in Tables 3-6 find a significant effect of capital account liberalization on growth. To ensure that capital account openness is not picking up the effect of current account openness, which often go hand-in-hand, I include the ratio of trade to GDP (Arteta et al., 2001). As mentioned previously, this variable also reduces the probability that the instrument has an independent effect on growth. The main results are robust to the inclusion of this variable. Similarly, capital account openness may be correlated with macroeconomic policies implemented to ensure that liberalization proceeds smoothly. Specifically, if governments implement policies correcting macroeconomic imbalances so as to prevent capital flight when liberalization does occur, the coefficient of capital account openness will reflect the growth enhancing effects of sound macroeconomic policy and overstate the impact of liberalization (Arteta et al. 2001). I therefore include inflation and the government budget surplus as a share of GDP. The main results were unchanged.

I also divide the sample into six six-year periods to test whether the findings are driven by period-specific results. Table 7 presents period-by-period estimation of equation (1). The periods 1982-87 and 1994-99 show no effect of capital account liberalization on growth. A likely explanation is that these periods were characterized by severe financial crises in emerging



markets in which financial liberalization led to capital inflows in the short run but outflows in the long run. Table 8 presents results for equation (2) where I use *GovQual* as the interaction variable. This table tells a similar story that capital account liberalization did not contribute to growth during the periods 1982-87 and 1994-99 but had a positive effect during 1988-93 and 2000-05. It also appears that the negative interaction effect in which countries with lower levels of institutional quality benefited more from capital account liberalization is driven by the period 1988-1993, a period of relative calm in emerging markets. In general, however, the interaction effect is weak throughout the entire sample period.

## **5. Conclusion**

This paper proposes the average level of capital account openness for all countries in a particular region as an instrument for liberalization in a particular country. The intuition behind this instrument is that there is a fad effect of capital account liberalization for countries of the same region. This instrument is more correlated with openness than are distance from the equator and legal origin, in part because it varies over time and differs depending on the measure of liberalization used. It is also more likely to be exogenous than lagged capital account openness.

The results indicate a significant effect of capital account liberalization on growth. The IV estimates are larger and more significant than the OLS estimates, suggesting the presence of negative feedback from growth to capital account openness. This finding holds for both the measures of openness based on capital account restrictions and the measures of openness based on the size of capital flows. This result breaks from the majority of the literature that finds limited evidence of an openness effect on growth using IV estimation. However, there is scant

evidence of a stronger effect in countries with better institutions. Thus the results confirm economic intuition that financial liberalization spurs growth but provide little evidence that this effect is magnified in countries with better institutions.

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Table 1  
Summary statistics: 1970-2005

	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Real GDP per capita growth	3,467	1.73	2.24	5.04	-31.34	19.92
IMF KA liberalization measure	3,467	0.30	0	0.41	0	1
Quinn Measure	2,216	0.59	0.50	0.28	0	1
Chinn-Ito measure	3,184	0.19	0	1.57	-1.77	2.60
Flows of Capital (% of GDP) <sup>a</sup>	1,211	9.22	4.92	18.08	-10.72	204.30
Inflows of Capital (% of GDP)	1,795	4.14	2.49	7.86	-30.50	122.85
GovQual	3,333	3.10	3.00	1.27	0.33	5.39
M2 (% of GDP)	2,869	44.44	32.24	40.04	0.92	425.09
Domestic credit provided by banking sector (% of GDP) <sup>b</sup>	3,320	58.92	46.63	46.87	-72.99	333.99
Credit to private sector (% of GDP)	3,308	43.60	30.12	37.36	0.00	255.31
Investment (% of GDP)	3,467	22.79	22.21	7.15	-17.38	59.77
School enrollment, secondary (% gross) <sup>c</sup>	834	74.11	81.54	31.68	5.19	160.15
Trade (% of GDP)	3,419	70.21	61.20	41.01	5.31	384.97
inflation	3,114	24.00	7.92	99.28	-21.68	1,927.98
Govt. Budget Surplus (% of GDP)	2,563	-30.58	-2.83	169.97	-1,966.09	75.83

Notes:

- a. capital flows can assume negative values (for example, disinvestment).
- b. this variable can assume a negative value because loans to the central government are measured in net terms.
- c. this variable can assume a value greater than 100, especially for richer countries, since gross enrollment is the ratio of total enrollment,

Table 2  
IV Estimation of equation (1) - First Stage

Dependent variable: Caplib Measure					
Caplib Measure:	IMF	Quinn	Chinn-Ito	flows	inflows
Average Openness	0.729 (14.07)***	0.755 (12.19)***	0.639 (11.26)***	1.000 (9.97)***	0.928 (11.27)***
log Initial Real GDP per capita (PPP)	0.111 (11.19)***	0.087 (9.26)***	0.532 (13.72)***	3.834 (4.98)***	0.739 (2.68)***
Investment/GDP (%)	-0.003 (2.27)**	-0.002 (1.82)*	-0.011 (1.97)**	0.005 (0.05)	0.102 (2.52)**
Secondary School enrollment rate (%)	-0.002 (4.22)***	-0.002 (4.20)***	-0.009 (4.40)***	-0.101 (2.44)**	-0.010 (0.70)
Constant	-0.567 (9.00)***	-0.382 (6.49)***	-3.24 (12.92)***	-25.187 (4.72)***	-7.34 (3.89)***
Observations	1,194	719	1,111	469	673
Countries	122	80	121	86	103
R-square	0.32	0.42	0.40	0.24	0.23
<i>Partial Correlation of Instrument with Caplib</i>					
Average Openness	0.37	0.44	0.34	0.46	0.43
Distance	0.29	0.12	0.16	0.04	0.03
Legal Origin	0.20	0.10	0.10	0.13	0.15
Lagged Openness	0.48	0.62	0.48	0.22	0.20
<i>Sample Correlation of Instrument with Caplib</i>					
Average Openness	0.45	0.63	0.54	0.54	0.51
Distance	0.17	0.35	0.34	0.23	0.20
Legal Origin	0.05	0.20	0.18	0.00	0.01
Lagged Openness	0.52	0.71	0.58	0.15	0.18

Robust t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table 3  
 OLS Estimation of equation (1)

Dependent variable: Real per capita GDP growth (%)					
Caplib Measure:	IMF	Quinn	Chinn-Ito	flows	inflows
Caplib	0.897 (3.34)***	2.569 (5.07)***	0.206 (2.72)***	0.022 (2.91)***	0.044 (2.99)***
log Initial Real GDP per capita (PPP)	-0.468 (2.95)***	-0.764 (4.25)***	-0.813 (5.83)***	-0.802 (4.14)***	-0.424 (2.21)**
Investment/GDP (%)	0.194 (8.89)***	0.215 (10.17)***	0.207 (11.40)***	0.236 (10.75)***	0.230 (11.85)***
Secondary School enrollment rate (%)	0.021 (2.77)***	0.025 (2.99)***	0.039 (5.78)***	0.034 (3.88)***	0.022 (2.50)**
Constant	-0.589 (0.68)	0.122 (0.14)	1.145 (1.48)	0.925 (0.85)	-1.388 (1.26)
Observations	1,194	719	1,111	470	673
Countries	122	80	121	86	103
R-square	0.14	0.21	0.21	0.28	0.22

Robust t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table 4  
 OLS Estimation of equation (2)<sup>a</sup>

Dependent variable: Real per capita GDP growth (%)					
Caplib Measure:	IMF	Quinn	Chinn-Ito	flows	inflows
Caplib	2.629 (2.99)***	3.493 (2.29)**	0.598 (2.60)***	0.126 (1.97)**	0.159 (1.54)
Caplib*GovQual	-0.540 (2.53)**	-0.305 (0.80)	-0.136 (2.24)**	-0.025 (1.74)*	-0.031 (1.30)
GovQual	0.616 (3.42)***	0.821 (2.79)***	0.533 (3.33)***	0.232 (0.84)	0.109 (0.58)
Observations	823	442	792	389	526
Caplib	0.809 (1.75)*	2.440 (2.70)***	0.256 (2.13)**	0.039 (1.48)	0.067 (1.74)*
Caplib*M2/GDP(%)	-0.003 (0.60)	-0.002 (0.14)	-0.001 (1.00)	0.000 (0.06)	0.000 (0.47)
M2/GDP(%)	0.000 (2.91)***	-0.007 (0.61)	-0.002 (1.20)	-0.004 (0.83)	0.000 (2.66)***
Observations	1,000	584	952	352	546
Caplib	0.772 (1.70)*	1.349 (1.49)	-0.059 (0.43)	0.070 (2.42)**	0.137 (3.17)***
Caplib*Credit to Private Sector (% of GDP)	-0.001 (0.29)	0.017 (1.48)	0.004 (2.47)**	0.000 (1.59)	-0.001 (2.44)**
Credit to Private Sector (% of GDP)	0.000 (2.13)**	-0.022 (2.51)**	-0.013 (4.55)***	-0.003 (0.94)	-0.001 (9.54)***
Observations	1,153	707	1,096	470	673
Caplib	0.780 (1.81)*	1.349 (1.49)	-0.059 (0.43)	0.070 (2.42)**	0.101 (2.35)**
Caplib*Domestic Credit from Banking Sector (% of GDP)	-0.003 (0.60)	0.017 (1.48)	0.004 (2.47)**	0.000 (1.59)	0.000 (1.57)
Domestic Credit from Banking Sector (% of GDP)	0.000 (2.78)***	-0.022 (2.51)**	-0.013 (4.55)***	-0.003 (0.94)	-0.001 (9.00)***
Observations	1,150	707	1,096	470	673

Robust t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Notes:

a. coefficients of control variables not shown.

Table 5  
 IV Estimation of equation (1)

Dependent variable: Real per capita GDP growth (%)					
Caplib Measure:	IMF	Quinn	Chinn-Ito	flows	inflows
Caplib	1.905 (2.62)***	2.893 (2.55)**	0.954 (3.97)***	0.075 (3.60)***	0.178 (3.79)***
log Initial Real GDP per capita (PPP)	-0.595 (3.35)***	-0.801 (3.57)***	-1.242 (6.53)***	-0.899 (4.82)***	-0.450 (2.35)**
Investment/GDP (%)	0.199 (8.84)***	0.217 (9.87)***	0.218 (11.46)***	0.237 (11.12)***	0.218 (11.08)***
Secondary School enrollment rate (%)	0.022 (2.85)***	0.025 (2.97)***	0.039 (5.60)***	0.030 (3.25)***	0.015 (1.56)
Constant	-0.074 (0.08)	0.175 (0.19)	4.092 (3.50)***	1.657 (1.58)	-0.895 (0.83)
Observations	1,194	719	1,111	469	673
Countries	122	80	121	86	103
R-square	0.13	0.21	0.14	0.20	0.15



Table 6  
IV Estimation of equation (2)<sup>a</sup>

Dependent variable: Real per capita GDP growth (%)					
Caplib Measure:	IMF	Quinn	Chinn-Ito	flows	inflows
Caplib	5.448 (2.85)***	4.180 (1.79)*	2.167 (4.23)***	0.923 (3.17)***	1.493 (4.08)***
Caplib*GovQual	-0.508 (1.00)	0.015 (0.02)	-0.279 (2.23)**	-0.192 (3.16)***	-0.313 (4.05)***
GovQual	0.606 (2.27)**	0.572 (1.35)	0.488 (2.61)***	2.213 (2.75)***	1.364 (2.87)***
Observations	823	442	792	389	526
Caplib	2.178 (2.43)**	2.932 (1.57)	1.201 (3.90)***	0.517 (2.87)***	0.477 (3.13)***
Caplib*M2/GDP(%)	-0.003 (0.28)	0.005 (0.15)	-0.002 (0.89)	-0.004 (3.02)***	-0.001 (3.35)***
M2/GDP(%)	0.000 (2.76)***	-0.011 (0.55)	-0.003 (0.96)	0.046 (2.33)**	-0.001 (5.43)***
Observations	1,000	584	952	351	546
Caplib	2.062 (2.53)**	2.353 (1.25)	0.905 (2.67)***	0.497 (3.43)***	0.541 (5.40)***
Caplib*Credit to Private Sector (% of GDP)	-0.007 (1.22)	0.018 (0.92)	0.001 (0.47)	-0.003 (2.91)***	-0.003 (4.80)***
Credit to Private Sector (% of GDP)	0.000 (2.01)**	-0.023 (1.57)	-0.012 (3.26)***	0.020 (2.33)**	-0.001 (7.67)***
Observations	1,153	707	1,096	469	673
Caplib	1.603 (1.86)*	1.996 (1.28)	1.178 (3.20)***	0.427 (3.27)***	0.537 (5.00)***
Caplib*Domestic Credit from Banking Sector (% of GDP)	0.002 (0.30)	0.032 (1.45)	-0.004 (1.08)	-0.003 (2.59)***	-0.003 (4.02)***
Domestic Credit from Banking Sector (% of GDP)	0.000 (2.75)***	-0.032 (1.94)*	-0.004 (0.67)	0.020 (2.04)**	-0.001 (6.63)***
Observations	1,150	706	1,092	469	673

Robust t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Notes:

a. coefficients of control variables not shown.

Table 7  
 OLS Estimation of equation (1)<sup>a</sup> - 6-year Period by 6-year Period

Dependent variable: Real per capita GDP growth (%)							
	1970-75	1976-81	1982-87	1988-93	1994-99	2000-05	Pooled <sup>b</sup>
Caplib (IMF measure)	1.762 (1.96)*	0.666 (1.03)	-0.412 (0.54)	1.944 (3.09)***	-0.122 (0.18)	0.081 (0.10)	0.763 (2.34)**
Observations	82	89	100	103	118	116	608
Caplib (Quinn measure)	2.357 (2.11)**	3.486 (2.42)**	2.134 (1.33)	4.095 (3.28)***	1.017 (0.87)	n.a.	2.845 (4.89)***
Observations	67	71	74	74	80		366
Caplib (Chinn-Ito measure)	0.380 (1.07)	0.292 (1.25)	0.065 (0.29)	0.356 (1.93)*	0.094 (0.59)	-0.128 (0.65)	0.155 (1.69)*
Observations	77	85	91	94	116	115	578
Caplib (total flows)	0.037 (0.29)	0.066 (0.90)	0.045 (0.32)	-0.056 (0.62)	0.035 (0.79)	0.014 (2.23)**	0.012 (1.31)
Observations	17	24	27	40	73	80	261
Caplib (total inflows)	0.249 (2.61)**	0.359 (2.29)**	-0.005 (0.03)	-0.131 (2.97)***	0.067 (0.75)	0.020 (2.12)**	0.011 (0.66)
Observations	27	53	49	59	91	93	372

Robust t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Notes:

a. coefficients of control variables not shown.

b. includes period fixed effects.

Table 8  
 OLS Estimation of equation (2)<sup>a</sup> - 6-year Period by 6-year Period

Dependent variable: Real per capita GDP growth (%)					
	1982-87	1988-93	1994-99	2000-05	Pooled <sup>c</sup>
Caplib (IMF measure)	-0.604 (0.27)	3.886 (2.80)***	-0.457 (0.18)	2.776 (1.02)	1.468 (1.41)
Caplib*GovQual	0.029 (0.06)	-0.648 (1.86)*	0.135 (0.20)	-0.999 (1.16)	-0.318 (1.28)
GovQual	1.040 (3.21)***	0.331 (0.84)	0.942 (1.65)	0.501 (0.80)	0.709 (3.62)***
Caplib (Quinn measure)	0.896 (0.29)	8.625 (2.56)**	3.394 (0.88)	n.a.	3.317 (2.05)**
Caplib*GovQual	0.068 (0.10)	-1.202 (1.59)	-0.642 (0.61)	n.a.	-0.323 (0.80)
GovQual	1.273 (2.59)**	0.353 (0.53)	1.480 (1.51)	n.a.	0.829 (2.57)**
Caplib (Chinn-Ito measure)	0.111 (0.22)	1.220 (2.41)**	0.219 (0.35)	0.415 (0.69)	0.426 (1.58)
Caplib*GovQual	-0.076 (0.59)	-0.261 (1.96)*	-0.027 (0.17)	-0.204 (1.07)	-0.117 (1.71)*
GovQual	1.206 (3.70)***	0.266 (0.76)	0.990 (2.21)**	0.283 (0.59)	0.687 (3.98)***
Caplib (total flows)	0.028 (0.02)	0.516 (1.73)*	-0.049 (0.37)	0.164 (2.08)**	0.133 (1.97)*
Caplib*GovQual	-0.003 (0.01)	-0.137 (1.95)*	0.025 (0.80)	-0.036 (1.94)*	-0.028 (1.81)*
GovQual	0.423 (0.46)	-0.118 (0.20)	1.263 (2.12)**	0.427 (1.17)	0.481 (1.74)*
Caplib (total inflows)	0.718 (1.13)	-0.135 (2.05)**	-0.239 (1.06)	0.253 (1.42)	0.036 (0.33)
Caplib*GovQual	-0.194 (1.34)	-0.009 (0.27)	0.092 (1.70)*	-0.055 (1.34)	-0.006 (0.26)
GovQual	0.840 (1.77)*	-0.251 (0.56)	0.400 (0.82)	0.101 (0.30)	0.292 (1.37)

Robust t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Notes:

a. coefficients of control variables not shown.

b. data are unavailable for GovQual for the first two periods shown in Table 6.

c. includes period fixed effects.

## Appendix

Table A1

Variable	Description and Source
<i>Standard Growth Regression Variables</i>	
GDP per capita growth (annual %)	GDP per capita growth (annual %): Annual percentage growth rate of GDP per capita based on constant local currency. Source: WDI.
Investment as % of GDP	Gross capital formation (% of GDP). Source: WDI.
School enrollment	School enrollment, secondary (% gross). Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers. Source: WDI.
Real GDP per capita	GDP per capita, PPP (constant 2000 international \$). Source: WDI
<i>Capital Account Liberalization Variables</i>	
IMF	0-1 binary indicator of capital account liberalization. Column E2 of the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions
Quinn	0-4 scale of capital account liberalization (in half-point increments), reported as a percentage of 100. Converted to 0-1 scale in this paper. Five years (1959, 1973, 1982, 1988, 1997) publicly available for 71 countries. 1950-99 available for 22 OECD countries. Source: Quinn (1997).
Chinn-Ito	Source: Chinn and Ito (2007)
Flows of capital/GDP (%)	Capital inflows and outflows (foreign direct investment and portfolio flows) divided by GDP. IFS v78bdd+v78bed+v78bfd+v78bgd divided by WDI GDP (current US\$)
Inflows of capital/GDP (%)	Capital inflows (sum of foreign direct investment and portfolio inflows) divided by GDP. IFS, lines 78bed+78bgd divided by WDI GDP (current US\$).
<i>Government Quality Variables</i>	
Bureaucracy Quality	Bureaucratic Quality, scale of 0-4. Source: International Country Risk Guide, published by The PRS group.
Corruption	Corruption in Government, scale of 0-6. Source: International Country Risk Guide, published by The PRS group.
Law and Order	Measures law and order tradition, scale of 0-6. Source: International Country Risk Guide, published by The PRS group.
<i>Financial Market Development Variables</i>	
M2 (% of GDP)	Money and quasi money (M2) as % of GDP: comprises the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government. Source: WDI.
Credit to private sector (% of GDP)	Domestic credit to private sector (% of GDP): refers to financial resources provided to the private sector, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises. Source: WDI.
Domestic credit provided by banking sector (% of GDP)	Domestic credit provided by banking sector (% of GDP): includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The banking sector includes monetary authorities and deposit money banks, as well as other banking institutions where data are available. Source: WDI.
<i>Other Variables</i>	
Trade (% of GDP)	Exports plus Imports divided by GDP. Source: WDI.
Govt. Budget Surplus (% of GDP)	IFS v80 divided by GDP (current local currency units) (WDI).
Inflation %	Annual percentage change in Consumer price index. Source: WDI.

Table A2  
Countries

Albania	Greece	Oman
Algeria	Guatemala	Pakistan
Angola	Guinea	Panama
Argentina	Guinea-Bissau	Papua New Guinea
Armenia	Guyana	Paraguay
Australia	Haiti	Peru
Austria	Hungary	Philippines
Azerbaijan	Iceland	Poland
Bahrain	India	Portugal
Bangladesh	Indonesia	Romania
Belarus	Iran	Saudi Arabia
Belgium	Ireland	Senegal
Bolivia	Israel	Sierra Leone
Botswana	Italy	Singapore
Brazil	Jamaica	Slovak Republic
Bulgaria	Japan	Slovenia
Burkina Faso	Jordan	South Africa
Cameroon	Kazakhstan	Spain
Canada	Kenya	Sri Lanka
Chile	Korea	Sudan
China	Kuwait	Sweden
China: Hong Kong	Latvia	Switzerland
Colombia	Lebanon	Syria
Costa Rica	Lithuania	Tanzania
Cote d'Ivoire	Madagascar	Thailand
Croatia	Malawi	Togo
Cyprus	Malaysia	Trinidad and Tobago
Czech Republic	Mali	Tunisia
Denmark	Malta	Turkey
Dominican Republic	Mexico	Uganda
Ecuador	Moldova	Ukraine
Egypt	Mongolia	United Arab Emirates
El Salvador	Morocco	United Kingdom
Estonia	Mozambique	United States
Ethiopia	Namibia	Uruguay
Finland	Netherlands	Venezuela
France	New Zealand	Vietnam
Gabon	Nicaragua	Yemen
Gambia	Niger	Zambia
Germany	Nigeria	Zimbabwe
Ghana	Norway	