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CAPITAL ACCOUNT LIBERALIZATION, INSTITUTIONAL QUALITY
AND ECONOMIC GROWTH:
THEORY AND EVIDENCE

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ABSTRACT

This paper shows that the effect of capital account liberalization on growth depends upon the environment in which that policy occurs. A theoretical model demonstrates the possibility of an inverted-U shaped relationship between the responsiveness of growth to capital account liberalization and institutional quality. Three empirical specifications based on the model are estimated using a panel of 71 countries. Estimates of all three specifications support the hypothesis of a non-monotonic interaction between the responsiveness of growth to capital account liberalization and institutional quality, with about one-quarter of the countries, those with better (but not the best) institutions exhibiting a statistically significant and economically meaningful effect of capital account openness on economic growth.

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1. Introduction

The positive experience of industrial countries that opened up to international capital flows since the early 1980s, and the boom in emerging market economies during the first half of the 1990s, bolstered the argument that an open capital account promotes growth and development. But, in the wake of the economic and financial crises in emerging markets in the latter part of the 1990s, critics questioned the wisdom of this type of economic integration. These critics include well-respected mainstream economists who strongly favor free trade in goods and services, but maintain that trade in assets fundamentally differs from trade in “widgets.” For example, in an influential article published in *Foreign Affairs* in 1998, Jagdish Bhagwati wrote “substantial gains [from capital account liberalization] have been asserted, not demonstrated ...” (p. 7). In a similar vein, Dani Rodrik (1999) warned “Openness to international capital flows can be especially dangerous if the appropriate controls, regulatory apparatus and macroeconomic frameworks are not in place.” (p. 30). By the end of the decade, an IMF report stated that the Executive Board of that institution “...has emphasized the substantial benefits of capital account liberalization, but stressed the need to carefully manage and sequence liberalization in order to minimize risks.”¹ Reviewing this topic, Kenneth Rogoff, then the Chief Economist and Director of Research for the IMF, wrote in the December 2002 issue of the IMF’s publication *Finance and Development* “These days, everyone agrees that a more eclectic approach to capital account liberalization is required.” (p. 55).

¹ From the *Report of the Managing Director to the International Monetary and Financial Committee on Progress in Strengthening the Architecture of the International Financial System and Reform of the IMF*, September 19, 2000. Available at <http://www.imf.org/external/np/omd/2000/02/report.htm>

A careful reading of the warnings advanced by Rodrik, the Executive Board of the IMF, and Rogoff, however, does not suggest that open capital accounts cannot have a salutary effect; rather, they argue that the environment in which capital account liberalization occurs is a potentially important determinant of its consequences. But the conditions under which capital account liberalization contributes to economic growth are not evident from published empirical research. Furthermore, Bhagwati's claim concerning an absence of evidence that an open capital account contributes to economic growth, which accurately characterized the state of the literature in the late 1990s, is still largely valid today.²

This paper, however, provides evidence that an open capital account could, under the right circumstances, contribute to economic growth. The conditional nature of this last statement reflects the theoretical and empirical results presented here that show that institutional quality affects the link between capital account liberalization and economic growth. But the conditional nature of this statement should not be overplayed; empirical results presented in this paper find that about one-quarter of the 71 countries in the sample, those with good, but not necessarily the best, levels of institutional quality would benefit from capital account liberalization.

Section 2 of this paper presents a model of capital account liberalization in the presence of expropriation, which is assumed to be negatively associated with institutional quality. This model suggests that there may be a non-monotonic, inverted-U shaped relationship between the responsiveness of growth to capital account openness and institutional quality, with the maximum effect of capital account liberalization on growth

² See the survey of the empirical literature on capital account openness and growth by Edison, Klein, Ricci and Sløk (2004).

found at intermediate levels of institutional quality. In this model, countries with poor institutions do not benefit as much from open capital markets as do countries with better institutions because both domestic and foreign investors face relatively high risks of expropriation in countries with poor institutions. Also, the marginal benefit from an open capital account in a country that has very good institutions, while positive, may not be as large as the marginal benefit of an open capital account in a country with only moderately good institutions, due to the differences in the relative reductions in expropriation in the two cases.

The model presented in Section 2 guides the empirical analysis presented in Section 3. The evidence from cross-country analysis, using three different types of specifications, supports the main prediction of the model concerning a non-monotonic, inverted-U shaped relationship between the responsiveness of growth to capital account openness and institutional quality. This evidence suggests that capital account liberalization promotes growth when a country has good institutions, but there is not a significant effect of capital account liberalization on growth for countries with either very poor institutions or those with the very highest quality institutions. Thus, the results presented in this paper offer conditional support for a policy of capital account liberalization, with the quality of domestic institutions serving as an important determinant of whether integrating into the world capital market delivers on the promise of more rapid economic growth.

2. Capital Account Liberalization, Institutional Quality, and Growth

The model presented in this section illustrates how the effect of capital account liberalization on growth depends upon the quality of domestic institutions. Institutional quality in this model represents the extent to which investors are protected from expropriation. Thus, institutional quality affects the extent to which domestic savings translate into investment as well as the premium demanded by foreigners when investing in the domestic economy.

This theory section first presents, in Section 2.1, a neoclassical growth model with two types of capital under the conditions of financial autarky whereby all capital is funded from domestic savings. Institutional quality is a parameter in this model. An alternative version of this model, one that includes partial capital mobility (following the contribution of Barro, Mankiw and Sala-i-Martin 1995) is presented next in Section 2.2. Section 2.3 models capital account liberalization by drawing on the solutions for the autarkic and partial capital mobility cases.

The solution presented in Section 2.3 provides a framework for the empirical analysis that follows, and guides the specification incorporating institutional quality and capital account liberalization. The indicator of capital account liberalization presented in this theoretical section, which corresponds to the indicator of capital account liberalization used in much of the empirical work on this topic, is the proportion of years that a country has an open capital account. The model presented in this section shows that the responsiveness of growth to this indicator of capital account liberalization, while consistently positive, may first increase, and then decrease, with improvements in institutional quality.

2.1 Steady State Output and Growth under Financial Autarky

The model used in this paper has two types of capital, K and H . Under financial autarky, the situation studied in this subsection, there is little difference in the characteristics of K and H but, as discussed below, an important difference exists between these two types of capital when international borrowing and lending occurs.

The production function for this economy includes K and H , as well as L , the number of workers, and E , the efficiency of labor, and is given by

$$[1] \quad Y = K^\alpha H^\beta (EL)^{1-\alpha-\beta}$$

where Y is output, and both α and β are between 0 and 1. We study the model with the variables expressed in terms of effective units of labor, and define $y = Y / EL$, $k = K / EL$ and $h = H / EL$. Using these variables, the production function is

$$[2] \quad y = k^\alpha h^\beta$$

The model attempts to capture the link between institutional quality and the responsiveness of growth to capital account liberalization through the effect of institutional quality on the return to savings. The parameter representing institutional quality in this model is q ($0 < q \leq 1$) with larger values of q indicating better institutions. In this model, the quality of institutions affects the rate of expropriation of capital by governmental or private actors who are not appropriately constrained by law, as captured by the function $x(q)$. This function represents the proportion of savings that contributes to physical investment, with $x'(q) > 0$ and $x(1) = 1$. This function appears in the capital accumulation equations for both K and H under autarky, when both types of capital can

only be accumulated through domestic savings, as shown in the two equations in [3], that express capital accumulation in terms of k and h .³

$$[3] \quad \begin{aligned} \frac{\dot{k}}{k} &= \frac{s_K \cdot x(q) \cdot y}{k} - (\delta + n + g) \\ \frac{\dot{h}}{h} &= \frac{s_H \cdot x(q) \cdot y}{h} - (\delta + n + g) \end{aligned}$$

In the two equations in [3], $\frac{\dot{L}}{L} = n$, $\frac{\dot{E}}{E} = g$, s_K is the proportion of savings devoted to the formation of K , s_H is the proportion of savings devoted to the formation of H , and δ is the rate of depreciation of both types of capital.

The steady state value of output per effective unit of labor of this economy under financial autarky, y_A^* , is

$$[4] \quad y_A^* = \left(\frac{s_K^\alpha s_H^\beta x(q)^{\alpha+\beta}}{(n+g+\delta)^{\alpha+\beta}} \right)^{1/(1-\alpha-\beta)}$$

Naturally enough, steady state output per effective unit of labor in autarky is higher with a higher level of institutional quality (that is, with a higher value of q).

Below we will compare the dynamic path of output per effective worker under autarky and under partial capital mobility. A Taylor-series expansion around the steady state yields the differential equation for output per effective unit of labor under autarky

$$[5] \quad \frac{\dot{y}}{y} = -(1-\alpha-\beta)(n+g+\delta)[\ln(y) - \ln(y_A^*)].$$

³ It is straightforward to allow for different $x(q)$ functions for the two types of capital.

2.2 Steady State Output and Growth with Partial Capital Mobility

With no restrictions on its movement, and no cost of adjustment, capital would move instantaneously to capital-scarce countries and equalize rates of return across nations. A model with this feature would have no meaningful transition dynamics. The results of such a model are obviously at odds with experience.

A more reasonable result is obtained if one assumes partial capital mobility, whereby there is perfect international capital mobility for some types of capital but not for others. Barro, Mankiw and Sala-i-Martin (1995) formalize this concept by assuming that physical capital, K , can serve as collateral and, as such, can be fully funded by foreign borrowing. This distinguishes K from H , which cannot serve as collateral and can only be accumulated through domestic savings if a country is credit-constrained.⁴ A country is credit-constrained, in this context, if the overall value of its assets that can serve as collateral, K , is less than or equal to the value of its debt, D , where $D = (K + H) - A$, and A is the overall value of assets of an economy. In this case, $A \leq H$ and, since H cannot serve as collateral for international borrowing, it can only be generated through domestic savings.

When K can serve as collateral in international asset trade, the amount of physical capital per effective worker, k , is determined by an equilibrium condition that sets the marginal return of capital equal to its marginal cost. The marginal return of capital is the marginal product of capital net of its rate of depreciation and net of expropriation.

⁴ Barro, Mankiw and Sala-i-Martin (1995) identify H as human capital, a natural interpretation since expected future wages typically cannot serve as collateral. It is reasonable, however, to broaden the definition of H to other types of capital as well. For example, differential collateral requirements exist for foreign direct investment and international portfolio investment, a point stressed by Froot and Stein (1991) in their model of the link between the real exchange rate and foreign direct investment.

Institutional quality affects the rate of expropriation and, therefore, the premium that must be paid to foreign lenders. This premium is assumed to be a negative function of institutional quality, $v(q)$, where $v'(q) < 0$ and $v(1) = \varepsilon$ where ε is a small premium associated with international lending, even in the presence of no expropriation. The arbitrage condition for k is, therefore,

$$[6] \quad \frac{\partial y}{\partial k} - \delta - v(q) = r_w$$

where r_w is the (exogenous) world interest rate. This equilibrium condition holds regardless of whether or not a country is capital constrained. An analogous equilibrium condition does not hold for h in a credit-constrained economy; rather, in this case, the $\frac{\dot{h}}{h}$ equation given in [3] determines its path of accumulation.⁵

The steady state levels of h and y in a credit-constrained economy are obtained by using the equilibrium condition for k (Equation [6]) in the steady state, and the steady state value of h consistent with the equation of motion for that variable in Equation [3]. The steady state level of output per effective unit of labor under this assumption of partial capital mobility, y_G^* , is

$$[7] \quad y_G^* = \left(\frac{\alpha^\alpha \cdot s_H^\beta \cdot x(q)^\beta}{(n + g + \delta)^\beta \cdot (r_w + \delta + v(q))^\alpha} \right)^{1/(1-\alpha-\beta)}.$$

As in the case under autarky, steady state output per effective unit of labor is higher with a higher level of institutional quality when there is partial capital mobility since $x'(q) > 0$

⁵ In terms of units of effective labor, an economy is credit constrained if $k \leq d$. If $k > d$ then there would be no meaningful transition dynamics since H would be instantaneously accumulated through international borrowing.

and $v'(q) < 0$. A distinction between the effect of institutional quality on the steady state levels of output under partial capital mobility and under autarky arises because k is financed through foreign lending in the former case while it is financed through domestic savings in the latter, and institutional quality has different effects on these two sources of financing investment.

The differential equation that describes the dynamic path of an open economy is

$$[8] \quad \frac{\dot{y}}{y} = -\lambda [\ln(y) - \ln(y_G^*)]$$

where $\lambda = \frac{1-\alpha-\beta}{1-\alpha}(n+g+\delta)$. Comparing this result to the differential equation for an autarkic economy in equation [5], we see that the rate of convergence is more rapid for a country with partial capital mobility than for a country that operates under financial autarky.⁶

2.3 Empirical Specification

The empirical specification of the effects of capital account liberalization on growth developed here draws on the solutions to the differential equations for an economy under financial autarky, [5], and for an economy with open capital markets, [8]. These solutions,

$$\begin{aligned} \text{Autarky} : \ln(y(t)) &= (\ln(y(0)) - \ln(y_A^*)) \exp(-\lambda(1-\alpha)t) + \ln(y_A^*) \\ \text{Open} : \ln(y(t)) &= (\ln(y(0)) - \ln(y_G^*)) \exp(-\lambda t) + \ln(y_G^*) \end{aligned}$$

⁶ This point is noted by Barro, Mankiw and Sala-i-Martin (1995). Also, Sachs and Warner (1995) argue that evidence shows unconditional convergence is more rapid in open economies, although their definition of openness differs from the one used here.

determine the average rate of growth of output per effective unit of labor over the period

0 to T , $\frac{1}{T} \ln \left(\frac{y(T)}{y(0)} \right)$, when an economy has a liberalization of its capital account at time L

(where $0 \leq L \leq T$). The indicator of capital account openness in this model, κ , represents the proportion of years between year 0 and year T that a country has an open capital account and is defined as

$$\kappa = \frac{T - L}{T}.$$

Thus, $0 \leq \kappa \leq 1$, with $\kappa = 0$ for a country that is closed throughout the period and $\kappa = 1$ for a country that is open throughout the period.⁷ The solution for the average rate of growth of output per effective unit of labor for an economy that spends the first $(1 - \kappa)T$ years with a closed capital account and the remaining κT years with an open capital account is

[9]

$$\begin{aligned} \frac{1}{T} \ln \left(\frac{y(T)}{y(0)} \right) &= -\frac{1}{T} \left\{ \left(1 - e^{-\lambda T(1-\alpha)(1-\kappa)} \right) \right\} \ln(y(0)) + \left[\left(1 - e^{-(1-\alpha)\lambda T(1-\kappa)} \right) e^{-\lambda T\kappa} \ln(y_A^*) + \left(1 - e^{-\lambda T\kappa} \right) \ln(y_G^*) \right] \\ &= -\frac{1}{T} C \ln(y(0)) + \frac{1}{T} S \end{aligned}$$

where, in the second line, C represents the term in curly brackets in the first line ($0 < C < 1$) and S represents the term in square brackets in the first line ($S > 0$).

⁷ It is worth noting that κ , the proportion of years that a country has an open capital account, corresponds to a standard indicator of capital account openness used in empirical analyses, and this indicator is used in the empirical analysis presented in Section 3 of this paper. Edison, Klein Ricci and Sløk (2004) discuss the different indicators of capital account openness used in empirical studies.

The parameter $-(C/T)$ represents the coefficient on the initial income term in a growth regression, and $0 < C < 1$.⁸ The solution in [9] shows that the rate of convergence is a function of the proportion of time spent with an open capital account, κ . The rate of conditional convergence is more rapid for countries with more time spent with an open capital account since $\frac{dC}{d\kappa} > 0$. We will test whether, in fact, conditional convergence is more rapid in open economies in the empirical section below.

The term S in [9] represents the steady state of an economy that has an open capital account for the proportion κ of the period T . In general, the presence of S in [9] motivates the inclusion, in a linear growth regression, of a range of variables that affect the steady state level of output. In particular, κ , the proportion of time spent with an open capital account, is one of these variables.⁹ Thus a Taylor-series expansion of S around its constituent variables gives us the linear specification

$$[9'] \quad \frac{1}{T} \ln \left(\frac{y(T)}{y(0)} \right) = -\frac{1}{T} C \ln(y(0)) + \gamma \kappa + ZB$$

where Z is a row vector of variables other than κ that affect S , the coefficients on these variables are the elements of the column vector B , and both γ and the elements of B are obtained from the first-order Taylor series expansion of S . In the case of γ , the expansion around $\kappa = 0$ gives us

$$[10] \quad \gamma = \frac{1}{T} \frac{\partial S}{\partial \kappa} = \lambda e^{\lambda \kappa T} \left[\ln(y_G^*) - (1 - a e^{\lambda(1-\alpha)(1-\kappa)T}) \ln(y_A^*) \right].$$

⁸ For example, $C=0.32$ when $\alpha=0.3$, $\beta=0.3$, $n=0.01$, $g=0.02$, $\delta=0.05$, $\kappa=0.5$ and $T=20$.

⁹ Note that $S = \ln(y_A^*)$ when $\kappa = 0$, and $S = \ln(y_G^*)$ when $\kappa = 1$.

where $(1 - ae^{\lambda(1-\alpha)(1-\kappa)T})$ is, for reasonable values of α , β , n , g , δ and T , between 0 and 1.¹⁰

The result in [10] shows that the source of the dependence of γ on institutional quality is through its effects on the steady states y_A^* and y_G^* or, more precisely,

$$[11] \quad \frac{\partial \gamma}{\partial q} = \frac{\alpha \lambda e^{\lambda \kappa T}}{1 - \alpha - \beta} \left[\left(- \left\{ 1 - (\alpha + \beta) e^{\lambda(1-\alpha)(1-\kappa)T} \right\} \right) \frac{d \ln x(q)}{dq} - \frac{d \ln(r_W + \delta + v(q))}{dq} \right].$$

The sign of this derivative can be negative, over some range of values of q , if the term in curly brackets is positive.¹¹

A further analysis of γ can be pursued by specifying $x(q)$, the function that links the protection of savings from expropriation to institutional quality, and $v(q)$, the function that links the premium paid on foreign funds to the quality of domestic institutions. To illustrate the relationship between γ and q , we assume that the $x(q)$ and $v(q)$ are

$$[12] \quad \begin{aligned} x(q) &= X^{q-1} \\ v(q) &= e^{-Vq} \end{aligned}$$

where $X > 1$ and $V > 0$. These functional forms meet the requirements outlined above that $x'(q) > 0$, $v'(q) < 0$, $x(1) = 1$, and, for appropriate values of V , that $v(1)$ is small. The logarithm of the parameter X represents the semi-elasticity of the protection of savings against expropriation with respect to the quality of institutions. The parameter V represents the semi-elasticity of the real premium paid on foreign funds with respect to institutional quality. In Table 1, we present values of $x(q)$ and $v(q)$, for different values

¹⁰ The term $(1 - ae^{\lambda(1-\alpha)(1-\kappa)T})$ is equal to 0.7 for $\kappa = 1$, and it equals 0.431 for $\kappa = 0$, when $T = 20$ (which corresponds to the number of years in the sample used in the empirical analysis presented below), and the parameter values are the same as those mentioned above in the discussion of C , that is, $\alpha = 0.3$, $\beta = 0.3$, $n = 0.01$, $g = 0.02$, and $\delta = 0.05$.

¹¹ In fact, using the parameter discussed above, the term in curly brackets in the derivative equals 0.174 for $\kappa = 0$, 0.318 for $\kappa = 1/2$, and 0.030 for $\kappa = 3/4$.

Table 1: Expropriation of Savings & Foreign Borrowing Premium						
Institutional Quality	Expropriation of Savings $x(q) = X^{q-1}$			Foreign Borrowing Premium (in basis points) $v(q) = 100 \times e^{-Vq}$		
Q	$X = 6$	$X = 10$	$X = 14$	$V = 8$	$V = 10$	$V = 12$
0.4	0.341	0.251	0.205	4.076	1.832	0.823
0.5	0.408	0.316	0.267	1.831	0.674	0.248
0.6	0.488	0.398	0.348	0.823	0.248	0.075
0.7	0.584	0.501	0.453	0.370	0.091	0.023
0.8	0.699	0.631	0.590	0.166	0.034	0.000
0.9	0.836	0.794	0.768	0.075	0.012	0.000
1	1	1	1	0.034	0.000	0.000

of q , under different assumptions about the value of X and V . The values presented in this table give a sense of the extent of expropriation, and the premium in foreign lending, that would obtain under different assumptions about the parameter values of $X = 6$, $X = 10$, and $X = 14$, and $V = 8$, $V = 10$, and $V = 12$.

We can determine q^* , the value of institutional quality at which γ reaches its maximum value, given these functional forms for $x(q)$ and $v(q)$. Setting the derivative

$\frac{\partial \gamma}{\partial q}$ equal to zero, we find that q^* is

$$[13] \quad q^* = \frac{1}{V} \ln \left[\frac{V - \ln(X) \times \{1 - (\alpha + \beta)e^{\lambda(1-\alpha)(1-\kappa)T}\}}{\{1 - (\alpha + \beta)e^{\lambda(1-\alpha)(1-\kappa)T}\} \times \ln(X) \times (r_w + \delta)} \right].$$

An analysis of this result shows that q^* is decreasing in both X and V . Table 2 illustrates this in its presentation of q^* , and the associated maximum value of γ , for different values of X and V , given the parameter values listed in the table.

The results in the Table 2 shows that the maximum responsiveness of growth to capital account liberalization occurs at levels of institutional quality between 0.47 and 0.70, given the assumptions about parameter values. Thus, the largest effect of capital

Table 2: q* Associated with Maximum γ				
		V = 8	V = 10	V = 12
X = 6	q*	0.702	0.585	0.503
	γ	0.0214	0.0220	0.0225
X = 10	q*	0.669	0.559	0.481
	γ	0.0218	0.0226	0.0231
X = 14	q*	0.651	0.544	0.469
	γ	0.0221	0.0229	0.0235
$\alpha = 0.3, \beta = 0.3, n = 0.01, g = 0.02, \delta = 0.05,$ $\kappa = 0.5, T = 20, r_W = 0.04$				

account liberalization on growth occurs among countries with good, but not the best, levels of institutional quality.

The intuition behind the result that γ is non-monotonic in q can be understood by first recalling that γ increases with $\ln(y_G^*)$ and decreases with $\ln(y_A^*)$. An improvement in institutional quality, from initial low levels, leads to a much larger increase in $\ln(y_G^*)$ than in $\ln(y_A^*)$, given the assumptions made about the functional forms of $x(q)$ and $v(q)$. But, at higher values of institutional quality, incremental improvements have less of an effect on $\ln(y_G^*)$ than on $\ln(y_A^*)$ and, consequently, γ decreases as q increases past q^* . Of course, the specifications of $x(q)$ and $v(q)$ determine the value of q^* and, indeed, if $q^* < 1$. But Table 2 illustrates that, for reasonable functional forms and parameter values, we find an inverted-U shaped relationship between γ and q .

The non-monotonic relationship between γ and q is further illustrated by Figures 1a and 1b which trace out γ for values of q between 0.3 and 1.0. Figure 1a presents this relationship for three different values of X (6, 10, and 14), given $V = 10$, while Figure 1b shows how γ varies with q for three different values of V (8, 10, and 12) when $X = 10$ (thus the middle line in each figure, representing $V = 10$ and $X = 10$, is the same across

the two figures).¹² These figures show that γ , while consistently positive, first increases, and then decreases, with q . The value of γ associated with q^* is about 10 percent bigger than its value when evaluated at $q = 1$ for the cases of $V = 10$ and $X = 10$, as well as for the cases where $V = 14$ and $X = 10$ and $V = 10$ and $X = 14$. The value of γ evaluated at q^* is between 20 and 25 percent larger than its value at $q = 0.3$ for each of the three cases depicted in Figure 1a, while, for the cases depicted in Figure 1b, the maximum value of γ , relative to its value at $q = 0.3$, ranges from 10 percent larger (for $V = 12$) to 46 percent larger (for $V = 8$).

The results in this section suggests that there may be a non-monotonic relationship between the responsiveness of growth to capital account liberalization and institutional quality, and also that the rate of conditional convergence may vary with the amount of time during which the capital account is open. In the next section we examine whether, in fact, the data support these hypotheses.

¹² The parameter values used to generate these figures are the same as those used up to this point. As discussed above, the savings rates s_H and s_K affect γ , but not $\frac{\partial \gamma}{\partial q}$ and, therefore, not q^* .

Figure 1a: Gamma & q, varying X (V=10)

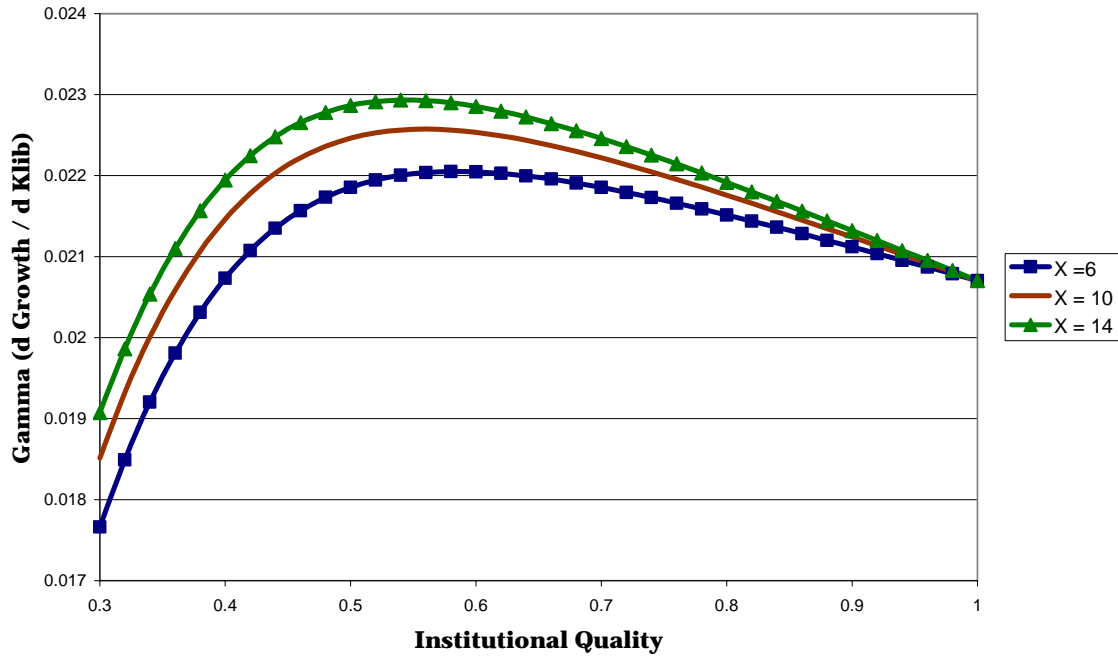
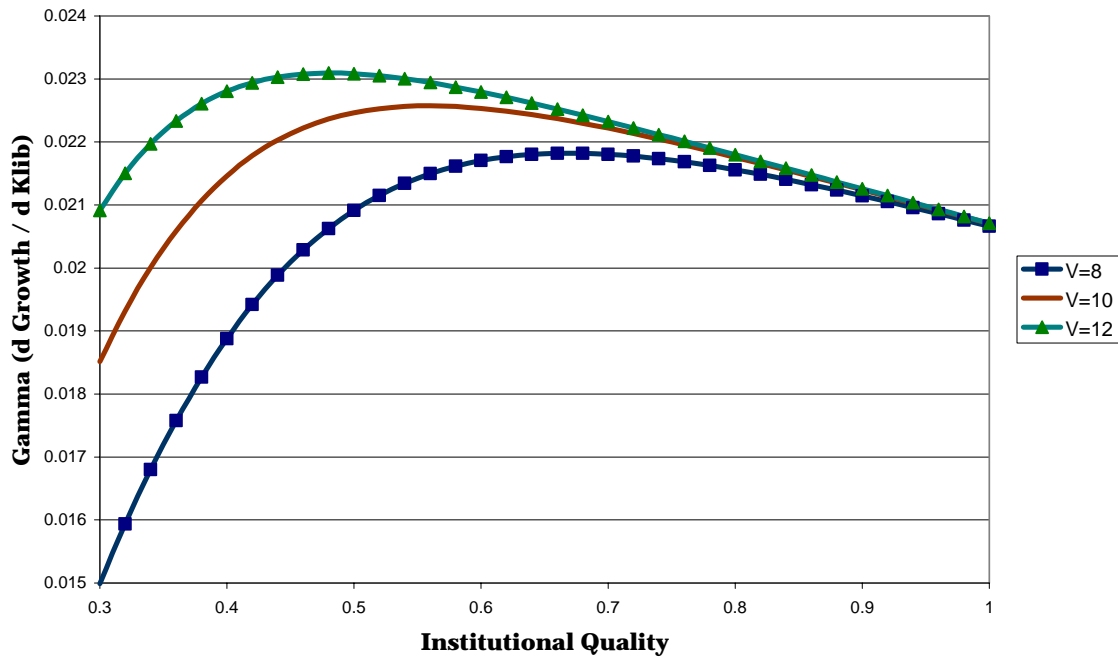


Figure 1b: Gamma & q, varying V (X = 10)



3. Empirical Estimates

This section presents an empirical analysis of the manner in which the responsiveness of economic growth to capital account openness depends upon institutional quality. The section opens with a discussion of three different empirical specifications motivated by the model developed above. The results of the analysis are then presented in Section 3.2. As shown in that section, estimates from each of the three specifications support the prediction of a non-monotonic effect of institutional quality on the responsiveness of growth to capital account openness. Furthermore, the estimated economic importance of open capital markets can be quite pronounced for countries with an appropriate level of institutional quality.¹³

3.1 Specifications

An empirical specification that allows one to test for a non-monotonic relationship between the responsiveness of growth to capital account openness and institutional quality is

[14]

$$\Delta \ln Y_{76-95,i} = \beta_1 \ln Y_{76,i} + \beta_2 Q_i + \beta_3 \kappa_i + \beta_4 (\kappa_i \times Q_i) + \beta_5 (\kappa_i \times Q_i^2) + \beta_6 (\kappa_i \times Q_i^3) + \beta_7 Z'_i + \varepsilon_i$$

where $\Delta \ln Y_{76-95,i}$ is the change in the natural logarithm of real per capital income between 1976 and 1995 of country i , $\ln Y_{76,i}$ is the natural logarithm of real per capita income in 1976 for country i , κ_i is an indicator of capital account openness of country i , and Q_i is

¹³ A data appendix describes the indicators used in the regressions for capital account openness, κ_i , and institutional quality, Q_i .

an indicator of institutional quality for country i .¹⁴ In this specification, γ , the responsiveness of the steady state level of output to the indicator of capital account openness, is

$$\gamma = \beta_3 + (\beta_4 \times Q_i) + (\beta_5 \times Q_i^2) + (\beta_6 \times Q_i^3).$$

This specification nests a model in which the effect of capital account openness on growth does not depend upon institutional quality (that is, a model in which $\beta_4 = 0$, $\beta_5 = 0$, and $\beta_6 = 0$), a model in which γ varies in a linear fashion with institutional quality (in which case $\beta_5 = 0$ and $\beta_6 = 0$), and a model in which γ varies in a quadratic fashion (a model in which $\beta_6 = 0$). A positive value for β_5 and a negative value for β_6 is consistent with an inverted-U shaped relationship between γ and Q_i (Q_i is strictly positive).

Another hypothesis from the model presented in Section 2 is that the rate of convergence depends upon the proportion of years a country had an open capital account. We test this hypothesis by augmenting specification [14] with a variable that represents the interaction of initial income and capital account openness, as shown in

[15]

$$\Delta \ln Y_{76-95,i} = \beta_1 \ln Y_{76,i} + \beta_C (\ln Y_{76,i} \times \kappa_i) + \beta_2 Q_i + \beta_3 \kappa_i + \beta_4 (\kappa_i \times Q_i) + \beta_5 (\kappa_i \times Q_i^2) + \beta_6 (\kappa_i \times Q_i^3) + \beta_7 Z_i' + \varepsilon_i$$

¹⁴ Estimates of this model using both OLS and instrumental variables are presented below. The $n \times 6$ matrix \mathbf{Z}_i includes, besides a column of 1s for the estimation of a constant, variables that are standard in cross-country growth regressions and that represent variables included in S in Equation [9], including the logarithm of the secondary school enrollment rate (a proxy for E), the average rate of investment to GDP over the years 1974 to 1978 (which, in the steady state, is related to the variables s_H and s_K), and the growth rate of the population between 1976 and 1995 (the parameter n in the model described above). As is often the case in empirical investigations of growth, one of the columns of the matrix \mathbf{Z}_i represents a dummy variable for African countries. The model suggests the importance of including the world interest rate as a regressor, but, in a cross-section panel regression, this variable, which is the same for all countries, is subsumed in the constant.

The rate of conditional convergence for country i is $\beta_1 + (\beta_c \times \kappa_i)$. The model presented in Section 2 predicts that a longer period with an open capital account contributes to a faster rate of conditional convergence. A test of this hypothesis is whether β_c is significant and negative.¹⁵

While the empirical specification [14] is flexible, since it nests a range of possible interactions between γ and Q , it is highly parameterized and, therefore, it may be viewed as a somewhat restrictive. For this reason, we also estimate two other specifications. One of these replaces the interactions between κ_i and Q_i , Q_i^2 , and Q_i^3 in [14] with a quadratic spline,

[16]

$$\Delta \ln Y_{76-95,i} = \beta_1 \ln Y_{76,i} + \beta_2 Q_i + \beta_3 \kappa_i + \omega_1 \kappa_i (Q_i - Q_{MIN})^2 + \omega_2 M_i \kappa_i (Q_i - \hat{Q}_{KNOT})^2 + \beta_7 Z'_i + \varepsilon_i$$

where \hat{Q}_{KNOT} is the estimated knot of the spline, M_i is a dummy variable that equals 0 for values of $Q_i \leq \hat{Q}_{KNOT}$ and otherwise equals 1, and Q_{MIN} is the minimum value of institutional quality in the sample. In this specification, the responsiveness of growth to capital account liberalization is

$$\gamma_{SPLINE} = \beta_3 + \omega_1 (Q_i - Q_{MIN})^2 + \omega_2 M_i (Q_i - \hat{Q}_{KNOT})^2$$

¹⁵ The partial derivative of growth with respect to capital account openness in [15] is

$$\gamma = (\beta_c \times \ln Y_{76,i}) + \beta_3 + (\beta_4 \times Q_i) + (\beta_5 \times Q_i^2) + (\beta_6 \times Q_i^3).$$

Initial income is significantly correlated with institutional quality, so we use the estimated values from the regression

$$\ln Y_{76,i} = \pi_0 + \pi_1 Q_i + u_i,$$

the results of which are reported in Table 3, to calculate the estimated value of γ from specification [15] as

$$\gamma = (\beta_c \times (\hat{\pi}_0 + \hat{\pi}_1 Q_i)) + \beta_3 + (\beta_4 \times Q_i) + (\beta_5 \times Q_i^2) + (\beta_6 \times Q_i^3).$$

Equation [16] is estimated through non-linear techniques that allow for the joint estimation of the β and ω coefficients as well as \hat{Q}_{KNOT} (which determines M_i).

A third specification, one that is even less restrictive in its parameterization, estimates different coefficients for the effect of capital account liberalization on growth for each quintile of institutional quality, as shown by

$$[17] \Delta \ln Y_{76-95,i} = \beta_1 \ln Y_{76,i} + \beta_2 Q_i + \sum_{j=1}^5 \alpha_j D_j \kappa_i + \beta_7 Z'_i + \varepsilon_i$$

where D_i represents a dummy variable that equals 1 if country i is in the j^{th} quintile for institutional quality, and is otherwise equal to zero. The value and pattern of significance of the estimates of the five α_j coefficients can be used to confirm the results derived from specifications [14] and [16] as to whether, in fact, the effect of capital account openness on economic growth varies systematically with institutional quality.

3.2 Capital Account Openness, Institutional Quality and Growth

This section presents estimation results in several ways. The estimated coefficients from regressions along with their standard errors are presented in Table 3. The OLS estimate of [14], the OLS estimate of [15], the IV estimate of [14], the non-linear least squares estimate of [16], and the estimate of [17] that includes the indicator of capital account openness, κ_i , interacted with the institutional quality quintile dummy variables are reported in Columns 1 – 5, respectively.

The results in Columns 1 – 4, however, do not provide a transparent answer to the central question of this paper, how the responsiveness of growth to capital account

openness varies with institutional quality.¹⁶ Therefore, the lower panel of Table 3 also includes, for Columns 1 – 4, estimates of γ calculated for the 10th, 30th, median, 70th and 90th percentile values of Q_i . This table also reports the number of countries that have values of Q_i such that the estimated value of γ is significant, and the percentiles spanned by this set of countries.

An even more clear representation of the results in Columns 1 – 5 is provided in Figures 2 – 6, respectively. Each of these figures plots, for one of the specifications reported in Table 3, the estimated value of γ (in a line in which filled circles represent estimates of γ_i for actual values of Q_i), along with the associated 95 percent confidence intervals (dashed lines). Figures 3, 4, 5, and 6 also include plots of γ as estimated in Column 1 (as diamonds unconnected by a line) for purposes of comparing results across specifications and estimation methods. Figures 2 – 5 also include a vertical line drawn at the smallest value of Q_i at which γ is significant at the 95 percent level of confidence, and another vertical line drawn at the largest value of Q_i at which γ is significant at the 95 percent level of confidence.

The OLS estimate of Specification [14], reported in Column 1 of Table 3, and represented in Figure 2, shows that capital account openness is a significant determinant of growth over the period 1976 to 1995 for a set of countries with above-median levels of institutional quality. The coefficient on κ_i itself, as well as the coefficient on each of the three interaction terms, $\kappa_i \times Q_i$, $\kappa_i \times Q_i^2$, and $\kappa_i \times Q_i^3$, are significant at better than the 95

¹⁶ The lower part of Column 5 presents the coefficients on the interaction of κ_i with the quintile dummy variables, where the percentile listed in the left column represents the midpoint of that quintile (i.e., the row labeled “10th Percentile” presents the coefficient for κ_i for the first quintile, the row labeled “30th Percentile” presents the coefficient for κ_i for the second quintile, and so on).

Table 3: Growth, Capital Account Liberalization, & Institutional Quality							
	1: OLS	2: OLS	3: IV	4: Non-linear LS Spline		5: OLS	
$\ln Y_{1976,i}$	-0.396	-0.374	-0.295		-0.371	-0.380	
(s.e.)	(0.136)	(0.158)	(0.138)		(0.100)	(0.137)	
$\ln Y_{76} \times \kappa_i$		-0.217					
(s.e.)		(0.376)					
Q_i	0.439	0.424	0.439		0.415	0.438	
(s.e.)	(0.097)	(0.114)	(0.187)		(0.077)	(0.096)	
κ_i	12.325	14.967	15.905		0.181	Coef. on (Share × Quintile Dummy) given below	
(s.e.)	(5.925)	(6.455)	(24.166)		(0.430)		
$(\kappa_i \times Q_i)$	-8.388	-9.317	-12.049	ω_1	0.046		
(s.e.)	(3.863)	(3.796)	(15.393)	(s.e.)	(0.069)		
$(\kappa_i \times Q_i^2)$	1.861	2.065	2.848	ω_2	-0.477		
(s.e.)	(0.806)	(0.799)	(3.122)	(s.e.)	(0.360)		
$(\kappa_i \times Q_i^3)$	-0.131	-0.143	-0.210	Knot	5.218		
(s.e.)	(0.054)	(0.053)	(0.205)	(s.e.)	(1.205)		
$\ln(\text{School})$	0.058	0.053	-0.074		0.033		0.030
(s.e.)	(0.093)	(0.095)	(0.178)		(0.106)		(0.093)
$\text{Invest}_{\text{Avg } 74-78}$	0.016	<i>0.015</i>	0.023		0.018		<i>0.015</i>
(s.e.)	(0.008)	(0.008)	(0.019)		(0.008)		(0.009)
Pop. Growth	<i>-0.712</i>	-0.712	-0.967		-0.773	-0.557	
(s.e.)	(0.410)	(0.414)	(0.781)		(0.389)	(0.404)	
Africa	-0.628	-0.632	-0.599		-0.638	-0.701	
(s.e.)	(0.157)	(0.159)	(0.231)		(0.172)	(0.151)	
Percentiles	Overall Effect, γ_i , for i at listed percentiles of Q_i					α_i	
10 th Percentile	0.417	0.057	-0.342	0.189		0.526	
(s.e.)	(0.358)	(0.379)	(0.720)	(0.419)		(0.408)	
30 th Percentile	0.123	0.148	-0.097	0.266		-1.322	
(s.e.)	(0.243)	(0.244)	(0.731)	(0.329)		(0.999)	
50 th Percentile	0.249	0.251	0.367	0.350		-0.257	
(s.e.)	(0.203)	(0.206)	(0.599)	(0.251)		(0.331)	
70 th Percentile	0.664	0.684	0.613	0.573		0.572	
(s.e.)	(0.186)	(0.187)	(0.286)	(0.200)		(0.278)	
90 th Percentile	-0.151	-0.126	-1.384	-0.318		-0.147	
(s.e.)	(0.236)	(0.239)	(1.183)	(0.326)		(0.221)	
# w/sig. + effect percentiles	17 55 th – 79 th	17 55 th – 79 th	6 63 rd – 72 nd	9 62 nd – 73 rd		14* 60 th – 80 th	
R ²	0.732	0.745	0.61	0.73		0.73	
No. of obs.	71	71	59	71		71	
Bold = significant > 95% level of confidence, <i>Italic</i> = sig. at 90% to 95% level of conf. Column 4: ω_1 is coef. on $\kappa_i(Q-Q_{MIN})^2$, ω_2 is coef. on $M \times \kappa_i(Q-Q_{KN})^2$ Column 5: α_i represents estimate at for midpoint of i^{th} quintile * by construction, (number / quintile) × (number of sig. quintile coefficients)							

percent level of confidence. This suggests that a cubic interaction between κ_i and Q_i , as opposed to no interaction, a linear interaction, or a quadratic interaction, is warranted. The lower panel of Table 3 shows that, with this specification and estimation method, 17 of the 71 countries in the sample (23.9 percent of the countries) have a value of γ that is significant. The set of countries represents those with institutional quality ranging from the 55th percentile (Mexico) to the 79th percentile (Ireland).

The quantitative effect of having an open capital account is economically meaningful, as well as statistically significant, for countries with institutional quality between that of Mexico and Ireland. For example, consider two hypothetical countries that are similar along all relevant dimensions, including initial income and their institutional quality. The strongest support for the opening sentence of this paragraph can be made by assuming that Q equals 5.75 for both of these economies since γ reaches a maximum value of 0.67 at this level of Q . If one of these countries maintained capital controls throughout the sample period while the other kept an open capital account, the estimated annual average growth rate of the open economy would be 3.35 percentage points greater than that of the closed economy, and the open economy would be 95 percent bigger than the closed economy after two decades. Of course, this is the maximum difference that is obtained with these estimates. But differences are notable with other assumed values of κ_i and Q_i as well. For example, at $Q = 4.64$, the point of the lower 95 percent confidence bound in the estimate with constant convergence, the estimated value of γ is 0.357. This suggests a difference of 1.79 percentage points in annual growth between a fully closed and a fully open economy, and a difference of 43

Figure 2: Gamma, Constant Conditional Convergence

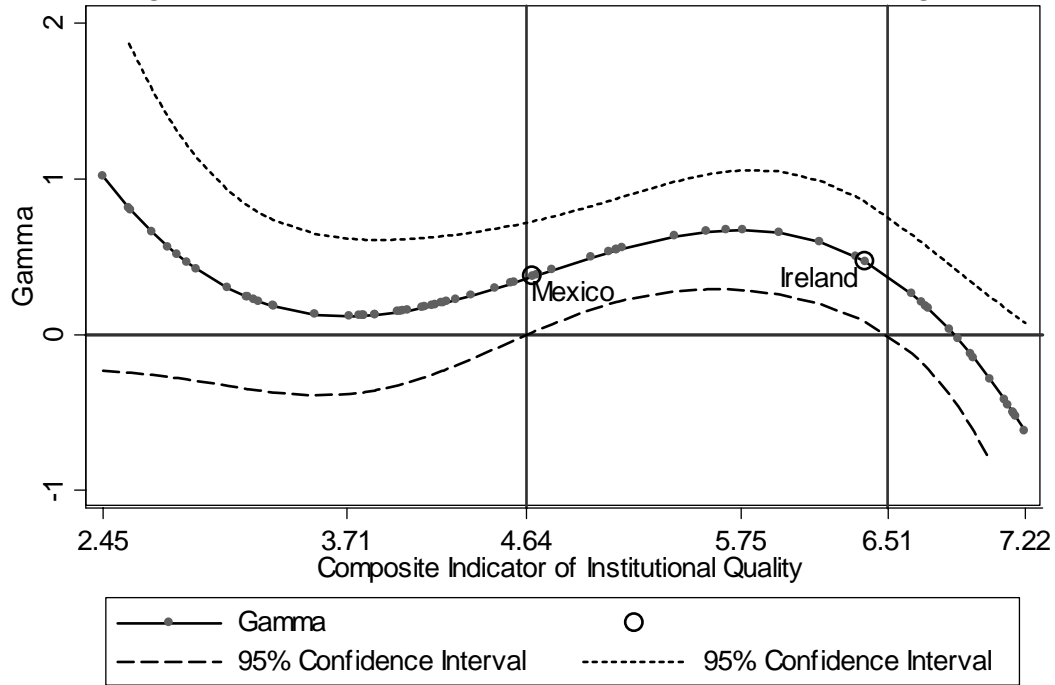
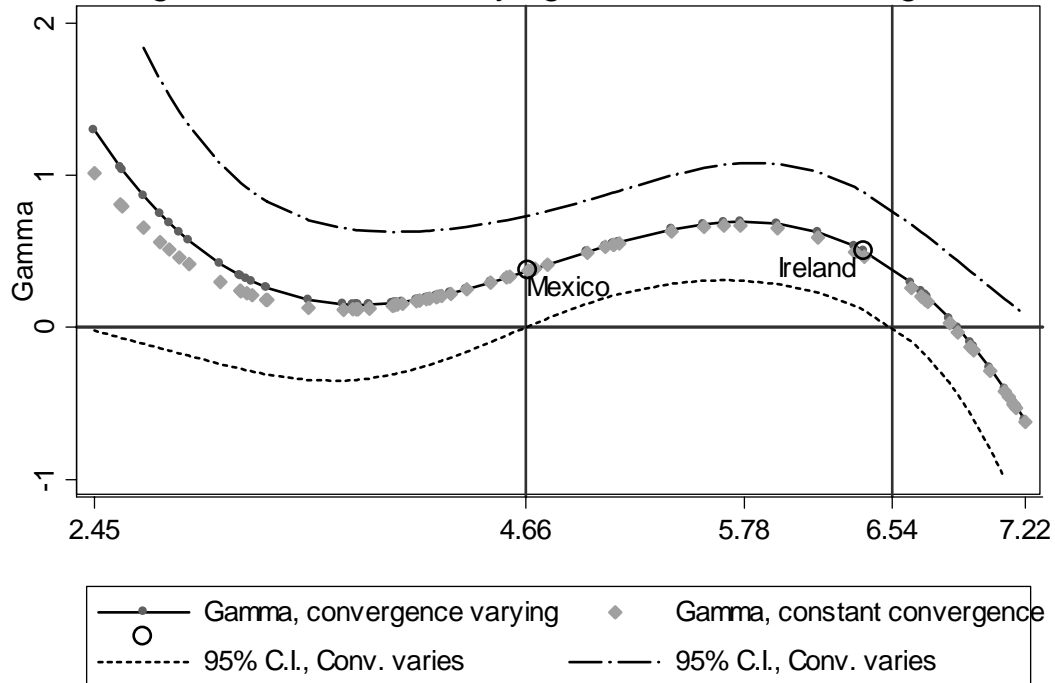


Figure 3: Gamma, Varying Conditional Convergence



percent in per capita income after two decades. Even comparing two economies for which $Q = 4.64$, with one that is closed and one that is open only during the second half of the sample, there is a difference of 0.893 percentage points in the annual growth rate, a difference that would result in a difference of 20 percent between the continually closed and periodically open economy after two decades.¹⁷

While these results strongly support one prediction of the model presented in Section 2, another prediction, that an open economy experiences more rapid conditional convergence than a closed economy, is not consistent with the empirical results. Column 2 presents the estimates from Specification [15] that allows for the possibility of varying conditional convergence through the inclusion of the interaction between initial income and the indicator of capital account openness. As predicted by the theory, the estimated value of this interaction term is negative, but it is not significant (the p-value is 0.57). But the estimated γ obtained with varying conditional convergence is almost identical to the γ obtained under the assumption of constant conditional convergence.¹⁸ In Figure 3, the estimates of γ for varying conditional convergence (represented by the line with the filled circles on it) and under the assumption of constant conditional convergence (represented by the unconnected diamonds) track each other very closely. In fact, as shown in the lower panels of Columns 1 and 2 in Table 3, the set of countries with a

¹⁷ These values of γ are broadly consistent with those presented in the theoretical model since the estimates of γ in the theoretical model represent effects on average annual growth and, consequently, the values of γ from the theoretical model must be multiplied by 20 to be compared them to the estimates of γ presented here. For example, the value of 20 times the maximum values of γ presented in Table 2 ranges from 0.428 to 0.47.

¹⁸ As discussed in footnote 15, the estimates that are drawn from a specification with a varying rate of convergence employ the results of the regression of Q_i on $\ln Y_{76,i}$ reported in Panel B of Table A.2.

significant value of γ for the varying conditional convergence estimate is the same as that for the constant conditional convergence estimate. Therefore, because of the lack of support for varying conditional convergence, and the similarity of results concerning how γ varies with Q across these two specifications, all further results presented here consider only the case of constant conditional convergence.

Column 3 of Table 3 presents instrumental variable estimates of Specification [14], and Figures 4 plots the associated estimate of γ , along with its 95 percent confidence interval. The instruments used in these estimates include κ_i for the period 1970 to 1974, similarly constructed indicators of current account openness, a multiple exchange rate regime, and surrender of export proceeds, the average of trade divided by GDP over the period 1970 to 1974, Quinn's (1997) indicator of the intensity of capital account controls in 1973 and his indicator of the intensity of current account controls for that year, and a set of regional dummy variables. These instruments are used for κ_i as well as the for interactions of κ_i with institutional quality.¹⁹

The lower panel of Columns 3 shows that fewer countries have a significant estimated value of γ with IV estimates than with OLS estimates, a result partially due to the smaller sample available for the IV estimates, but also one typically found when comparing IV to OLS estimates. Figure 4 also shows, however, that over the range of values of Q_i for which γ is significant in the IV estimates, or even over the larger range of values of Q_i for which γ is significant in the OLS estimates, the IV and OLS estimates of γ track each other closely.

¹⁹ The R^2 in the first-stage regression for κ_i is 0.64.

Figure 4: Gamma, IV Estimate

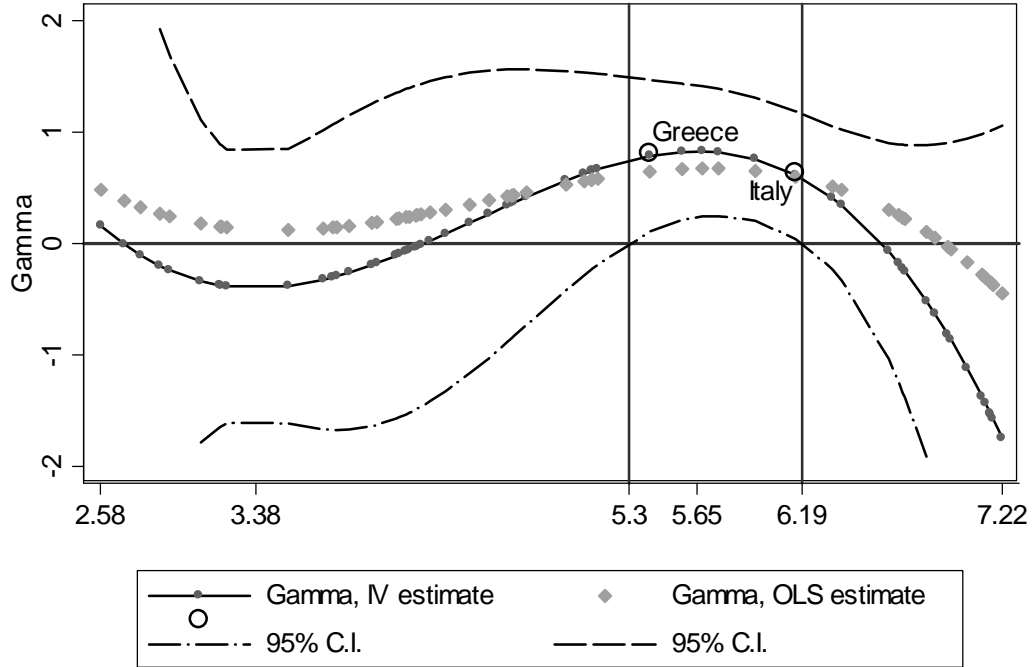
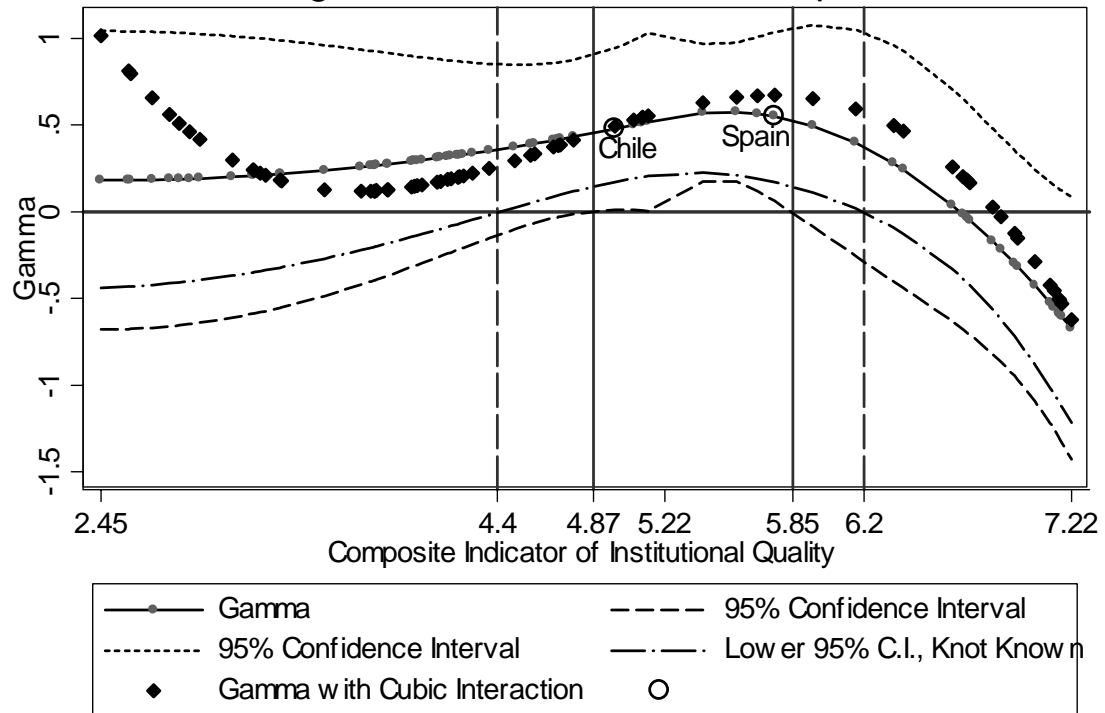


Figure 5: Gamma, Quadratic Spline



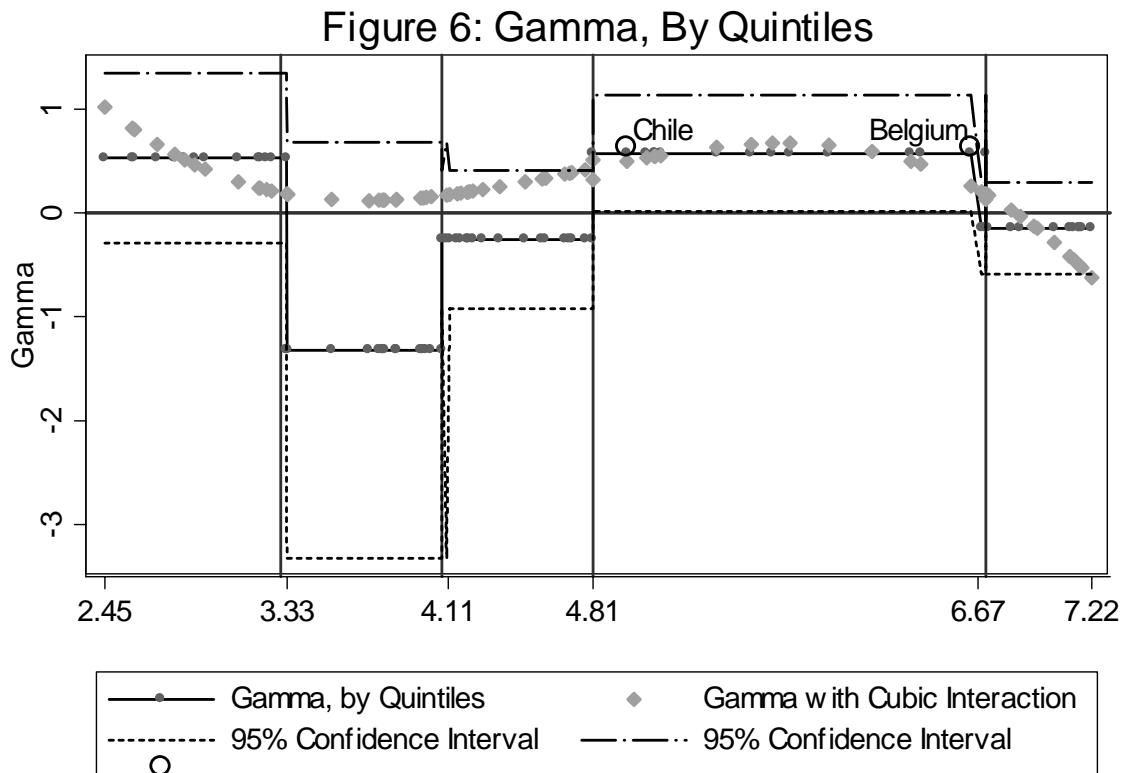
The fourth column of Table 3 presents the estimates of Specification [16] which includes a quadratic spline, with the knot of the spline estimated simultaneously with the coefficients of the regression using nonlinear least squares. The lower panel of this column shows that 9 countries, those with institutional quality between the 62nd and 73rd percentiles, have significant estimated effects of capital account openness on growth. The size of the estimated effect for the 70th percentile is only about 16 percent different than the effect for the country at that same percentile using Specification [14].

The similarity between the estimated effects of institutional quality on the responsiveness of economic growth to capital account openness in the spline and cubic interaction specifications is shown more fully in Figure 5. The plot of γ estimated with a quadratic spline specification (the line with the filled circles) as well as the plot of γ from the basic cubic interaction (the unconnected diamonds) track each other closely. Figure 5 also includes the upper and lower 95 percent confidence intervals for γ , as well as the lower 95 percent confidence interval for γ if the estimated value of the knot, 5.218, is treated as a known parameter rather than an estimate. This latter confidence interval gives a much wider range of significant values of γ (even though the p-value for the estimate of the knot is less than 0.001), as shown by the dashed vertical lines, with 23 of the 71 countries having estimates of γ that are significant at better than the 95 percent level of confidence when the value of the knot is treated as a parameter of the model.

The final column in Table 3 presents the estimates of Specification [17] in which κ_i is interacted with a set of dummy variables representing the quintiles of institutional quality. The results in this column show that the coefficient on κ_i is only significant for the 4th quintile, that is, from the 60th percentile to the 80th percentile. This corresponds

closely to the more parameterized results presented in Columns 1 and 2, where significant values of γ are obtained for countries between the 55th and 79th percentiles. Also, the estimated value of γ of 0.572 for the 4th quintile is within the range of significant values of γ from the estimates in Columns 1 and 2 of 0.357 to 0.670.

The close correspondence between the estimates of γ from Specification [14] and Specification [17] is also demonstrated by Figure 6. This figure shows that the 4th quintile, for which institutional quality ranges from 4.81 to 6.67, is the only one in which the confidence interval for γ does not overlap zero. In this range, the estimated values of γ from Specification [14], represented by the unconnected diamonds, closely correspond to the estimate from Specification [17]. Thus, the overall result for the effect of institutional quality on the responsiveness of growth to capital account openness is robust to results from this different estimation technique.



4. Conclusion

The debate over the consequences of capital account liberalization tends to be painted in broad strokes of black and white. This paper suggests a more nuanced approach, one that allows for shades of gray.

The model in this paper presents a logical framework demonstrating that the effect of capital account liberalization on economic growth varies with institutional quality. Estimates from several empirical specifications consistent with this model suggest that an open capital account can make a statistically significant and economically meaningful contribution to economic growth. But, as predicted by the theory presented earlier in the paper, this estimated effect varies with institutional quality. In particular, the effect of capital account openness on growth is found to be statistically significant for about one-quarter of the countries in the sample, and these countries tend to be ones with better (though not the best) institutions. There is a strong correlation between institutional quality and income per capita, and the countries that tend to benefit significantly from capital account liberalization are mostly upper-middle-income countries.

At a policy level, the results presented in this paper answer, to some extent, the critics of capital account liberalization who assert that its benefits have not been demonstrated. But the model and empirical results presented here do not offer an unqualified endorsement of capital account liberalization either. Instead, the main message of this paper is that the environment in which this policy takes place can have an important effect on its consequences.

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Data Appendix

Indicators of Capital Account Openness and Institutional Quality

In this data appendix we discuss the indicators of capital account openness and institutional quality used in the regressions.

A.1 Indicator of Capital Account Openness

The theoretical model presented in Section 2 includes the parameter κ that represents the proportion of years that a country had a continuously open capital account. For the empirical analysis in this paper, we construct the indicator of capital account openness κ_i that represents the proportion of years between 1976 and 1995 that country i is recorded a country as having an open capital account by the *Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER)*, a publication of the International Monetary Fund.²⁰ This indicator has been used in other empirical studies of the effects of capital account openness on growth, including Grilli and Milesi-Ferretti (1995), Rodrik (1998) and Klein and Olivei (1999).²¹

²⁰ Every issue of the *Annual Report on Exchange Arrangements and Exchange Restrictions* published between 1967 (which refers to conditions in 1966) and 1996 (which refers to conditions in 1995) includes a summary table in which row E.2, labeled “Restrictions on payments for capital transactions,” addresses the presence or absence of capital controls. The 1997 issue of *Annual Report on Exchange Arrangements and Exchange Restrictions* expanded the summary information on capital controls including, for the first time, a distinction between restrictions on inflows and restrictions on outflows. Unfortunately, this new classification system cannot be mapped into the early system, making the use of a panel bridging the pre-1996 and post-1996 data problematic.

²¹ An alternative empirical indicator of capital account openness developed by Dennis Quinn (1997) attempts to record the intensity of controls. Quinn’s indicators are only available for a limited set of years for non-industrial countries. Edison, Klein, Sløk and Ricci (2004) compare κ_i to Quinn’s indicators

Table A.1 presents some statistics and information on κ_i . The IMF publication records that about half of the countries in the data set (36 of the 71 countries for which we have full data) had closed capital accounts throughout this period. Among the 35 countries that had some experience with open capital accounts (a set that includes all 17 industrial countries in the sample), 6 were recorded as having had open capital accounts each year from 1976 to 1995; the United States, Belgium, the Netherlands, Canada, Malaysia and Hong Kong.

As defined here, κ_i does not distinguish between a one-time liberalization and an on-again, off-again pattern of capital account restrictions. Fortunately, in the large majority of observations in the data set, κ_i corresponds directly to κ in the theoretical model, that is, it reflects an early period with capital account restrictions and, if nonzero, a later period with an open capital account. For the 29 countries where κ_i did not equal 0 or 1, the governments of 20 of them (all 14 industrial countries and 6 of the 15 non-industrial countries that had a value of κ_i greater than 0 but less than 1) did not close the capital accounts once it was opened.²²

Table A.1: Capital Account Openness Indicator			
κ_i = proportion of years with open capital accounts (from IMF <i>Exchange Arrangements and Exchange Restrictions</i>) 71 observations, 36 = 0, 35 \neq 0.			
Percentiles (for non-zero cases)			
25 th	50 th	75 th	90 th
0.15	0.35	0.85	1.00

²² For details on this, see Edison, Klein, Ricci and Sløk (2004).

A.2 Indicator of Institutional Quality

A variety of indicators of institutional quality have been used in empirical research. The composite indicator used in this paper, Q_i , represents, for country i , the 1984 to 1995 average of five series from the data set constructed by Steve Knack and Philip Keefer of the IRIS Center at the University of Maryland; Bureaucratic Quality, Control of Corruption in Government, Risk of Expropriation, Repudiation of Government Contracts, and Rule of Law (Law and Order Tradition). These series are based on data from the *International Country Risk Guide*, published by the PRS Group.²³ A higher value for any of the indicators represents a higher quality of an institution so, for example, a higher score for Repudiation of Government Contracts means less of a risk of repudiation and a higher score for Risk of Expropriation means a smaller risk.

Table A.2 presents some statistics for Q_i . Panel A shows the minimum and maximum values, as well as the values for the 10th, 30th, 50th, 70th and 90th percentiles, for the 71 observations in the sample. The regression of the logarithm of income per capita in 1976 on Q_i , presented in Panel B, shows a highly significant link between the logarithm of initial income per capita and institutional quality.²⁴ The results in Panel C show that there is a very high correlation between all five components of the overall indicator of institutional quality. This high correlation explains why the results of the estimates presented below are largely unchanged if any single component is used rather than the average of all five, as well as if a different weighting scheme is used to calculate the overall indicator of institutional quality.

²³ See <http://www.prsgroup.com/icrg/icrg.html>.

²⁴ As mentioned in footnote 15, this estimate is used to evaluate γ in specification [15].

Table A.2: Institutional Quality Indicator and Its Components																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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