Capital Controls: A Political Economy Approach

Laura Alfaro*

Harvard Business School
Soldiers Field Road, Morgan Hall 263. Boston Massachusetts, 02163

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Abstract

This paper examines the economic consequences of political conflicts that arise when countries implement capital controls. In an overlapping-generations model, agents decide on whether to open or close the economy to capital flows. The young (workers) receive income only from wages while the older ones (capitalists) receive income only from savings. I characterize the set of stationary equilibria for an infinite horizon game. Assuming dynamic-efficiency, when the median representative is a worker (capitalist), capital-importing countries will open (close) while capital-exporting countries will close (open). These predicted patterns are consistent with data on liberalization policies over time across various countries.

* Tel: 617-495-7981. Fax: 617-496-5985. E-mail lalfaro@hbs.edu

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1. Introduction

This paper examines a political economy approach to explain capital liberalization policies observed across countries for which I consider the distributional effects from opening and closing the economy to international capital flows.

“Economic theory leaves no doubt about the potential advantages of global financing trading. International financial markets allow residents of different countries to pool various risks. A country suffering a temporary recession or natural disaster can borrow abroad.… At the global level, the international capital market channels world savings to their more productive uses, irrespective of location.” Obstfeld (1998).

However, a simple examination of the world’s economies reveals that the policies adopted by different countries at different points in time are in discord with those proposed by economists.

“Until World War I, free capital market linked financial centers in Europe, the Western Hemisphere, Africa and the Far East. The international financial market broke up during World War I, made a brief comeback between 1925 and 1931, and then withered in the Great Depression. At that time, governments everywhere limited the scope of domestic financial markets as well, imposing tighter regulation and prohibiting myriad activities outright. World War II cemented the demise of the global capital market… However, private capital movements began to return in the 1960s…” Obstfeld (1998).

At the end of World War II, international markets for goods, services and financial assets were essentially nonexistent due to protectionist policies around the globe and currency inconvertibility. However, the path towards greater globalization in the capital markets observed after World War II has been neither identical across nations nor monotone for most economies. Graphs #1–#5 show a capital control index constructed using IMF’s Annual Report on Exchange Arrangements and Exchange Restrictions data on: i. exchange arrangements: separate exchange

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rates for some or all capital transactions; ii. restrictions on payments for current transactions; iii. restrictions on payments for capital transactions.

The capital control index for developing countries (Graph #1) shows an open-close-open-close-open cycle during the period of analysis. Graph #2 shows the index for industrialized countries. Since 1966, industrialized countries have followed a relatively constant liberalization policy. In the same graph, we can observe Europe’s performance. Northern Europe followed a path towards liberalization similar to that of industrialized countries. Southern Europe, on the other hand, followed an open-close-open cycle. Northern and especially Southern Europe’s performance is strongly influenced by the elimination of controls within the European Union. Graph #3 shows the policies pursued by the so-called Asian Tigers and Japan. These countries have also followed a constant liberalization approach but the speed in their liberalization process seems more dramatic than for industrialized countries. Further breakdown for developing countries suggests some interesting patterns. Latin American countries followed a close-open-close-open cycle (Graph #4). Graph #5 plots the index for a sample of African countries. There is a weak close-open pattern but overall they have imposed more restrictions than Latin America

Why do some countries open while others keep their economies closed? Why do some countries choose to open and later decide to close? To address openness dynamics and attempt to answer these questions, this paper considers the distributional effects resulting from opening and closing an economy to international capital movements.

In a one-good intertemporal model of trade, countries gain from borrowing or lending abroad when there is a difference between the economy’s autarky interest rate and the world
interest rate\textsuperscript{2}. However, whereas an economy, as a whole, can benefit from opening to international markets, some groups within an economy may lose in the absence of necessary compensating transfers.

These results become clearer under the light of an overlapping generation (OLG) model (where individuals work and consume when young thereby receiving wages, and enjoy yields from savings and consume when old) which allows a dynamic setup where workers and capitalists can be identified with the young and old generation respectively\textsuperscript{3}. If capital is mobile and labor is not, opening the economy will have different effects across agents. Capital exports, due to international rates higher than autarky ones, help the capitalists and hurt the workers (lower capital levels imply lower wages); capital imports have the opposite results.

The impact of capital mobility on different generations indicates that allowing for international factor movements can create a sharp political division between generations. Rather than allowing compensatory schemes to mitigate intergenerational conflicts, we model an open economy as the outcome of a non-cooperative game between players who wish to maximize their own utility. Therefore, instead of imposing a social welfare function, we allow the median representative, worker (young) or capitalist (old), to decide every period whether to open or not to the international capital market, through an electoral process.

Other justifications for capital controls include fiscal considerations (retention of domestic saving, maintenance of the domestic tax base) and limitation of short-term capital flows due to price and/or wage rigidities and investment irreversibility. These can imply slower real

\begin{itemize}
  \item In a large economy, monopoly power in terms of trade (in this case, the interest rate) could be used to improve national welfare (optimal tariff argument). Then, a closed economy outcome can be thought as one equilibrium of a 2 country game, where each country would be better imposing restrictions if the other does not retaliate (prisoners dilemma game). However, for a small economy, the optimal tax is zero.
  \item See Woodford (1988).
\end{itemize}
economy speed of adjustment and/or excess volatility in financial markets that may induce excess exchange rate volatility and negative effects on real economic activity. Other second-best argument used in the stabilization/structural reform literature argues that in the presence of trade restrictions, capital flows, can be welfare reducing.

Self-fulfilling attacks against fixed exchange rates not motivated by market fundamentals provide additional justification for the imposition of capital controls. Eichengreen and Wyplosz (1993) suggest that countries with credibility problems would be more likely targets of speculative attacks and would therefore be more likely to impose controls. However, the signaling literature cautions that countries that lift capital controls could signal “good behavior”, while those that impose them could be perceived as to be following inconsistent policies, which would worsen credibility.

Alesina and Tabelini (1989) consider distributional issues when explaining the imposition of capital controls. In a two period general equilibrium model with two government types with conflicting distributional goals, they show that left-wing parties are more prone to restrict capital outflows than right-wing governments. In their model, capital controls make the capitalists worse off. The model presented in this paper extends this interpretation by considering the effects of the characteristics of the economy on the agent’s welfare.

“Once homogeneity between private agents has been removed, distributional reasons become an important consideration in the evaluation of foreign exchange restrictions”. Alesina, Grilli, Milesi-Ferretti (1994).

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4 See Mathieson and Rojas-Suarez (1992), Alesina, Grilli and Milesi-Ferretti (1994) and Dooley (1995) for comprehensives reviews of the literature.
5 Obstfeld (1986)
6 Bartolini-Drazen (1995)
Distributive arguments have long been used in the trade literature. A simple Hecksher-Ohlin model with all the standard assumptions shows that when a country opens trade, the remuneration to the factor used intensively in the exporting sector will increase while that the factor used in the importing sector will drop. The political economy of trade literature focuses on these issues and tries to explain prevailing policies by emphasizing distributional considerations.\footnote{See Mayer (1984), Helpman (1995), Grossman and Helpman (1995).}

In the capital-movements literature, evidence from Checchi (1992) shows that preventing capital outflows shifts the distribution of income in favor of wage earners. Measuring the effectiveness of the controls in Great Britain, Japan and Australia with the differentials between domestic and offshore interest rates and testing for causality, he provides empirical evidence that supports the argument that capital controls indeed affected income distribution.

In an OLG framework, Ruffin and Yoon (1993) show that the current old can compensate (or be compensated by) future generations via an improvement in the terms of trade (and consequently a movement from autarky to free trade) if and only if the economy is dynamically efficient. They devise a simple technique to compare welfare across different generations. They set up a trust with which winners compensate losers. Thus they are able to identify whether an economy is better or worse off after opening. In practice, the existence of this type of compensation schemes is quite rare. Therefore, it is relevant to analyze whether an open or closed economy is the outcome of a non-cooperative game without compensating transfers.

The paper is organized as follows. The next section presents the basic model. In the second section, each generations decide whether to open or close to capital flows. Under dynamic efficiency, if the median representative belongs to the young/worker (old/capitalist) fraction, capital-importing countries will open (close) while capital exporting ones will remain closed.
This outcome is unique. Both equilibria are sustainable if the economy is dynamic inefficient and we allow for closed loop strategies. Finally, the last section presents the data and discusses the empirical results.

2. Benchmark Model: No uncertainty

a. Households

Following Diamond (1965), consider an infinite-period economy in which agents live for only two periods. At each point in time two generations are alive: young and old. Agents are identical within generations. For each person born at generation \( t \), \((1+n)\) persons are born in generation \((t+1)\). Population growth, \( n \geq -1 \), is constant.

Young individuals are endowed with one unit of labor, which they supply inelastically when young and earn a wage \( w_t \). They consume part of their wage income during the first period of life and save the rest. The amount of savings depends on first period income and next period’s interest rate. When old, they consume the return and principal from savings. There is no altruism across generations.

Let \( c_t^1 \) be first period consumption and \( c_{t+1}^1 \) second period consumption for the generation born at \( t \). Individuals born at time \( t \) are characterized by the intertemporal utility function, \( u(c_t^1, c_{t+1}^1) \). The utility function is assumed to be twice continuously differentiable and strictly quasi-concave on the interior of the consumption set \( \mathbb{R}^2_+ \) and increasing in both arguments:

\[
\begin{align*}
    u_1(c_1, c_2) &> 0 & \text{for } c_1, c_2 > 0 \\
    u_2(c_1, c_2) &> 0 & \text{for } c_1, c_2 > 0
\end{align*}
\]

Future consumption is a normal good,
\[ u_{ij} \geq u_{i1j} \quad \text{for} \quad c_1, c_2 > 0 \]

Let \( S_t = w_t - c_t \), be the savings in period \( t \). Let \( R_{t+1} \) denote the gross return on savings \( (R_{t+1} = 1 + r_{t+1}) \). Therefore, second period consumption is given by \( c_{t+1} = R_{t+1}S_t \). Each agent born at time \( t \) maximizes his lifetime utility function:

\[ U = u(c_t^t, c_{t+1}^t) \]

subject to \( c_t^t + \frac{c_{t+1}^t}{R_{t+1}} = w_t \)

alternatively, \( S_t = w_t - c_t = S(w_t, R_{t+1}) = \max_{st} \ u(w_t - S_t, \ S_t R_{t+1}) \)

The indirect utility is given by: \( V = U(w_t, R_{t+1}) \)

b. Technology

At any point in time a single good is produced according to a constant returns to scale production function, \( f(k) \), where \( k \) stands for capital labor ratio, \( k = K/L \). The production function is twice continuously differentiable, increasing and strictly concave, for \( k > 0, f(k) > 0, f'(k) > 0, f''(k) < 0 \).

Output can be either consumed or saved as capital. Capital depreciates at a rate \( \delta \). Let \( u_t \) be the rental rate, \( u_t = r_t + \delta \). Firms seek to maximize profits defined by:

\[ \Pi: f(k_t) - u_t k_t - w_t \]

Competition in the markets for capital and labor services assures that each factor is going to be paid its marginal product:

\[ f_k(k_t) = u_t = r_t + \delta \]

\[ w[k_t] = f(k_t) - k_t f_k(k_t) \]

Under this assumption, it is straightforward to show that increases in the remuneration to one factor are accompanied by reductions in the payments to the other one (i.e., \( dw/dr = -k \))
c. Economic Equilibrium: Autarky

An economic equilibrium is a sequence of vectors \((S_t, w_t, R_t)\) such that:

a. Households maximize utility taking the price vector \((w_t, R_{t+1})\) as given:

\[
S_t = \arg\max_{s_t} U \left( w_t - S, S R_{t+1} \right)
\]

b. Given the price vector \((w_t, R_{t+1})\), firms maximize profits:

\[
w_t = w[k_t] = f(k_t) - k_t f_k(k_t), \quad R_t = 1 + f_k(k_t) - \delta
\]

c. Market Clearing: the amount of capital available next period \((t+1)\) consists of the savings of the young generation at \(t\).

\[
(1+n) k_{t+1} = S_t [w[k_t], R_{t+1}] = G(k_t, k_{t+1}) \tag{1}
\]

When political interactions are added to the model, two economic equilibria will be of crucial importance. These are the autarkic steady state and the trade state equilibria.

An autarkic steady-state equilibrium is simply the stationary equilibrium obtained when the economy does not receive or generate outflows of capital from other economies. In this case, the prices \(R_t\) and \(w_t\) are endogenously determined at the point where capital has converged to its steady state.

Formally, an autarkic steady state equilibrium is a vector \((s^a, w^a, R^a)\), such that:

\[
S^a = \arg\max_{s} U \left( w^a - S, R^a S \right) \quad (1+n) k^a = S^a
\]

\[
w^a = f ( k^a ) - k^a f_k ( k^a ) \quad R^a = 1 + f_k ( k^a ) - \delta
\]

A unique asymptotically stable steady state exists if \(G(k)\), defined in equation (1), is a

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8 Galor and Ryder (1989) discuss sufficient and necessary conditions for the existence of a non-trivial asymptotically stable steady state. A sufficient condition for concavity in \(G(k)\) is for the savings function to increase with positive changes in \(R\) (substitution effect of increases in the interest rate dominates the income effect).
single valued, strictly concave function and steeper than the 45° line at the origin. If so, \( G(k) \) will intersect the 45° line at some positive value of \( k \).\[b\]

**d. Economic Equilibrium: Open Economy**

Now we characterize an economy that is open to international capital flows. Assume that capital is mobile but labor is not. Home country takes the international interest rate, \( r^* \), as fixed by the world economy and capital immediately adjusts to conform to this new interest rate (small economy and no cost of adjustment assumptions). Define \( R^i = 1 + r^i \); let \( a_t \) be the assets held by domestic residents per capita at time \( t \).

An open economy equilibrium is sequence of vectors \((S_t, w_t, R^i_t)^\infty_{t=0}\) such that at each time \( t \):

a. Households maximize utility given the \((w_t, R^i_{t+1})\)

\[
S_t = \arg\max_{s_t} U (w_t - s_t, s_t R^i_{t+1})
\]

b. Firms maximize profits

\[
w_t[k_i] = f(k_i) - k_i f_k(k_i); \quad R^i_t = 1 + f_k(k_i) - \delta
\]

c. Market Clearing

\[
(1+n)a_{t+1} = S_t [w_t, R^i_{t+1}] = w_t[k_i] - c_t [w_t, R^i_{t+1}]
\]

An open economy steady state equilibrium is a vector \((s^i, w^i, R^i)\) such that:

\[
S^i = \arg\max_{s} U (w^i - S, R^i S); \quad (1+n)a^i = S^i
\]

\[
w^i = f(k^i) - k^i f_k(k^i); \quad R^i = 1 + f_k(k^i) - \delta
\]

\[9\] A stationary allocation \((s, w, R)\) is defined as dynamic inefficient if the associated net interest rate is lower than the population growth (economy’s growth), \( 1 - \delta + f'(k) = R \leq 1 + n \). This is a situation of oversaving or overaccumulation where the level of capital available to the economy is above the golden rule level, \( k^* \), defined by: \( \delta + n = f'(k^*) \). Otherwise, the allocation is said to be dynamic efficient.
3. Political decision

This section analyzes the political interaction between members of subsequent generations who decide whether to keep the economy open or closed to capital flows.

“There exists no agreed upon theory of domestic politics. This reflects partly the fact that there are many channels through which residents convey their desire to policy makers and these ways differ across issues and across concerned groups in society. Moreover, political institutions vary across countries and they affect the ways in which influence works out through the system” Helpman (1995)

One alternative is to consider the capital control policy as the outcome of majority voting à la Mayer (1984). As argued by Helpman (1995), “there are few instances in which direct democracy is applied to a broad range of issues. However, there exists a view that in a representative democracy policy outcomes are reasonably close to what is supported by the majority of voters. In such cases the simple analysis of majority voting serves as a good approximation.” Therefore, one alternative is to assume that the policies implemented are the result of majority voting and that they reflect the preferences of the median voter. Since we have an unidimensional issue space and single-peaked preferences we can appeal to the median voter theorem.

Another approach is to assume that the government designs policies as to satisfy special interest groups. In this case, we consider the preferred policies by the “median contributor”.

We can reconcile both approaches by analyzing the preferred policies of the “median representative” who would be either the median voter or the median contributor depending on the political institutions of the country, eligibility rules and voter’s participation.

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10 See Helpman (1995) for a survey on the political economy approaches developed to explain trade policy.
In our framework, there are two possible cases: the median representative could belong either to the young or the old generation. Voting decisions are made at the beginning of each period. The following diagram is helpful in understanding the timing of events.

\[
\begin{align*}
\text{VOTE} & \quad (c_t=(1-s)w_t) & \quad \text{VOTE} & \quad (c_{t+1}=sR_{t+1}w_t) & \quad \text{VOTE} \\
\end{align*}
\]

To rank the utility effects of discrete changes in the interest rate, we use a logarithmic utility, \( U = \ln c_t + \beta \ln c_{t+1} \), and a standard Cobb-Douglas production function, \( f(k_t) = A k_t^\alpha \), which are common assumptions in the literature and allow for a simple closed-form solution of the model. These imply that there will be a unique asymptotically stable steady state, which facilitates the game theoretical analysis. One further noteworthy feature of logarithmic utility functions (jointly with a zero second-period income assumption) is that the saving decision is perfectly inelastic with respect to changes in the interest rate. For the game theoretical analysis discussed later, this does not seem to be an important drawback.\(^{12}\)

To further simplify the solution of the model, let the population growth equal to zero; the technology parameter (\( A \)) and the depreciation rate (\( \delta \)) equal to one. Additionally, we will assume that both the home country and the rest of the world are in a steady-state equilibrium\(^{13}\). Thus, we

\[\text{\textsuperscript{12} Similar results can be obtain with an isoelastic utility function } U(c^{\prime}_t, c^{\prime}_{t+1}) = \frac{1}{1-\sigma} \left( c^{\prime}_t + \frac{1}{\sigma} c^{\prime}_{t+1} \right) \text{ as long as the substitution effect from changes in the interest rate dominates the income effect (} \sigma > 1\). Though all results need to be simulated due to the lack of closed form solutions.\]

\[\text{\textsuperscript{13} Appendix 1 fully solves the model.}\]
obtain that $R = u_t$ and $w = \frac{1 - \alpha}{\alpha R_t^{1-\alpha}}$. The indirect utility of the young individual in terms of $R_t$ is given by:

$$U[R_t, R_{t+1}] = \ln \left( \frac{R_{t+1}^s}{R_t^{1-\alpha}} \right) + \ln \left( R_t \right) + \ln (1 - s) - \ln (1 - s) + s \ln s$$

It is crucial to notice that the economic decisions are completely disjoint from the political decisions. Once the wage is given, the first period consumption, and savings are already determined, independently of next period interest rates ($R_{t+1}$), and, therefore, independently of political decisions. This result hinges on the assumption of logarithmic preferences.

### 3.1 Old/Capitalist Median Representative

The old generation worked last period. Therefore, changes in their utility are due only to changes in the interest rate. If the economy opens to international markets, and capital flows in (capital-importing economy) because of higher domestic returns ($R_a > R_i$), interests will fall and the old would be hurt. If on the other hand capital flows out (capital-exporting economy) due to higher rates abroad ($R_a < R_i$), they are better off. Therefore, independently of the status of the economy (dynamic efficient or inefficient), if the economy is capital exporting they will vote to allow capital flows and they will vote to stay closed if it is capital importing.

Since the old generation maximizes their utility by choosing the status of the economy that increases interest rate returns, they behave like capitalists.\(^{14}\)

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\(^{14}\) This interpretation will be used in the empirical analysis. See Appendix 2.
3.2 Young/worker Median Representative

Each generation is faced with the decision to join international capital markets or not. Since, the median representative’s decision has a measurable and acknowledged influence on other agents’ payoffs (they do not behave “competitively”), to analyze political decisions one should approach this problem as a game among consecutive representatives. First we will consider open-loop equilibria and later, closed-loop equilibria. The terms closed-loop and open-loop are used to distinguish between two different information structures in multi-stage games. Under closed-loop information structures, players can condition their play at time \( t \) on the history of the game until that date. Open loop strategies, on the other hand, are functions of calendar time only. Equilibria that use either type of informational structure are referred to, respectively, as closed-loop equilibria and open-loop equilibria.  

There are four possible scenarios: capital importing or exporting, and economies that are either dynamic efficient or inefficient.

**Case A.1: Capital Importer \((R_a > R_i)\). Dynamic efficient**

In this case, opening to international markets will imply a wage increase in the home economy. The lifetime utilities for the current generation \( t \) under all possible scenarios are given by:

1. \( U(R_i, R_a) = \ln \frac{R_a^i}{R_i^{\alpha - a}} \), if the economy is open when young and closed when old;
2. \( U(R_i, R_i) = \ln \frac{R_i^i}{R_i^{\alpha - a}} \), if the economy is open at his young and old age;
3. \( U(R_a, R_a) = \ln \frac{R_a^i}{R_i^{\alpha - a}} \), if the economy is closed at his young and old age;

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\(^{15}\) Fudenberg and Tirole (1993)
iv. \( U(R_a, R_f) = \ln \frac{R^f_a}{R^{T-a}_a} \), if the economy is closed when young and open when old.

Define \( U(R_a, R_c) \equiv a; U(R_a, R_i) \equiv b; U(R_i, R_i) \equiv c; U(R_i, R_a) \equiv d \).

In a dynamic efficient economy, given \( R_a > R_i \), it is easy to show that:

\[ a > b > c > d \]

We can observe young generation \( t \)'s payoff in the normal form payoff table:

\[
\begin{array}{c|cc}
  t & O & C \\
  \hline
  t+1 & b & a \\
  O & d & c \\
\end{array}
\]

**PROPOSITION 1:** “Always open” is an open loop equilibrium for the economy. Moreover, the equilibrium is unique.

**Proof.** As a reminder, notice that \( a, b, c, d \) represent lifetime utilities. The first part of proposition 1 is trivial since voting “open” is clearly a dominant strategy for player \( t \). Moreover, it is a dominant strategy for player \( t+1 \) as it is clear in the following normal form game payoff matrix. In general, to play open is a dominant strategy for every generation. This can be shown in the following normal form of the game that includes player \( t, t+1 \) and \( t+2 \).

To prove the second part of the proposition we should notice that the minmax value is \( b \). Thus, agents do not need to accept payoffs with lifetime utility below \( b \). Additionally, they cannot obtain utilities above \( b \). For them to obtain payoff \( a \), the following generation would have to
accept payoff \( c \), but since \( b \) is the minmax, they can always guarantee themselves at least this payoff. Hence, closed loop strategies are not able to support any other equilibrium outcome. The only possible outcome equilibrium is an economy always open.

**Case A.2: Capital Exporter (Ra < Ri) Dynamic efficient.**

Analogously, wages will fall if a capital exporter economy opens to international markets.

Define \( U(R_a, R_i) \equiv a; \ U(R_a, R_a) \equiv b; \ U(R_i, R_i) \equiv c; \ U(R_i, R_a) \equiv d. \)

Again with \( a > b > c > d \), the normal form of the game is:

\[
\begin{array}{c|c|c}
\text{t+1} & \text{O} & \text{C} \\
\hline
\text{t} & \text{O} & \text{c} \\
& \text{c} & \text{d} \\
& \text{a} & \text{b} \\
\end{array}
\]

Similarly, we can derive the following proposition.

**PROPOSITION 2:** “Always closed” is an open-loop equilibrium for this economy. The equilibrium is unique.

Notice from Propositions 1 and 2 that since the dominant strategy for members of the young generation is to vote for the status of the economy that maximizes wages, they behave like workers. This parallelism will be used in the empirical analysis.
Case B.1: Capital Importer ($R_a > R_i$) Dynamic inefficient.

$$U(R_b, R_a) \equiv a; \ U(R_a, R_a) \equiv b; \ U(R_b, R_i) \equiv c; \ U(R_a, R_i) \equiv d.$$ Again with $a > b > c > d$, the normal form game is:

<table>
<thead>
<tr>
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<th>t+1</th>
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<tbody>
<tr>
<td>t</td>
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<td>C</td>
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In this case the minmax is $c$. Non stationary outcomes can be ruled out because in economies that move from closed at $t$ to open at $t+1$, the generation $t$ would receive payoff $d < c$. We would not observed either non stationary outcomes where the economies moves from open at $t$ to close at $t+1$, because in this case, it would be generation $t+1$ that would receive payoff $d < c$. This is shown in the normal form of the game that includes generations $t$, $t+1$, and $t+2$.

First by looking at open loop strategies, we get:

**PROPOSITION 3:** The unique open loop equilibrium outcome is an economy that is always open.

However, in contrast with previous cases, both stationary outcomes are, in principle, possible equilibria. The closed economy outcome, though Pareto superior to the open economy one, cannot be sustained with open loop strategies since each generation has an incentive to deviate and vote to open the economy. Let us analyze this case more closely. When the interest
rate increases, a member of generation $t$ experiences a fall in his wage at time $t$. However, if the increase in the interest rate persists until the next period, and the economy is dynamic inefficient, the positive effect on his utility due to this higher interest rate more than compensates for the negative effect derived from the decrease in the wage rate. If at $t$, a member of the current generation cannot force future generations to maintain a closed economy, and therefore, higher interest rates, the best thing she/he can do this period is to secure a higher wage today by voting to open the economy. If inter-generational cooperation were possible, they could obtain higher payoffs, but cooperation can only be sustained using closed-loop strategies.

In order to find a closed-loop equilibrium we need to use history dependent strategies. In trigger strategies of this sort, any agent who deviates is punished in the following period. Agents who deviate to punish previous generations are rewarded. This may be thought as a self-enforcing norm of behavior for society.

Consider the following strategy for the young generation at $t$ (for all $t > 2$):

- **close** if either $\text{young}_{t-1}$ played closed or if $\text{young}_{t-1}$ played open and $\text{young}_{t-2}$ also played open
- **open** otherwise

Thus we have:

**PROPOSITION 4:** The equilibrium outcome “economy always closed” is sustainable by closed loop strategies.

**Proof:** We can prove that there are no gains from deviating from this strategy. On the equilibrium path, the payoff from following the strategy is $b$ and from deviating is $c < b$. In

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Notice that in a capital importing-dynamic inefficient economy, to keep the economy close is Pareto Superior to opening the economy.
addition, off the equilibrium path, the payoff from punishing a defector is equal to $a$, which is greater than the payoff of not punishing that is $b$.$\blacksquare$

Therefore, in a dynamic inefficient economy, punishments are always sufficiently large to prevent deviations. This requires $\beta$ to satisfy the following condition: $(1-2\alpha)\beta > \alpha$; or alternatively $(1-\alpha)s > \alpha$. In the case of a very patient agent, $\beta \to 1$, we require $\alpha < 1/3$. In the extreme case of completely impatient agents, $\beta \to 0$, the dynamic inefficiency condition holds if $\alpha \to 0$. This is a case where the production function doesn’t depend on capital (endowment economy). Completely impatient agents in endowment economies are indifferent between opening or closing the economy.

Proposition 3 and 4 tell us that both stationary equilibrium outcomes are possible when the economy is dynamically inefficient.

Case B.2: Capital exporter ($R_a < R_i$) Dynamic inefficient

$U(R_a, R_i) \equiv a$; $U(R_i, R_i) \equiv b$; $U(R_a, R_a) \equiv c$; $U(R_i, R_a) \equiv d$. Again with $a > b > c > d$.

Proposition 3 and 4 can be easily generalized to this case. Under open loop strategies, $c$ can be sustained. Using trigger strategies we can sustain the Pareto superior equilibrium $b$.

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4. Empirical Test

The aim of this section is to perform an empirical test on the determinants of capital controls following Alesina, Grilli and Milesi-Ferretti (1994) (AGM here after) and incorporating the predictions of the model presented in Section 3. AGM perform an empirical test on the determinants of capital controls -not on the effectiveness- on a sample of OECD countries. They link capital restrictions and economic and political institution variables based on various explanations that focus on medium term aspects. They included variables on Central Bank independence, exchange rate regime as well as distribution variables. They find that capital controls are more likely in countries when the exchange rate is pegged or managed and with limited central bank independence.

According to the theoretical implications of our model, we should observe capital-importing nations governed by left parties (worker groups) and capital exporting ones with right ruling parties (capitalists) opening to foreign capital. The opposite should be true for economies that are capital importing governed by right wing parties and capital exporting ones with left governments should close. Table #1 summarizes these predictions.

Before specifying the econometric model, we need to address the following issues:

1. How to measure capital controls;
2. How to characterize a country as a capital exporter/importer;
3. How to address dynamic efficiency and inefficiency;
4. How to characterize a country as democratic;
5. Who is the median representative of an economy.

Grilli and Milesi-Ferretti (1995) mention that this type of analysis is not suitable to study interplay between foreign exchange, market instability and speculative attacks.
4.1. Capital Controls Measurement

Since 1966, the International Monetary Fund’s Annual Report on Exchange Arrangements and Exchange Restrictions includes a summary table that describes whether a country has adopted any of the following restrictions:\(^{18}\) i. exchange arrangements: separate exchange rates for some or all capital transactions; ii. restrictions on payments for current transactions; iii. restrictions on payments for capital transactions.

Table #2 summarizes this information for the countries included in our sample.\(^{21}\) By 1994, all of the 20 industrialized countries in our sample had eliminated the use of separate exchange rates on financial transactions and restrictions on payments for current transactions as forms of controlling capital flows and only 10% (2 of them) still used restrictions on capital transactions.

The information on capital controls was used to construct the dependent variable (y). \(y\) takes the value 3 when restrictions (i), (ii), and (iii) were adopted for a given year in a given country; 2 if any two types of restrictions were in place; 1 if only one type of restriction was used, and 0 otherwise. Since the IMF definition does not include certain practices that might “reasonably be considered capital controls”\(^{22}\), I followed Epstein and Schor (1992) guidelines to correct for such practices in the USA, Germany and Switzerland. \(y'\) takes the value 4 when restrictions (i), (ii),

\(^{18}\) Following Alesina, Grilli and Milesi-Ferretti (1994) Drazen and Bartolini (1995) and Grilli and Milesi-Ferretti (1995) we constructed a capital control index with these data. These studies acknowledge the limitations of the index in measuring the intensity or effectiveness of capital controls. However, it is difficult to find another measure “that is comparable across countries and that is available for sufficiently long periods of time”.

\(^{19}\) Adams and Greenwood (1985) show that the effects of a dual exchange rates regime are essentially identical to those of capital controls. The requirement that domestic financial transactions with the rest of the world be undertaken at a separate exchange rate is equivalent to levying a tax on those transactions.

\(^{20}\) Current account transactions can be used (partially) to evade restrictions on capital transactions through practices such as leads and lags in export billing, over invoicing of imports, and under invoicing of exports.

\(^{21}\) For a list of the countries included in the estimation see Appendix 3.

\(^{22}\) See Epstein and Schor (1992) for a brief history of controls in the OECD from 1950-1986 and further comments on the advantages and disadvantages of the IMF measures.
and (iii) and other practices were adopted for a given year in a given country; 3 if any three restrictions were in place; 2 if two were used, 1 if only one, and 0 otherwise.

The econometric test uses both indices.

4.2. Characterization of Capital Exporting/Importing Countries

Our model’s predictions depend on whether the economy is capital exporting or capital importing. Theoretically, we define a capital exporting economy as one in which the autarky real interest rate is below the international real rate (in a capital importing country the autarky real rate is above the international rate).

Empirically, it is complicated to interpret interest rate data to judge whether an economy is a capital importer or exporter. In the case of economies that are even slightly open to international markets, interest rates reflect transaction, information and mobility costs; capital controls, political risk, devaluation expectations and default risk. Even if we consider onshore and offshore yields on the same instruments denominated in the same currency, the yields will still reflect restrictions on capital flows and country risk. In addition, real interest rate estimations require information on inflation expectations.

Rather than using interest rate data to identify capital exporting or importing countries, we used the capital account balance as a proxy variable. A country is taken to be capital exporter if the capital account is negative and a capital importer otherwise. This information was taken from the balance of payment accounts in the IMF International Financial Statistics data set. Graphs #6a show the capital account as a percentage of GDP for the sub-sample of industrialized countries. It is important to keep in mind that the size of the Error and Omissions account (the statistical discrepancies in the balance of payment accounts) is by no means negligible and there
is no accurate way of comparing these magnitudes across countries. The discrepancies imply not only that the capital account magnitude measurement is inaccurate but also that the sign of the capital account might be incorrect.

We also note that the value of the capital account can be influenced by the existence of capital controls. This, of course, generates endogeneity problems. To address these problem and the fact that short-term fluctuations might temporarily affect the balance of payment accounts, we also calculate 5 year averages of the capital account (as percentage of gross domestic product).

4.3. How to address dynamic efficiency/inefficiency

Abel, Mankiw, Summers and Zeckhauser’s (AMSZ here after) (1989) seminal paper shows that if gross returns to capital (gross profits on output) invariable exceed gross investment in a steady state, then the steady state is dynamically efficient. They construct empirical measures of annual gross profits and gross investments and find that, according to their criterion, the United States (1929-1985), England, France, Germany, Italy, Canada and Japan (1960-1984) are all dynamic efficient. Following AMSZ, all countries were considered to be dynamic efficient.23

4.4 Democratic Countries

The conclusions of the theoretical model rely on the assumption that government policies reflect the desires of the population. Therefore, we need an index of political freedom for each country at each point in time in order to determine if the country was “democratic enough.”

23 An alternative specification was considered using the No-Ponzi game condition for government debt. A country was characterized as dynamic inefficient if in each of the previous last five years, the government’s rate of return was less than the growth of GDP. The results (available upon request) were robust to the model’s specification.
Freedom In the World, a Freedom House publication, contains annual surveys of political rights and civil liberties for all countries. Their rating of political and civil liberties range from 1 (representing the most free) to 7 (the least free). They average the civil and political liberties rating and categorize countries as free when the measurements is between [1,3), partly free for [3,5.5) and not free [5.5,7]. For estimation purposes, only free countries were considered.

4.5 Median Representative

The model’s predictions depend not only on the status of the economy (whether it is capital exporting or importing and dynamic efficient or inefficient), but also on the identity of the median representative and the group to which he/she belongs.

The effects of changes in the political franchise on policies have long been acknowledged in areas like public spending, trade, and taxation. It is difficult to empirically determine the median representative of an economy because, among other factors, it depends on the actual participation of the electorate at each particular election. For example, younger people tend to be more indifferent towards political issues and voting in the United States than in European countries. Changes in the political system and regime, extension of political franchise, majority rule, electorate participation and in general, political institutions can change the identity of the median representative.

To “proxy” the median representative, we used a political variable for OECD countries constructed by Lambertini (1998) that ranks the political orientation of the political party or the coalition in power. It takes values between [-2,2], with minimum step changes of plus or minus

\footnote{Thus eliminating Spain’s, Portugal’s and Greece dictatorship periods.}
\footnote{See Meltzer and Richard (1981), Alesina and Tabellini (1990).}
0.5, representing changes in the executive branch of the government reflecting electoral vote, reshuffling of the governing coalition in a parliamentary system or votes of no confidence. A value of 2 represents the most “right” government in the spectrum of that country and -2 the most “left”. We assume that “right” wing governments follow policies that benefit the “capitalists”, while the “left” ones tend to benefit the workers.

5. Specification and Estimation of the Model

Let $y^*$ be a latent variable that captures how restrictive the capital control policy might be. Note, however, that we cannot observe $y^*_{it}$, but only a proxy of this, $y_{it}$. As described in Section 4.1, the dependent variable ($y$) incorporates the information on capital flows restrictions. We exploited the ranking information in $y_{it}$ by using and ordered probit model.

The model specification is then:

$$y^*_{it} = x_{it} \beta + z_{it} \gamma + u_{it}$$

$$u_{it} \sim \text{normal distribution with zero mean and variance one}$$

$$z_{it} = \text{additional variables that capture alternative explanations}$$

where,

$$y^a_{it} = 3 \quad \text{if } y^*_{it} > v_3 \quad \text{(all three capital controls observed)}$$

$$y^a_{it} = 2 \quad \text{if } v_3 \geq y^*_{it} > v_2 \quad \text{(any two capital controls observed)}$$

$$y^a_{it} = 1 \quad \text{if } v_2 \geq y^*_{it} > v_1 \quad \text{(any capital controls observed)}$$

$$y^a_{it} = 0 \quad \text{if otherwise } v_1 > y^*_{it} \quad \text{(no capital controls)}$$

The probability of observing outcome $i$, where $i \in \{0, 1, 2, 3\}$, corresponds to the probability that the estimated linear function, plus random error, is within the range of the cut-off
points, $v_{i-1}$ and $v_i$, estimated for the outcome: $\text{Prob}(\text{outcome}_j = i) = P (v_{i-1} < \beta' x + u_i \leq v)$. One estimates the coefficients $\beta$ and $\gamma$ along with the cut points $v_1, v_2, v_3$. For the variable $y'$, one estimates the coefficients $\beta'$ and $\gamma'$ along with the cut points $v_1, v_2, v_3, v_4$.

**Specification 1**

- Let $A$ be the set of countries that are democratic and capital importing;
- Let $B$ be the set of countries that are democratic and capital exporting;

Let $x_{Ai}$ be defined as the product of a dummy variable that takes the value 1 if a country belongs to group $A$ and zero otherwise, and the political wing variable, i.e.,

$$
x_{Ai} = \begin{cases} 
I^* \text{ political wing variable, if the observation at time } t \text{ for country } i \text{ belongs to group } A; \\
0 \text{ otherwise, country } i \text{ at } t \text{ does not belong to } A
\end{cases}
$$

$x_{Bi}$, was defined similarly.

**Specification 2**

- Let $A$ be the set of countries that are democratic and capital importing (5 year averages);
- Let $B$ be the set of countries that are democratic and capital exporting(5 year averages);

The variables $x_{Ai}$, $x_{Bi}$ where defined analogously.

The additional variables ($z$) used in both specifications were:

**Central Bank Independence variables**: the variable Legal captures central bank independence. Higher numbers correspond to more independence (which should be negatively correlated with the controls).

**External Sector variables**: A dummy variable (ed) taking the value of one during periods of fixed or managed exchange rates and 0 otherwise, was included to capture how much countries rely on controls to assist them in managing the exchange rate (positive sign)

---

26 Ordered logit was also used in the estimation, obtaining similar results. Results available upon request
**Tax System and size of government variables:** The log of real GDP per capita (LRGDP) which is assumed to be positively correlated with the sophistication of the tax system. Countries with higher real GDP per capita are expected to impose less controls. The (lagged) ratio of government consumption to GDP (Gl) is expected to have a positive sign.

6. Data and Results

The data set contains variables for 20 industrialized countries. Table #4 shows the results for the estimations under specification 1. The first set of estimates indicates that democratic, capital exporting countries under right wing governments or capital importing countries under a left wing authority tend to impose less capital controls (positive and significant coefficient for $\beta_A$ and a negative one for $\beta_B$). Therefore, we cannot reject the hypothesis that distributive/social conflict issues do affect the decision to impose capital controls.

Also, countries with managed or fixed exchange rate regimes are more likely to introduce capital controls (significant and positive sign). Independent central banks (legal variable) tend to impose lower level of controls. The level of development variable captured by the log of real GDP per capita had a negative and significant value. Larger governments (government size variables) tend to impose more controls. In relation to the external sector variables, the current account one had a negative and significant value, while the openness variable (exports plus imports as a percentage of GDP) was not significant. These results are consistent with those found by AGM.

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27 The predictions of the model are robust to the inclusion of variables that capture the degree of openness. Results available upon request.
Table #5 shows the estimates for the capital control variable that adjusts for other practices. The results are consistent with those predicted by the model.

Table #6 shows the results under specification 2. The estimations are robust to a capital account measure that considers five year averages. Again, we cannot reject the hypothesis that distributive concerns affect the decision to impose capital controls. These findings, as shown in Table #7 are robust to a broader measure of capital controls.

6. Extensions and Conclusions

In this paper we addressed the political conflict involved around international capital controls in an environment where economic agents vote on whether to close or open the economy to capital flows. We characterized the equilibrium of the infinite horizon model with overlapping players in a non-cooperative game between players who wish to maximize their own utility. We found that in dynamic efficient economies with a young/worker median representative capital-importing countries will open to international capital flows while capital-exporting countries will tend to remain closed. The results are the opposite if the median representative belongs to the old/capitalist group.

The empirical test shows that the exchange rate regime, government size, central bank independence, level of development as well as distributive issues (according to the specification of our model) allow us to explain the existence of capital controls.

In our analysis, we did not allow for transfers among generations. For example, when we assumed the median representative to belong to the young/worker generation, we allow no role for the old/capitalist. However, if under the implemented policy, they generation loses more than what the current generation wins, there exists some incentive for the old to try to “bribe” the
young to change their vote. This analysis might shed some light in explaining compensation schemes that exist in some common areas and the integration of some countries to such areas where a priori important sectors of the economy seem to lose from such policy. However, and because usually this common area treaties are negotiated within a small group of countries, we feel that large economy setup is probably more suitable for studying this type of phenomena. We would like to extend research in this direction. Additionally, we would like to extend the empirical analysis to a sample of developing countries.

---

28 Bribing might be thought of more generally as compensation or a compromise between generations (i.e., to open the economy in exchange for welfare transfers).
Appendix 1: Log utility function - Cobb Douglas production function

a. Households

Assume a log utility function of the type \( U = \ln c_t + \beta \ln c_{t+1} \) and a constant population.,

\( 0 \leq \beta \leq 1 \). First order conditions imply: \( c_t = \frac{I}{I + \beta} w_t, c_{t+1} = \frac{\beta}{I + \beta} R_{t+1} w_t \)

Let \( s = \beta / (1 + \beta) \), the indirect utility function is given by:

\[
U_t = (1 - s) \ln [(1 - s) w_t] + s \ln [s R_{t+1} w_t]
\]

(1)

b. Technology

\( f(k_t) = A k_t^\alpha \), to simplify the analysis, let \( A = 1 \), then

\[
r_t[k_t] = \frac{\alpha}{k_t^{1-\alpha}} - \delta
\]

\[
k_t = \left( \frac{\alpha}{\mu_t} \right)^{1/\alpha}
\]

\[
\mu_t = r_t + \delta = f'(k_t) = \alpha k_t^{\alpha-1}
\]

\[
R_t = 1 + r_t = f'(k_t) + 1 - \delta
\]

\[
w[k_t] = (1 - \alpha) k_t^\alpha
\]

\[
w[k_t] = (1 - \alpha) \left( \frac{\alpha}{\mu_t} \right)^{1/1-\alpha}
\]

c. Market clearance

\( (1 + n) k_{t+1} = s w_t = s (1 - \alpha) k_t^\alpha \)

Substituting \( \mu_t = R_t - l + \delta \) in (1) the indirect utility function can be written as:

\[
U(R_t, R_{t+1}) = \ln \left[ \frac{R_{t+1}^\mu}{R_t^\mu - l + \delta} \right] + c
\]

In steady state:

\[
\kappa = \left( \frac{(1 - \alpha)s}{l + n} \right)^{1/\alpha}
\]

\[
\mu = f'(\kappa) = \frac{\alpha}{s} \left( \frac{l + n}{1 - \alpha} \right)
\]

\[
\omega = (1 - \alpha) \left( \frac{\alpha}{\mu} \right)^{1/1-\alpha}
\]
Efficiency in the steady state

\[ R \geq I + n \]

\[ \frac{\alpha}{1-\alpha} \geq s \left[ \frac{1 - (1 - \delta)}{I + n} \right] \]

For \( \delta = I \), then: \( \alpha/(1 - \alpha) \geq s; \) in terms of \( \beta \) this implies: \( \beta \leq \alpha/(1-2\alpha) \) (*). For values of alpha above 0.5, the right side of equation (*) becomes negative. Given that beta is lies between zero and one, alpha needs to be less than 0.5 if we wish to characterize a dynamic efficient economy. Notice that if \( \beta=I \), then we need values of alpha higher than one third to obtain dynamic efficiency. In the Real Business Cycle literature, estimates for capital share for the United States usually suggest a value around 0.4.

Appendix 2: Worker-Capitalist Problem

Define a worker as an agent that receives income solely from wages (assume he cannot participate of the credit market neither as a lender nor as a borrower). Her/His decision problem is given by:

Worker. \[ \text{Max: } \sum_{s=1}^{\infty} \beta^{s-t} \ln(c_s) \quad \text{s.t. } w_s = c_s \]

He/she will choose the state of the economy that maximizes the value of \( w_s \), that being either to open the economy or to keep it closed.

Define a capitalist as an agent whose income derives exclusively from the ownership of capital. Then, his/her decision problem is:

Capitalist. \[ \text{Max } \sum_{s=1}^{\infty} \beta^{s-t} \ln(c_s) \quad \text{s.t. } \sum_{t=1}^{\infty} \left( \frac{1}{I + r} \right)^{s-t} (c_s + k_{s+t} - k_s) = \sum_{s=1}^{\infty} \left( \frac{1}{I + r} \right)^{s-t} (r_k_s) \]
From first order conditions: $c_{s+1} = \beta(1+r)c_s$. If we assume $\beta(1+r)=1$, and from the budget constraint, hers/his optimal decision is then: $c_{s+1} = c_s = r k_t$

Given the initial $k_t$, she/he maximizes her/his utility by choosing the state of the economy with higher interest rates ■

Appendix 3: Countries

Unites States  
Canada  
Japan  
Australia  
New Zealand  
Austria  
Belgium  

Denmark  
France  
Germany  
Ireland  
Netherlands  
Norway  
Sweden  

Switzerland  
United Kingdom  
Greece  
Italy  
Portugal  
Spain

Appendix 4: Sources and variables definitions

$y$: dummy variable taking the value of three when capital all capital controls are in place, two, if any two are in place, one if only one was used and zero otherwise. Type of capital controls considered: i. multiple exchange rates for financial transactions; ii. restriction on payments for capital transactions; iii. restriction on payments for current transactions. The variable $y'$ includes also other capital flow restrictions.

Source: IMF Annual Report on Exchange Rate Arrangements and Exchange Restrictions, and kindly provided by L. Bartolini and Epstein and Schor (1992)

$kacc$: dummy variable taking the value of one 1 if country is capital importer, zero otherwise.

$kacc'$: dummy variable taking the value of one 1 if in the years, t, t-1, … t-4, the country, on average as a percentage of GDP has been importer, zero otherwise.

Source: IMF International Financial Statistics, various issues
Pol: dummy variable taking the value of one if the country is classified as free by the Freedom House report, zero otherwise. **Source:** Freedom In the World, Freedom House. Various issues.

$log\text{rdep}$: Log of real GDP per capita.

Gl: Ratio of government consumption to GDP (lagged).

**Source:** IMF International Financial Statistics, various issues

legal: Central bank independence measure.

**Source:** Cukierman, A. and others.

Ed: Dummy variable taking the value of one during periods of fixed or managed exchange rates.

**Source:** IMF Annual Report on Exchange Rate Arrangements and Exchange Restrictions,

PW: Political orientation of political party or coalition in power. [-2,2], 2 represents the most “right” government in the spectrum of such country; -2 the most “left”. **Source:** Lambertini (1996)

**References**


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**Gastil, Raymond.** *Freedom in the World.* Freedom House, various issues.


**International Monetary Fund.** *Annual Report on Exchange Arrangements and Exchange Restrictions*, various issues.


_______________ “The Global Market: Benefactor or Menace?” Draft April, 1998


**TABLE #1**  
*Democratic and Dynamic Efficient Countries*

<table>
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<tr>
<th>Median representative</th>
<th>Capital Importer</th>
<th>Capital Exporter</th>
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<tr>
<td>Young / Workers</td>
<td>Open</td>
<td>Close</td>
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<tr>
<td>Old / Capitalists</td>
<td>Close</td>
<td>Open</td>
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**TABLE #2**  
*Percentage of Countries with Restrictions on Capital Flows*

<table>
<thead>
<tr>
<th>Year</th>
<th>(i) Separate Exchange Rates</th>
<th>(ii) Restrictions on Payments for Current Transactions</th>
<th>(iii) Restrictions on Payments for Capital Transactions</th>
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<tr>
<td>1966</td>
<td>15.0</td>
<td>35.0</td>
<td>70.0</td>
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<tr>
<td>1970</td>
<td>20.0</td>
<td>35.0</td>
<td>75.0</td>
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<tr>
<td>1975</td>
<td>20.0</td>
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<tr>
<td>1980</td>
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<td>60.0</td>
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<td>1985</td>
<td>5.0</td>
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<td>0.0</td>
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<tr>
<td>1994</td>
<td>0.0</td>
<td>0.0</td>
<td>10.0</td>
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Note: 20 industrialized countries were included in the sample.

**TABLE #3**  
*Model Predictions*

<table>
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<th>Capitalists: PW &gt;0</th>
<th>Capital importer</th>
<th>↑ controls</th>
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<tr>
<td>Capital exporter</td>
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<tr>
<td>Workers: PW &lt;0</td>
<td>Capital importer</td>
<td>↓ controls</td>
<td>(+)</td>
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<tr>
<td>Capital exporter</td>
<td>↑ controls</td>
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</table>
### Table #4
**Industrialized Countries**
**Ordered Probit Estimation**
**Annual Data: IMF Index**

|       | Coef. | Std. Err. | Z     | P>|z| |
|-------|-------|-----------|-------|-----|
| $\beta_A$ (imp) | 0.093 | 0.050 | 1.874 | 0.061 |
| $\beta_B$ (exp) | -0.143 | 0.066 | -2.168 | 0.030 |
| Legal | -3.715 | 0.402 | -9.240 | 0.000 |
| Ed | 0.456 | 0.127 | 3.599 | 0.000 |
| Lrgdp | -2.785 | 0.222 | -12.554 | 0.000 |
| Gl | 0.090 | 0.017 | 5.129 | 0.000 |
| _cut1 | -26.191 | 2.064 |  | |
| _cut2 | -25.447 | 2.047 |  | |
| _cut3 | -23.564 | 2.003 |  | |
| y Probability Observed | 0.000 | Pr(xb+u<_cut1) | 0.321 | |
| 0.333 | Pr(_cut1<xb+u<_cut2) | 0.171 | |
| 0.667 | Pr(_cut2<xb+u<_cut3) | 0.423 | |
| 1.000 | Pr(_cut3<xb+u) | 0.086 | |

Number of obs = 440.000  
LR chi2(8) = 283.700

$A$: democratic and capital importing countries  
$B$: democratic and capital exporting countries;

### Table #5
**Industrialized Countries**
**Ordered Probit Estimation**
**Annual Data: IMF adjusted Index**

|       | Coef. | Std. Err. | Z     | P>|z| |
|-------|-------|-----------|-------|-----|
| $\beta_A'$ (imp) | 0.103 | 0.049 | 2.089 | 0.037 |
| $\beta_B'$ (exp) | -0.131 | 0.064 | -2.055 | 0.040 |
| Legal | -3.046 | 0.377 | -8.074 | 0.000 |
| Ed | 0.479 | 0.124 | 3.876 | 0.000 |
| Lrgdp | -2.642 | 0.213 | -12.376 | 0.000 |
| Gl | 0.072 | 0.017 | 4.260 | 0.000 |
| _cut1 | -25.056 | 1.996 |  | |
| _cut2 | -24.147 | 1.976 |  | |
| _cut3 | -22.829 | 1.933 |  | |
| y' Probability Observed | 0.000 | Pr( xb+u<_cut1) | 0.275 | |
| 0.333 | Pr(_cut1<xb+u<_cut2) | 0.216 | |
| 0.667 | Pr(_cut2<xb+u<_cut3) | 0.423 | |
| 1.000 | Pr(_cut3<xb+u) | 0.086 | |

$A$: democratic and capital importing countries  
$B$: democratic and capital exporting countries;
### Table #6
**Industrialized Countries**
**Ordered Probit Estimation**
**Average Data: IMF Index**

|     | y Coef. | Std. Err. | z     | P>|z| |
|-----|---------|-----------|-------|-----|
| $\beta_A$ (impav) | 0.116 | 0.053 | 2.208 | 0.027 |
| $\beta_B$ (expav) | -0.286 | 0.078 | -3.683 | 0.000 |
| Legal | -3.797 | 0.446 | -8.508 | 0.000 |
| Ed | 0.502 | 0.137 | 3.653 | 0.000 |
| Lrgdp | -3.007 | 0.260 | -11.543 | 0.000 |
| Gl | 0.067 | 0.019 | 3.622 | 0.000 |
| _cut1 | -28.699 | 2.427 | |
| _cut2 | -27.939 | 2.408 | |
| _cut3 | -25.923 | 2.352 | |

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Number of obs = 336  Prob>chi2 = 0.0000  LR chi2(8) = 227.080  LR = -336.569

$A$: democratic and capital importing countries (5 years averages);
$B$: democratic and capital exporting countries (5 years averages);

### Table #7
**Industrialized Countries**
**Ordered Probit Estimation**
**Average Data: IMF adjusted Index**

|     | y' Coef. | Std. Err. | z     | P>|z| |
|-----|----------|-----------|-------|-----|
| $\beta'_A$ (impav) | 0.127 | 0.052 | 2.417 | 0.016 |
| $\beta'_B$ (expav) | -0.243 | 0.076 | -3.213 | 0.001 |
| Legal | -3.429 | 0.432 | -7.937 | 0.000 |
| Ed | 0.573 | 0.136 | 4.203 | 0.000 |
| Lrgdp | -2.979 | 0.258 | -11.558 | 0.000 |
| Gl | 0.065 | 0.019 | 3.520 | 0.000 |
| _cut1 | -28.383 | 2.400 | |
| _cut2 | -27.538 | 2.379 | |
| _cut3 | -25.535 | 2.324 | |

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Number of obs = 336  Prob>chi2 = 0.0000  LR chi2(8) = 220.830  LR = -343.098

$A$: democratic and capital importing countries (5 years averages);
$B$: democratic and capital exporting countries (5 years averages);
Developing Countries' Capital Control Index

i. Separate exchange rates for capital transactions;
ii. Restrictions on payments to current transactions
iii. Restrictions on payments to capital transactions

Graph #1

Source: IMF's survey on Exchange Arrangements and Exchange Restrictions

Industrialized Countries' Capital Control Index

(Restrictions i,ii,iii)

Graph #2