Contagious Policies:
An Analysis of Spatial Interactions Among Countries' Capital Account Policies

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Abstract

Countries' capital account policies might be contagious in the sense that domestic policies are driven by other countries' policies. A model of strategic interactions is developed to show that countries' best response to policy changes elsewhere consists in imitating this policy.

Using a spatial econometric model, the hypothesis of policy interactions is tested in a large panel data set. The evidence shows that capital account policies are contemporaneously correlated across countries. Concerning fundamentals, the move to a fixed exchange rate regime and an increase in real world interest rates are correlated with the imposition of capital account restrictions.

Keywords: Capital Controls, Strategic Interaction, Panel Data Analysis

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1 Introduction

Whether capital may move freely in and out of a country, is a policy decision taken by national governments and central banks. While capital flows may contribute to an efficient allocation of capital both in geographic and intertemporal terms, their volatility and speculative nature have aroused concern: The positive temporary growth effects of capital account liberalization as predicted by the neoclassical growth theory might be offset by the negative effects of recurrent financial instability and crises. Countries' capital account policies have to take these potential costs and benefits into account.

This paper reconsiders the determinants of capital account policy. It adds two novel aspects to the extensive literature on the causes and consequences of capital account liberalization: First, it analyses the determinants of policy changes as opposed to policy reversals and, second, focuses on policy interactions among countries.

While other studies have investigated the determinants of capital account liberalization[1] or of cross-country differences in financial openness, this paper explicitly considers policy changes. The existing literature examines large and permanent changes in capital account policy, namely policy reforms like liberalization episodes. My approach, however, analyses capital account policy in a more general context in that it also includes policy changes that are small or temporary. After many countries have liberalised their capital accounts, there is room for policy adjustments: Capital account policy, like the temporary re-imposition of controls, can be used strategically and hence has become an instrument of international economic policy. This paper treats capital account policy as an alterable policy instrument and tries to identify the factors that drive this policy.

The existing literature focuses on economic and political characteristics of a country as potential determinants of its capital account policy. While concentrating on country fundamentals, this approach disregards one possibly important factor: policy spillovers across countries.

[1] Capital account liberalization refers to a discrete policy change from a regime of a closed capital account to one that favours financial integration in the world market. It is usually measured by a binary variable. The analysis of capital account liberalization disregards policy adjustments as long as they do not represent a fundamental policy change.

Capital account policies might be contagious in the sense that countries copy their neighbours' policies. In the literature on financial crises, contagion is defined as a significant increase in the probability of a crisis conditional on a crisis occurring in another country. Analogously, policies might be driven rather by policy changes in other countries than by domestic fundamentals. In this case, the series of an index of capital account openness would show a significant degree of co-movement across countries, which cannot be explained by fundamental determinants of capital account policy.

The analysis of macroeconomic policy interactions among countries has a long tradition. Whereas the traditional focus is on interactions of countries' monetary, fiscal and trade policies, countries' capital account policies might also be characterised by international linkages. In the case of trade policy, a country's openness is influenced by the policies of trading partners. Since changes in tariffs and barriers to trade are usually the result of bi- or multinational negations – even institutionalised by the WTO – a country's policy is driven by the general tendency: A country might only agree to liberalise its barriers to trade if its trading partners also do so. Hence, in trade policy the co-movement of policies is a result of the bargaining process. In the case of capital account openness, this co-movement of policies might also be present although for different reasons. Nonetheless, existing empirical studies generally assume that the capital account policy is driven by domestic factors.

To my knowledge there are only two papers that include the notion of policy interactions in their analysis of capital account policies. Leblang (1997) augments the set of domestic determinants of capital controls by a systemic variable that is exogenous to the domestic economy. He assumes that the increasing de facto financial integration raises the cost of capital controls and therefore increases the incentive to liberalize the capital account.[2] The empirical results do not support his hypothesis: Whereas the relationship between de facto and de jure financial openness is insignificant for OECD countries, they are negatively correlated (contrary to the hypothesis) in non-OECD countries. Simmons and Elkins (2004) investigate interdependent state behaviour in discrete shifts between policy regimes. They conclude that capital account liberalization, the decision to move from a closed to an open capital account, is influenced by international economic competition. Models that only consider domestic determinants of policy are misspecified.

[2] He disregards the fact that de facto financial integration is affected by capital account policy. De facto financial integration is neither systemic nor exogenous to a given country.

Gassebner et al. (2010) use a similar econometric approach to investigate whether economic reforms in one country are influenced by reforms adopted by other countries. They find evidence for the importance of reforms in geographically and culturally proximate countries.

Since the following analysis focuses on the policies that determine the openness of the capital account, it restricts its attention to de jure capital account openness. De facto capital account openness, which may be measured by the flows or stocks of cross-border capital, is a different concept. De facto capital account openness is expected to depend on the de jure openness to the degree that controls are effective and difficult to evade. Aizenman and Noy (2009) find weak evidence that de jure restrictions on capital flows reduce de facto financial openness. Dooley (1996) concludes that controls have been effective in sustaining yield differentials between domestic and foreign investments.

This paper is organised as follows: Section 2 describes possible interactions among countries' capital account policies. To motivate the empirical work, section 3 develops a game-theoretic model of countries' best response to capital account policies in other countries. Section 4 presents the econometric methodology. Section 5 discusses the empirical results and the final section concludes.

2 Contagious capital account policy

Capital account policy is usually regarded as being driven by domestic factors, economic and political ones. However, there are several reasons why domestic capital account policy might be affected by neighbouring countries' policies. The interaction among countries might have three different causes: economic competition, signalling externalities and information diffusion.

Economic competition: If a country dismantles capital controls, it reduces the cost imposed on foreigners who invest domestically. Their net-of-tax return rises. As a result the country attracts capital inflows whose counterpart are capital outflows in other countries, which have become less attractive investment places due to the other country's policy. Capital outflows will especially be notable in countries of the same geographic region since empirical studies have shown that international investors allocate capital to regions rather than specific countries. As a result, a neighbouring country that wants to prevent capital outflows has to copy its neighbour's policy and liberalise its capital account as well.

If a country raises capital controls, this reduces foreign investors' net return and leads to a reallocation of capital to other countries. Hence, countries benefit from the imposition of controls elsewhere.

Signalling externalities: The use of capital controls might also produce negative externalities: Their imposition might be interpreted as a signal of worsening fundamentals. The country fears a speculative attack and therefore impedes capital outflows. Neighbouring countries might be affected by this policy by various channels: First, investors might again consider the region as a sum and assume that fundamentals in the neighbouring countries have worsened, too. Therefore, they withdraw their capital from countries of the same region. Second, even if fundamentals are independent between countries, investors might fear that a currency crisis in the centre country spreads to neighbouring countries due to contagion. As a result, they will also withdraw their capital. Third, investors might fear that the country fears that investors withdraw their capital because of the two points made before. Therefore, investors expect the country to impose capital controls. In consequence, investors try to withdraw their capital before the country prohibits capital repatriation. All three points indicate that the imposition of capital controls in one country induces capital outflows in the other country. The country may prevent this capital outflow by a simultaneous imposition of capital controls. Hence, investors' expectations regarding capital account policy might become self-fulfilling. This strain of argumentation shows that contagious crises might lead to contagion in policies.

Information diffusion: The use of a certain capital account policy – i.e. the introduction of capital outflow controls – provides information of its effects and potential benefits for other countries (demonstration effect). Countries learn from a successful policy implementation elsewhere. A positive experience with a policy leads to a re-examination of this policy tool in other countries.
If other countries recently changed their capital account policy, a government can more easily justify an equal adjustment of its policy and enforce this policy against the pressures of interest groups. When neighbours relax capital controls it becomes harder to justify them politically and economically.

All these arguments point to the fact that capital account policies cannot be considered independently of other countries' policies. Besides domestic factors, there is a role for

international interdependencies. As described above, interdependencies might be the result of economic competition, signalling effects and information diffusion.

Resource flow model

This strategic interaction among countries can be modelled in the framework of a resource flow model (see Brueckner 2003). In this model, a country is affected by the amount of a resource that is employed within its borders. While the global level of this resource is given, its distribution between different countries depends on the policy choices of all countries. Hence, a country chooses the level of a decision variable z_i but it is also indirectly affected by the decisions in other countries, z_{-i}.

This model has been applied to international corporate tax competition, both theoretically and empirically (see Brueckner and Saavedra 2001 and Devereux et al. 2008).[3] Since capital controls decrease the expected return of foreigners' domestic investment, they can be considered as an indirect form of taxation.[4] Consequently, the model can directly be applied to countries' choices with regard to their capital account policy.

Assume that country i's objective function $\widetilde{V}$ is given by:

$$\widetilde{V}\left(z_i, s_i, X_i\right) \tag{1}$$

where s_i is the level of domestic assets held by foreigners and X_i is a vector of characteristics of country i, on which preferences depend. The level of foreign investment depends on the capital account policy at home (z_i) and in all other countries (z_{-i}) as well as on characteristics of the domestic economy:

$$s_i = H\left(z_i, z_{-i}, X_i\right) \tag{2}$$

[3] This literature usually finds evidence for interactions among different countries' tax rates, although a race to the bottom cannot be confirmed. The strength of these interactions depends positively on a country's degree of financial openness. Devereux et al. (2008) find evidence that capital account liberalization in OECD countries has increased strategic interactions in taxsetting. The removal of capital controls is associated with a decrease of domestic corporate tax rates.

[4] Capital controls are basically a form of taxation. They differ from conventional taxes since they are only levied on cross-border investment, namely domestic investment of foreigners or the investment of domestic citizens abroad.

X_i contains economic variables like corporate tax rates and the domestic return on capital as well as institutional variables like political stability and corruption. After substituting (2) into (1), the reduced form of the model can be written as:

$$V(z_i, z_{-i}, X_i) \tag{3}$$

This objective function is maximised by choice of z_i resulting in a reaction function of the form

$$z_i = R(z_{-i}, X_i) \tag{4}$$

Hence, the capital account policy of country i depends on its characteristics X_i and on the capital account policy in the rest of the world. In this general form, the slope of the reaction function can take either sign.

What are the consequences of changes in other countries' capital account policies? Let us assume that in the status quo world capital is distributed across countries such that its net return is equalised. Moreover, z_i has been chosen such that country i's objective function is maximised.

There are two channels through which the choice of z_i affects domestic welfare: First, the capital account policy determines the amount of foreign capital within the domestic economy. A unilateral removal of capital controls leads to a higher level of capital per worker. This increases labour productivity and consequently labour income. The growth rate of output increases temporarily. Capital account restrictions, in turn, decrease the return on domestic capital and render investment projects inefficient that would be profitable without capital account restrictions.[5] The relationship between capital account policy and the allocation of world capital is formally illustrated in Appendix A. Second, capital account restrictions increase a country's monetary policy autonomy under fixed and managed exchange rates. They may reduce exchange rate volatility and reduce the risk of sudden capital flight, which might result in a currency crisis. Currency crises, in turn, usually reduce the growth rate of output.

In sum, there is a trade-off between output growth and the reduction of output volatility. Countries that maximise their utility choose an optimal combination of the level of output and output stability.

[5] It is assumed that the imposition of capital controls raises domestic interest rates. That is to say, the loss of capital inflows is not totally substituted by an increase in domestic savings.

It is worth noting that the net return of capital invested abroad depends on the entire vector of z: If one country imposes capital controls, the net return of capital falls in all countries. Hence, investment projects that so far have not been profitable in countries $j \neq i$, become attractive for foreign capital. Capital leaves the country that raised controls and is redirected to the remaining countries. Labour productivity increases in these countries. As a consequence, raising capital controls has a positive externality for the rest of the world.

Are these theoretical considerations with respect to the influence of capital account openness on interest rates and the level of output supported by empirical findings? Henry (2003) reports empirical evidence that capital account liberalization increases output through its effect on the domestic interest rate: Capital account liberalization permanently decreases the cost of capital and raises investment. This temporarily increases the growth rate of output such that the level of output is permanently higher. This finding is confirmed by Bekaert et al. (2005) who find that the growth rate of GDP per capita increases after capital account liberalizations.
With respect to the relationship between capital account openness and the likelihood of growth-reducing currency crises the findings are ambiguous. While some studies claim that controls increase the risk of currency crises (Bordo et al. 2001; Leblang 2003; Glick and Hutchison 2005), others find financial liberalization to be positively associated with the occurrence of currency crises (Kaminsky and Reinhart 1999; Demirguc-Kunt and Detragiache 1998). The latter emphasise an indirect transmission channel: Financial liberalization increases the probability of banking crises, which, in turn, are positively correlated with currency crises (twin crises).

The process of global capital account liberalization has seen two waves, first in industrial countries (late 1970s and early 1980s) and later in developing countries (late 1980s and early 1990s). Is this observation consistent with the concept of contagious policies? Our theory explains both, the observation of a general trend and the difference in timing for the two country groups. Countries compete for capital with members of their peer group, namely countries with similar characteristics with respect to country risk, financial development and the level of income. Policy interactions primarily take place between countries that are considered similar with respect to investment conditions. As a consequence, the trend, which may be explained by the strategic interactions among countries, is expected to be limited to countries of a peer group. Policy changes in different country groups are rather independent of each other and may occur at different points in time.

3 A game-theoretic model of strategic interactions: growth versus crises

Given these theoretical considerations with respect to policy spillovers across countries, I present a simple model of these strategic interactions. It is assumed that there exist two groups of countries: In the first group capital is relatively abundant and in the other capital is relatively scarce. Since the marginal productivity of capital is relatively high in the latter group, capital flows to these countries.

The strategic interactions affect the group of recipient countries. They compete for the capital of the capital-abundant region. The model examines the interaction between two countries of the inflow group, a domestic country and a foreign country. They can influence the amount of capital inflows by their capital account policy. Foreign variables are denoted by an asterisk. All equations are stated from the perspective of the domestic country. Since countries are assumed to be symmetric, one gets the corresponding equation for the foreign country by putting an asterisk on domestic variables and vice versa.

Assume that governments face the following loss function:

$$L = \left(y - y^*\right)^2 \tag{5}$$

where y represents output and y^* its target value. y^* may be considered as the maximum value of output that is attained if all other potential recipients of capital flows have closed capital accounts. As a consequence, the entire capital flow from the capital-abundant region is invested in the country under consideration. This implies that $y \leq y^*$. y^* corresponds to the state without currency crisis. If all other potential recipients of capital flows are closed, a sudden capital flight is less probable since a reallocation of capital to other countries is not possible. Since I want to focus on the effect of capital account policy, all other determinants of output are assumed to be pre-determined.

Output is affected by capital account openness through two channels, a direct and an indirect one: First, more open economies are expected to attract more capital, which increases output. Analogically, the more open the foreign country, the more international capital it withdraws from the domestic economy:

$$y = \rho_1 z + \rho_2 z^* + \rho_3 x_1 \tag{6}$$

where our policy variable z is an index of capital account openness with larger values indicating a higher degree of openness. x_1 are country characteristics that affect output. The

ρ's are coefficients, which are assumed to be pre-determined. If capital account openness increases growth, $\rho_1>0$. If the foreign country opens its capital account, the world net capital return rises and capital leaves the domestic country ($\rho_2<0$). The other determinants x_1 are defined such that larger values increase growth ($\rho_3>0$).

The second channel, through which capital account openness affects growth, is an indirect one: Financial openness is expected to be positively associated with the probability of a currency crisis, which, in turn, affects economic growth:

$$\theta = \delta_1 z + \delta_2 \Delta z + \delta_3 \Delta z^* + \delta_4 x_2 \tag{7}$$

where θ denotes the probability of a currency crisis with $0 \le \theta \le 1$. Financially more open economies are more likely to suffer from a crisis ($\delta_1>0$). Moreover, changes in capital account policy (Δz) may be regarded as a signal that induces investors to re-examine their investment choices. If a decrease in capital account openness is interpreted as a signal for an ensuing crisis, δ_2 is negative. Accordingly, if the foreign country decreases its capital account openness, investors might fear that the whole region will be affected by a contagious crisis ($\delta_3<0$)[6]. x_2 is a vector of other factors that determine the probability of a currency crisis. These variables are assumed to be independent of the policy choice z.

After combining (6) and (7) and assuming that the output cost of a financial crisis is C[7], expected output is determined by the following expression:

$$y = \rho_1 z + \rho_2 z^* + \rho_3 x_1 + \theta \cdot C \tag{8}$$

We now derive the reaction function for the domestic country. Substituting the constraint (8) in the loss function (5) and minimizing the loss function with respect to the country's policy choice z, yields the following reaction function:

$$z = -\frac{1}{\rho_1 + (\delta_1 + \delta_2)\cdot C} \cdot \left(\rho_2 z^* + \rho_3 x_1 - \left(\delta_2 z_{-1} - \delta_3 \left(z^* - z^*_{-1}\right) - \delta_4 x_2\right)\cdot C - y^*\right) \tag{9}$$

[6] It is assumed that the level of capital account openness in the foreign country is uncorrelated with the probability of a crisis in the domestic country.

[7] While a fully-fledged financial crisis is assumed to depress output directly, the probability of a crisis and the level of output are negatively associated through the foreign investment channel: Foreign investors require a rate of return that equals the world interest rate plus a country-specific risk premium. The risk premium increases in the probability of a crisis. This implies that risky countries have to pay a higher rate of return, which, in turn, means that the number of profitable investment projects decreases in the risk premium.

where z_{-1} and z^*_{-1} represent the level of capital account openness in the preceding time period in the domestic and foreign country, respectively. To simplify this expression, a term D is created that contains the constants. The reaction function then can be expressed as:

$$z = -\frac{\rho_2 + \delta_3 \cdot C}{\rho_1 + (\delta_1 + \delta_2)C} \cdot z^* + D \qquad (9')$$

The second order condition for a minimum of the loss function implies that $\rho_1 > -(\delta_1 + \delta_2) \cdot C$ which means that the overall effect of financial openness on growth is positive, since the direct output effect dominates the output-reducing effect of crises. This assumption is in line with empirical findings (Rancière et al. 2006).

The reaction function illustrates how the capital account policy of the domestic country depends on the foreign country's policy. Given our assumptions concerning the signs of the coefficients, the policies are positively related: If one country liberalises its capital account, the other country's best response is to follow this policy and to remove controls as well. If one country raises capital controls, the other country's best response is to imitate this policy. These reaction functions are depicted in Figure 1. Their intersection is the non-cooperative Nash solution.

Assume that the reaction function of the foreign country changes such that for each policy z a larger value z* is chosen. This might be induced by a change in other determinants of output (x_1*) that decreases output. As a consequence, D increases and the reaction function moves upward (see reaction function z*'(z) in Figure 1). The new Nash equilibrium is characterised by both, a higher value of z and a higher value of z*. This illustrates the case of policy contagion: If a change in fundamentals induces one country to open its capital account, the other country's best response consists in copying this policy even though domestic conditions have not changed.

4 Empirical strategy

The following section sets the foundations for the empirical analysis: It describes the data set, presents the standard control variables and explains the econometric approach

4.1 Data

The empirical analysis is carried out on the basis of a pooled data set of cross-country and time-series observations. It contains annual data from 1970 to 2007 for 160 countries. Since data for several explanatory variables are missing for some countries, the number of countries used in the econometric analysis depends on the particular specification and is indicated in the respective tables. With a few exceptions data are taken from the International Financial Statistics of the IMF and the World Development Indicators of the World Bank. A detailed description of the sample and data sources can be found in the appendices B and C.

4.2 Measures of capital account policy

Capital account openness may be limited by legal restrictions. These include direct controls on capital inflows and capital outflows, quantitative limits and prohibitions. Multiple exchange rate systems and the taxation of capital flows are forms of indirect capital controls.

Most indices of de jure capital account openness are based on the information provided in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). It offers a binary variable that informs about the existence of controls in different categories of restrictions.[8]

An index of capital account openness that is based on this information was developed by Chinn and Ito (2002, 2006). It embodies four binary dummy variables on restrictions on international financial transactions, namely the presence of multiple exchange rates, restrictions on current account transactions, restrictions on capital account transactions and the requirement of the surrender of export proceeds. The index value is given by the first

[8] The data set also has some shortcomings. It neither provides information about the intensity of controls – are limits binding? – nor about their effectiveness and enforcement. Moreover, these variables are too aggregated. For example, they do not distinguish between controls on capital inflows and controls on capital outflows.

principal component of these four dummy variables. Higher values indicate that countries are more open to cross-border financial transactions.

An alternative index of de jure capital account openness is provided by Edwards (2007). He combines the information of the indices of Quinn (2003) and Mody and Murshid (2005), which are based on data from the IMF. Country-specific information is used to revise and refine the index. The index is scaled over the range from zero to one hundred where a score of one hundred is equivalent to free capital mobility. Since the index provides data only until the year 2000, regressions including the index cover a reduced period ending in 2000.

4.3 Control variables

In the following section the control variables are presented. The selection of these potential determinants of capital account policy is guided by previous empirical studies in this area (e.g. Leblang 1997; Brune et al. 2001; Glick and Hutchison 2005).

Development: The literature on the timing of capital account liberalization emphasises that a developed banking system, prudential regulation and sound institutions are prerequisites for countries being able to benefit from large capital flows (see for example McKinnon (1993) and Edwards (1984)). These institutional conditions generally depend on the level of development of a country, for which GDP per capita is a proxy. It is therefore expected that countries with a higher GDP per capita are associated with a more open capital account.

Trade openness: Trade openness and capital account openness are expected to affect each other positively for various reasons. First, ideological beliefs might foster the integration of a country in the world economy with respect to both flows of goods and flows of capital. Second, countries that are open to trade are characterised by temporary deficits and surpluses in their current account. Capital flows are required to finance this imbalance in trade flows. Finally, the benefits of an open capital account fall disproportionately on those engaged in international trade. Hence, countries with a relatively large sector for tradables possess a stronger interest group in favour of capital account liberalization.

Government size: The relative size of government might affect a government's position towards financial openness. The larger government expenditures are, the stronger the incentive to restrict capital flows in order to secure sufficient government revenues. Various authors point out that rent-seeking activities, which might increase in the relative size of the government, explain the resistance to opening the economy (Alesina et al. 1994; Leblang

1997). In the empirical analysis relative government size is measured by government consumption relative to GDP.

Trade imbalance: The balance of the current account relative to GDP is an additional factor that influences capital account policy. Large current account deficits imply that the country accumulates external debt. Capital controls might be used to limit these deficits.

Exchange rate regime: According to the policy trilemma, the objectives of exchange rate stability, monetary policy independence and capital mobility are mutually inconsistent. Only two out of these three possible objectives can be attained jointly. Capital controls are a means of resolving the trilemma: By restricting capital mobility, they allow a country to pursue an independent monetary policy under a fixed exchange rate system. If the domestic currency comes under pressure, the exchange rate peg may be defended by restrictions on cross-border capital flows, which limit the scope for speculation. Therefore, countries with fixed exchange rate regimes are less likely to remove capital controls.

Besides these macroeconomic variables, political factors might also determine a country's capital account policy.

Type of rule: Democracies are more likely to open their capital account: Autocracies tend to maximize their power over the domestic economy by insulating it from external market forces. Democracies are generally characterised by fewer restrictions.

Freedom: Countries that are characterised by a high degree of political and economic freedom are more likely to allow the free movement of capital.

World interest rate: Low real interest rates in the rest of the world imply that the incentives to invest abroad are weak, whereas capital inflows might be larger. In such an environment, capital outflow controls might be removed without much effect. On the other hand, the control of capital inflows gains in importance. Hence, the overall effect on capital account openness is ambiguous.

Pressures on the foreign exchange market (currency crises): The causality between currency crises and capital controls may run in both directions: On the one hand, the presence of capital controls might influence the probability of a currency crisis. On the other, pressures on the foreign exchange market or the experience of a crisis might affect a country's capital account policy.

Whereas actual currency crises are characterized by sharp depreciations, an unsuccessful speculative attack can be identified indirectly by counteractive measures taken by a central bank: The currency may be defended by the sale of reserves or an increase of the interest rate. Following the strategy of Eichengreen et al. (1996) an index of exchange market pressures (EMPI) is calculated: It summarizes the changes of the nominal exchange rate and reserves, each weighted by the inverse of their standard deviation[9]:

$$EMPI_{it} = \frac{1}{\sigma_e}\frac{\Delta e_{it}}{e_{it}} - \frac{1}{\sigma_r}\frac{\Delta R_{it}}{R_{it}}$$

where e is the nominal exchange rate and R are reserves. t indicates the time period and the index i denotes a certain country. The standard deviation σ is calculated individually for each country over the whole period. In our application changes in e are calculated relative to the U.S. Changes in reserves are not compared with a reference country since a simultaneous fall of reserves in many countries might signal a global crisis.

A currency crisis is usually defined to occur if the index exceeds its mean plus two standard deviations. Instead of using a binary variable, the continuous index is used in the regression analysis. This has two advantages: First, any threshold value of the index that separates crisis from non-crisis episodes would be arbitrary. Second, the index allows us to investigate whether the strength of pressures on the domestic currency matters for capital account policy.

4.4 Stationarity

The validity of the following empirical analysis relies on the assumption that the time-series are stationary. To check the stationarity of our variables, two panel unit root tests are applied that account for cross-sectional dependence: Pesaran (2007) and Breitung (2000). The results are reported in Table 1. The hypothesis of non-stationary series cannot be rejected for some of our variables in levels at conventional levels of significance. However, the results do not point to a unit root in any of the first-differenced series.

[9] In contrast to Eichengreen et al. (1996) this index does not include changes in the interest rate. This approach, which is in line with other empirical studies, is due to missing interest rate data for many countries.

4.5 Econometric methodology

As described in the theoretical section, the policy of one country might be influenced by policy decisions in other countries. A country's capital account policy might be driven by the international tendency rather than domestic fundamentals. There might exist a contagion effect that leads to co-movements in capital account policy changes.

Hence, besides the set of control variables (see section 4.3) other countries' capital account policies have to be included as an additional determinant:

$$\overline{CAP}_{it} = \sum_{j \neq i} w_{ij} CAP_{jt} \quad \text{and} \quad \sum_{j \neq i} w_{ij} = 1$$

where CAP is an index of capital account openness and the subscript t stands for time. w_{ij} are nonnegative weights, which are specified a priori. These weights measure the importance of country j's capital account policy for country i.

As weighting scheme I use the classical spatial weighting matrix, which has been used widely for analyzing bilateral trade flows. It is based on the geographic distance between countries. More proximate countries obtain a larger weight. Hence, I assume that the influence of other countries' policies is inversely related to distance: The closer a country, the stronger its policy correlation.

These weights are calculated as follows: For each country, the maximal bilateral distance is determined. From this value, the individual distances are subtracted such that the most proximate country receives the highest value and the most distant country the value zero. To obtain weights, these values are normalised such that they sum to one for each country.

The following panel equation is estimated:

$$CAP_{it} = \alpha \sum_{j \neq i} w_{ij} CAP_{jt} + X_{i,t-1} \beta + c_i + u_{it}$$

where α and β are coefficients (β is a vector). X is the matrix of control variables. c_i is a country-specific fixed effect and u_{it} the error term. Although α is assumed to be constant

across countries, the strength of the interaction effect differs between countries depending on the weights with $\partial z_i / \partial z_j = \alpha \cdot w_{ij}$.[10]

Since we are interested in explaining changes in current account policies, the equation is estimated in first differences. Moreover, all control variables X are lagged by one period to limit simultaneity problems.

In estimating interaction models, two issues warrant special attention: (1) the endogeneity of the other countries' policy choices z_j and (2) the possible correlation of the error term across countries (spatial dependence).
Strategic interaction implies that the policy choices in different countries are determined jointly. Therefore, the linear combination of weighted z_j's is endogenous and correlated with the error term u_{it}. Estimation by OLS leads to inconsistent results. Therefore, I use an instrumental variables approach: The weighted linear combination of the z_j's is regressed on X_i and on the same weighted linear combination of the X_j's. The fitted values of this regression are used as instruments for the weighted linear combination of the z_j's. As shown by Kelejian and Prucha (1998) this approach also solves the second complication, namely spatial error dependence. It arises when omitted variables, which become automatically part of the error term, are correlated across countries. As a consequence, one might observe policy co-movements across countries that are due to the omitted variable but not to policy interactions. The use of panel data may also alleviate the problem of spatial error dependence provided that the influence of the omitted variables can be captured by the country fixed effect.

5 Interactions of capital account policies across countries: empirical results

Table 2 presents the results of bivariate regressions: The change in capital account openness is regressed on its weighted change in the rest of the world. Whereas the regression of column (1) contains all countries of our database, the other columns present results for subsamples that are formed according to countries' income level and geographic location. The results show that for the full sample domestic capital account policy is driven by policies elsewhere.

[10] This, however, does not mean that the influence of one country on another is estimated. The relative importance of a country is determined a priori by the definition of the weights.

If the rest of the world opens its capital account, the domestic economy also liberalises its capital account. The coefficient of roughly 0.4 implies that on average countries liberalise their capital account to a lower degree than the rest of the world.[11] Policy spillovers are present, but countries do not outdo each other. There is no race to the bottom. This finding is consistent with the prediction of the theoretical model in section 3. The regression results for the subsamples show that this behaviour is mainly driven by the Latin American countries. For the other country groups, the policy in the rest of the world does not significantly influence domestic policies.

Table 3 replicates these regressions for a different measure of capital account openness, namely the index constructed by Edwards. The results support our hypothesis of interactions among countries: The sample of all countries and the subsamples of Latin American and Asian countries in particular are characterised by capital account policies that are triggered by policy changes in the rest of the world.

The following tables include the standard set of control variables for capital account policy. They test whether policy spillovers can be identified in addition to the effects of fundamentals and exogenous shocks. The change in the Chinn-Ito index of capital account openness is used as dependent variable.

Column (1) of Table 4 includes the set of macroeconomic control variables. An increase in economic development measured by changes in real GDP per capita reduces capital account openness. This finding, which is not in line with the theoretical predictions, is not robust to alternative specifications (see columns 3 and 4). A fixed exchange rate is associated with more restrictions on capital flows. This effect is consistent with the hypothesis of the policy trilemma. Capital account policy elsewhere triggers domestic policy changes: If the rest of the world liberalises capital flows, the domestic economy follows this trend. Coefficients for the other economic variables are not statistically significant in the determination of capital account policy.

[11] From a theoretical standpoint it is not plausible that each individual country liberalises less than the rest of the world. However, one has to bear in mind that this coefficient only measures the policy spillovers across countries, that is to say, policy changes that can neither be explained by domestic fundamentals nor common exogenous shocks. Common exogenous shocks (i.e. changes in world interest rates) or country linkages (i.e. in trade openness: an increase in one country necessarily leads to an increase in at least one other country) might be additional factors that lead to co-movements in capital account policies.

Column (2) adds two political factors: Whereas a trend towards a more democratic regime is accompanied by a removal of capital account restrictions, the effect of changes in an index of economic and political freedom is not statistically significant. The existence of policy spillovers is robust to this change: A global liberalization of the capital account induces the domestic economy to open its capital account, too.

Potential capital inflows might depend on world interest rates. Therefore, column 3 additionally includes changes in US real interest rates as a covariate. A decrease in real returns on the world market is accompanied by a removal of capital controls. Decontrol might be politically feasible in an environment of low world interest rates since the risk of massive capital outflows is lower. Changes in the world interest rate lead to a co-movement of capital account policies in all countries since these changes are exogenous to domestic policy making. Nevertheless, our measure of policy spillovers is still significant. This implies that there are two sources of country co-movements: (i) global shocks affecting all countries and (ii) policy interdependencies due to economic competition and signalling externalities. Additionally, trade openness becomes significant in this specification. An opening of the current account is associated with an opening of the capital account. This co-movement might be the result of a package of liberal reforms.

The last column in Table 4 adds changes in the exchange market pressure index. While currency crises do not significantly affect capital account policies, the effects of the other variables are qualitatively unchanged compared to column 3.

The full sample consists of a heterogeneous set of countries. Policy making, however, might differ between more homogeneous groups of countries. Therefore, I divide the whole sample in two subsamples.

The results are reported in Table 5. Columns (1) and (2) replicate the regressions of Table 4, columns (2) and (4) for a subsample of 22 industrial countries. While the explanatory power of the specifications is low and the majority of control variables is statistically insignificant, the presence of policy spillovers can be confirmed in one out of the two specifications.

Columns (3) and (4) present the respective results for emerging and developing countries. The move to a fixed exchange rate regime and an increase in world interest rates turn out to be the most important determinants of capital account policy. Both are associated with an imposition of capital controls. Our measure of policy interdependencies is significant in both specifications. In sum, contagion in capital account policies seems to be a characteristic of

emerging and developing countries whereas the results indicate that co-movements in industrial countries are rather due to common shocks.

6 Conclusions

This paper reconsiders the determinants of countries' capital account policy. Besides the standard control variables considered in the literature in this area, it focuses on capital account policies in the rest of the world.

The theoretical section develops a model of policy choice in which countries interact strategically. It shows that a country's best response to other countries' policies consists in imitating their decisions: open the capital account when others remove capital controls and close the capital account when other countries impose restrictions.

The empirical part tests this hypothesis. It investigates whether the policy in one country is correlated with the policy in other countries after controlling for economic and political fundamentals. The evidence is striking: The regression analysis suggests that capital account policies in neighbouring countries affect domestic policies by an economically and statistically significant degree. Countries imitate each other.

With respect to the control variables, two effects are robust to different specifications: The adoption of a fixed exchange rate regime is accompanied by the imposition of capital controls. On average, countries are aware of the restrictions implied by the policy trilemma and set policies accordingly: They secure the move to a more rigid exchange rate regime by a reduction in capital mobility in order to maintain monetary policy independence. Restrictions on the capital account are strengthened when the real world interest rate increases.

The results are consistent with the hypothesis that capital account policies are shaped by the competition for global capital. As a consequence, capital account policies are contagious.

References

Aizenman, J. and I. Noy (2009) 'Endogenous financial and trade openness', *Review of Development Economics* 13(2),175-189.

Alesina, A., V. Grilli and G. M. Milesi-Ferretti (1994) 'The political economy of capital controls', in: L. Leiderman and A. Razin, *Capital mobility: The impact on consumption, investment and growth*, Cambridge: Cambridge University Press.

Bekaert, G., C. R. Harvey and C. Lundblad (2005) 'Does financial liberalization spur growth?', *Journal of Financial Economics* 77(1), 3-55.

Bordo, M., B. Eichengreen, D. Klingebiel and M. S. Martinez-Peria (2001) 'Is the crisis problem growing more severe?', *Economic Policy* 16(32), 51-82.

Breitung, J. (2000) 'The local power of some unit root tests for panel data', in B. Baltagi (ed.), *Advances in Econometrics, Volume 15, Nonstationary Panels, Panel Cointegration, and Dynamic Panel*, Amsterdam: Elsevier Science.

Brueckner, J. K. (2003) 'Strategic interaction among governments: an overview of empirical studies', *International Regional Science Review* 26(2), 175-188.

Brueckner, J. K. and L. A. Saavedra (2001) 'Do local governments engage in strategic property-tax competition?', *National Tax Journal* 54, 231-253.

Brune, N., G. Garrett, A. Guisinger and J. Sorens (2001) 'The political economy of capital account liberalization', unpublished manuscript, UCLA International Institute.

Chinn, M. D. and H. Ito (2002) 'Capital account liberalization, institutions and financial developments: cross country evidence', NBER Working Paper 8967.

Chinn, M. D. and H. Ito (2006) 'What matters for financial development? Capital controls, institutions, and interactions', *Journal of Development Economics* 81(1), 163-192.

Demirguc-Kunt, A. and E. Detragiache (1998) 'Financial liberalization and financial fragility', Policy Research Working Paper Series 1917, The World Bank.

Devereux, M. P., B. Lockwood and M. Redoano (2008) 'Do countries compete over corporate tax rates?', *Journal of Public Economics* 92(5-6), 1210-1235.

Dooley, M. P. (1996) 'A survey of literature on controls over international capital transactions', *IMF Staff Papers* 43(4), 639-687.

Edwards, S. (1984) 'The order of liberalization of the external sector in developing countries', Princeton Essays in International Finance No. 156, Princeton University.

Edwards, S. (2007) 'Capital controls, sudden stops, and current account reversals', in S. Edwards (ed.), *Capital controls and capital flows in emerging economies: Policies, practice, and consequences*, Chicago: University of Chicago Press.

Eichengreen, B., A. K. Rose and C. Wyplosz (1996) 'Contagious currency crises', *Scandinavian Journal of Economics* 98(4), 463-484.

Freedom House (2008), *Freedom in the world 2008: The annual survey of political rights and civil liberties*, New York: Rowman & Littlefield Publishers.

Gassebner, M., N. Gaston and M. Lamla (2010) 'The inverse domino effect: Are economic reforms contagious?', *International Economic Review*, forthcoming.

Glick, R. and M. Hutchison (2005) 'Capital controls and exchange rate instability in developing economies', *Journal of International Money and Finance* 24(3), 387- 412.

Ghosh, A. R., A.-M. Gulde and H. C. Wolf (2002) *Exchange rate regimes: Choices and consequences*, Cambridge, Mass: The MIT Press.

Henry, P. B. (2003) 'Capital-account liberalization, the cost of capital, and economic growth', *American Economic Review Papers and Proceedings* 93(2), 91-96.

Henry, P. B. (2007) 'Capital account liberalization: Theory, evidence, and speculation', *Journal of Economic Literature* Vol. XLV, 887-935.

Kaminsky, G. and C. Reinhart (1999) 'The twin crises: The causes of banking and balance-of-payments problems', *American Economic Review* 89(4), 473-500.

Kelejian, H. H. and I. R. Prucha (1998) 'A generalized spatial two-stage least squares procedure for estimating a spatial autoregressive model with autoregressive disturbances', *Journal of Real Estate Finance and Economics* 17, 99-121.

Kose, M. A., E. Prasad, K. Rogoff and S.-J. Wei (2009) 'Financial globalization: a reappraisal', *International Monetary Fund Staff Papers* 56(1), 8-62.

Leblang, D. (1997) 'Domestic and systemic determinants of capital controls in the developed and developing world', *International Studies Quarterly* 41, 435-454.

Leblang, D. (2003) 'To defend or to devalue: the political economy of exchange rate policy', *International Studies Quarterly 47*, 533-559.

Levin, A., C.-F. Lin and C.-S. J. Chu (2002) 'Unit root tests in panel data: Asymptotic and finite-sample properties', *Journal of Econometrics* 108, 1-24.

Marshall, M. G. and K. Jaggers (2008), *Polity IV Project: Political regime characteristics and transitions, 1800–2007*, Center for Global Policy, George Mason University. Available from: http://www.systemicpeace.org/polity/polity4.htm.

McKinnon, R. (1993) *The order of economic liberalization: Financial control in the transition to a market economy*, second ed., Baltimore: John Hopkins Press.

Mody, A. and A. P. Murshid (2005) 'Growing up with capital flows', *Journal of International Economics* 65(1), 249-266.

Pesaran, M. H. (2007) 'A simple panel unit root test in the presence of cross section dependence', *Journal of Applied Econometrics* 22(2), 265-312.

Quinn, D. P. (2003) 'Capital account liberalization and economic globalization, 1890-1999: a synoptic view', *International Journal of Finance and Economics* 8(3), 189-204.

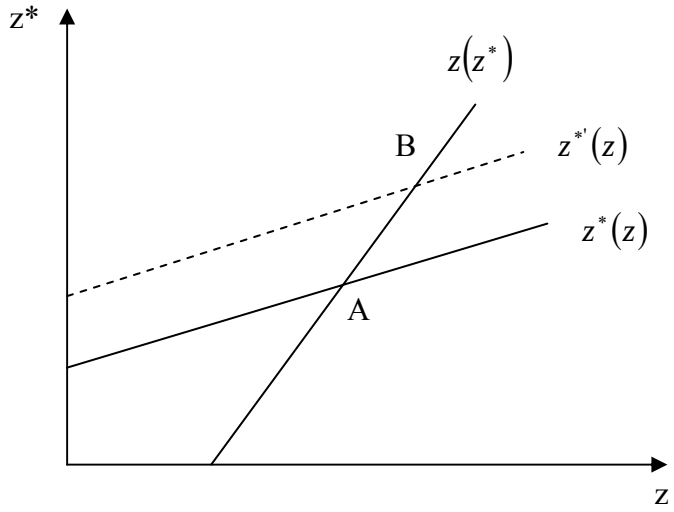
Rancière, R., A. Tornell and F. Westermann (2006) 'Decomposing the effects of financial liberalization: Crises vs. growth', *Journal of Banking and Finance* 30(12), 3331-3348.

Simmons, B. A. and Z. Elkins (2004) 'The globalization of liberalization: Policy diffusion in the international political economy', *American Political Science Review* 98(1), 171-189.

Stulz, R. M. (1999) 'Globalization of equity markets and the cost of capital', NBER Working Paper 7021.

World Bank (2009) *World Development Indicators*, Washington, DC.

Figure 1: Interdependence of policy choices



This graph depicts the best response of the domestic country to policy choices in the foreign country z(z*) and the best response of the foreign country to domestic policies z*(z). Point A is the non-cooperative Nash-equilibrium. Point B is attained if the foreign country prefers – for domestic reasons – a more open capital account.

Table 1: Panel unit root tests

Variable	Lags	Trend	Pesaran test (p-value)		Breitung test (p-value)	
			Level	First-difference	Level	First-difference
Capital account openness	0	no	0.00	0.00	0.99	0.00
	0	yes	0.82	0.00	0.97	0.00
	1	no	0.18	0.00	0.33	0.00
	1	yes	1.00	0.00	0.24	0.00
Real GDP per capita	0	no	1.00	0.00	1.00	0.00
	0	yes	1.00	0.00	1.00	0.00
	1	no	0.99	0.00	1.00	0.00
	1	yes	0.82	0.00	1.00	0.00
Trade openness	0	no	0.01	0.00	0.12	0.00
	0	yes	0.10	0.00	0.08	0.00
	1	no	0.02	0.00	0.00	0.00

	1	yes	0.06	0.00	0.00	0.00
Government size	0	no	0.13	0.00	0.01	0.00
	0	yes	0.84	0.00	0.03	0.00
	1	no	0.08	0.00	0.00	0.00
	1	yes	0.78	0.00	0.00	0.00
Current account balance (relative to GDP)	0	no	0.00	0.00	0.00	0.00
	0	yes	0.00	0.00	0.00	0.00
	1	no	0.00	0.00	0.00	0.00
	1	yes	0.00	0.00	0.00	0.00
Democracy	0	no	1.00	0.00	1.00	0.00
	0	yes	1.00	0.00	0.40	0.00
	1	no	1.00	0.00	0.99	0.00
	1	yes	1.00	0.00	0.00	0.00
Freedom	0	no	0.80	0.00	1.00	0.00
	0	yes	1.00	0.00	0.00	0.00
	1	no	1.00	0.00	0.99	0.00
	1	yes	1.00	0.00	0.00	0.00
Currency crisis, index	0	no	0.00	0.00	0.00	0.00
	0	yes	0.00	0.00	0.00	0.00
	1	no	0.00	0.00	0.00	0.00
	1	yes	0.00	0.00	0.00	0.00

Note: This table reports the results of two panel unit root tests, namely those proposed by Pesaran (2007) and Breitung (2000). The p-value shows the level of significance at which the null hypothesis of a unit root in each individual time-series can be rejected. The alternative hypothesis is that all individual series are stationary.
Both tests require a balanced panel data set. Therefore, for each variable a subsample is constructed that contains only those countries, for which data for the period 1975-2006 are available without gap. Since any systematic relationship between the availability of data and the characteristics of the time-series is improbable, the subsample can be considered as a random sample of the population of all countries.
The results are sensitive to the number of lags included and to the choice of specification (trend). The inclusion of lags of the variable accounts for serial correlation in the errors. Therefore, results for different numbers of lags - with and without trend - are reported.
As proposed by Levin, Lin and Chu (2002), before computing the Breitung test statistic the series are demeaned in order to mitigate the impact of cross-sectional correlation.
The two variables for exchange rate regimes are not considered since they are dummy variables.
Since the world interest rate is the same for all countries, its characteristics can be analysed by unit root tests for individual time-series. According to the Phillips-Perron test and the augmented Dickey-Fuller test the hypothesis of a unit root cannot be rejected at the 10% level of significance. After first-differencing, however, the p-value falls to 0.00.

Table 2: Spatial interactions in capital account policies: Bivariate regressions

Dependent variable: Change in openness of the capital account (Chinn-Ito-index)
Estimation method: Fixed effects estimator

	(1) All countries	(2) Industrial countries	(3) Emerging markets	(4) Asia	(5) Latin America	(6) Africa
Change in global capital account policy	0.3915 (2.51**)	0.2679 (1.33)	0.0307 (0.06)	0.6309 (1.05)	1.1343 (2.61**)	0.0092 (0.05)
Number of countries	140	22	18	16	22	43
Number of observations	3251	717	511	368	641	1006
Adjusted R^2	0.00	0.00	0.00	0.01	0.01	0.00

Notes:
t-statistics (in brackets) computed with heteroskedasticity-consistent standard errors.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 3: Spatial interactions in capital account policy

Dependent variable: Change in openness of the capital account (Index of Edwards)
Estimation method: Fixed effects estimator

	(1) All countries	(2) Industrial countries	(3) Emerging markets	(4) Asia	(5) Latin America	(6) Africa
Change in global capital account policy	12.63 (3.68***)	-1.90 (-0.38)	1.33 (0.14)	24.63 (2.10*)	38.12 (4.38***)	5.64 (1.30)
Number of countries	126	22	18	13	21	40
Number of observations	2250	556	352	267	446	684
Adjusted R^2	0.01	0.01	0.00	0.02	0.03	0.00

Notes:
t-statistics (in brackets) computed with heteroskedasticity-consistent standard errors.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 4: Determinants of capital account policy

Dependent variable: Change in openness of the capital account (Chinn-Ito index)
Estimation method: Fixed effects estimator (all variables in first differences)

	(1)	(2)	(3)	(4)
Real GDP per capita	-0.032 (-1.68*)	-0.0345 (-1.79*)	-0.0214 (-1.31)	-0.0253 (-1.45)
Trade openness	0.1214 (1.28)	0.1207 (1.28)	0.1899 (2.04**)	0.1664 (1.69*)
Government size	-0.2002 (-0.48)	-0.2298 (-0.55)	-0.2725 (-0.67)	-0.1770 (-0.42)
Current account balance (relative to GDP)	0.0377 (0.27)	0.0326 (0.23)	0.0589 (0.42)	0.0598 (0.42)
De jure fixed exchange rate, dummy	-0.0926 (-2.34**)	-0.0943 (-2.39**)	-0.0909 (-2.35**)	-0.0972 (-2.48**)
De jure intermediate exchange rate, dummy	-0.0277 (-0.85)	-0.0279 (-0.86)	-0.0261 (-0.80)	-0.0273 (-0.82)
Democracy		0.0078 (1.73*)	0.0075 (1.69*)	0.0099 (1.92*)
Freedom		0.0189 (1.33)	0.0194 (1.36)	0.0213 (1.36)
Real world interest rate			-0.0147 (-2.37**)	-0.0129 (-2.02**)
Currency crisis, index				-0.0067 (-1.65)
Global capital account policy	0.5791 (3.39***)	0.5927 (3.38***)	0.4352 (2.12**)	0.4824 (2.28**)
Number of countries	140	140	140	138
Number of observations	3179	3152	3152	3012
Adjusted R^2	0.04	0.04	0.07	0.13

Notes:
t-statistics (in brackets) computed with heteroskedasticity-consistent standard errors.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 5: Determinants of capital account policy: Subsamples

Dependent variable: Change in openness of the capital account (Chinn-Ito index)
Estimation method: Fixed effects estimator (all variables in first differences)

	Industrial countries		Emerging and developing countries	
	(1)	(2)	(3)	(4)
Real GDP per capita	-0.0762 (-2.36**)	-0.073 (-2.16**)	-0.0026 (-0.13)	0.0016 (0.08)
Trade openness	-0.3157 (-1.02)	-0.3186 (-0.71)	0.1448 (1.50)	0.1960 (1.95*)
Government size	0.4986 (0.27)	-0.2470 (-0.13)	-0.2529 (-0.60)	-0.3348 (-0.80)
Current account balance (relative to GDP)	0.0735 (0.11)	0.2025 (0.29)	0.0210 (0.15)	0.0645 (0.44)
De jure fixed exchange rate, dummy	-0.0111 (-0.11)	-0.0212 (-0.20)	-0.1296 (-3.24***)	-0.1232 (-3.10***)
De jure intermediate exchange rate, dummy	-0.0452 (-0.45)	-0.0488 (-0.47)	-0.0318 (-0.99)	-0.0293 (-0.89)
Democracy	0.0101 (0.55)	0.0122 (0.68)	0.0078 (1.66*)	0.0089 (1.69*)
Freedom	-0.0013 (-0.05)	0.0037 (0.12)	0.0198 (1.31)	0.0239 (1.44)
Real world interest rate		0.0057 (0.54)		-0.0171 (-2.23**)
Currency crisis, index		0.0087 (1.04)		0.0070 (1.33)
Global capital account policy	0.7510 (2.83***)	0.6051 (1.67)	0.5979 (2.75***)	0.4918 (1.84*)
Number of countries	22	21	118	117
Number of observations	681	647	2471	2371
Adjusted R^2	0.01	0.03	0.10	0.19

Notes:
t-statistics (in brackets) computed with heteroskedasticity-consistent standard errors.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Appendix A: Capital account policy and the allocation of capital

Assume that two countries produce a private good using mobile capital (K) and immobile labour (L) via a constant returns to scale production function

$$Y = A \cdot F(K, L) \qquad \text{with} \quad F_K > 0, \;\; F_L > 0, \; F_{KK} < 0, \;\; F_{LL} < 0$$

where Y denotes output and A measures total factor productivity. In the intensive form this can be written as

$$y = A \cdot f(k)$$

where y denotes output per capita and k represents capital per capita. The two countries produce according to the same production function but may differ in their capital account openness. International capital flows to the use with the highest risk-adjusted return. It thereby equalises net-of-tax returns such that in equilibrium its distribution satisfies:

$$A \cdot f'(k) \cdot z = r = A \cdot f'(k^*) \cdot z^*$$

where z and z* are the indices of capital account openness ($0 < z < 1$). The larger z, the more open the capital account. r is the endogenous worldwide net return. If the domestic country removes capital controls, its net return rises. As a consequence, capital leaves the foreign country and is re-invested in the domestic country. This has two consequences: First, capital per worker rises in the domestic economy. This temporarily increases the growth rate of output during the inflow period and leads to a permanently higher level of output. The country's net return falls again until it reaches r. Second, r increases. The new equilibrium is characterised by a larger share of world capital invested in the domestic economy and by a higher net return of capital.

Focusing on risk-adjusted returns, up to now the analysis implicitly assumed that the risk premium is not affected by a country's capital account policy. As shown in Henry (2003, 2007) for the case of the opening of the capital account in a previously closed economy, the change in the risk premium can be captured by the difference between the covariance of the return on the domestic and the world market on the one hand and the variance of the return on

the domestic market on the other. Empirical evidence reported in Stulz (1999) suggests that this difference is negative such that capital account liberalization reduces the risk premium.

In sum, a removal of capital controls might provide a double dividend: First, it rises a country's risk free rate of return for foreign investors. Second, it might reduce a country's risk premium. This leads ceteris paribus to a reallocation of capital to the domestic economy.

Appendix B: Country list (140 countries)

Albania	Ecuador	Latvia	Saudi Arabia
Algeria	Egypt, Arab Rep.*	Lebanon	Senegal
Argentina*	El Salvador	Lesotho	Sierra Leone
Armenia	Equatorial Guinea	Liberia	Singapore
Australia	Estonia	Libya	Slovak Republic
Austria	Ethiopia	Lithuania	Slovenia
Bahrain	Fiji	Macedonia, FYR	Solomon Islands
Bangladesh	Finland	Madagascar	South Africa*
Belarus	France	Malawi	Spain
Belgium	Gabon	Malaysia*	Sri Lanka
Benin	Gambia, The	Mali	Sudan
Bolivia	Georgia	Mauritania	Swaziland
Botswana	Germany	Mauritius	Sweden
Brazil*	Ghana	Mexico*	Switzerland
Bulgaria	Greece	Moldova	Syrian Arab
Burkina Faso	Guatemala	Mongolia	Republic
Burundi	Guinea	Morocco	Tajikistan
Cambodia	Guinea-Bissau	Mozambique	Tanzania
Cameroon	Guyana	Namibia	Thailand*
Canada	Haiti	Nepal	Togo
Central African	Honduras	Netherlands	Trinidad and Tobago
Republic	Hungary*	Nicaragua	Tunisia
Chad	India*	Niger	Turkey*
Chile*	Indonesia*	Norway	Uganda
China*	Iran, Islamic Rep.	Oman	Ukraine
Colombia	Ireland	Pakistan	United Kingdom
Comoros	Israel*	Panama	United States
Congo, Rep.	Italy	Papua New Guinea	Uruguay
Costa Rica	Jamaica	Paraguay	Venezuela, RB
Cote d'Ivoire	Japan	Peru*	Vietnam
Croatia	Jordan	Philippines*	Yemen, Rep.
Cyprus	Kazakhstan	Poland*	Zambia
Czech Republic	Kenya	Portugal	Zimbabwe
Denmark	Kuwait	Romania	
Djibouti	Kyrgyz Republic	Russian Federation*	
Dominican Republic	Lao PDR	Rwanda	

Notes: This appendix lists the maximum number of countries that are used in our regression analysis. Countries marked with an asterisk belong to the group of emerging-market countries.

Appendix C: List of variables and data sources

Variable	Source	Description
De jure capital account openness (Chinn-Ito)	Chinn and Ito (2002, 2006)	Measure of the de jure openness of the capital account. Calculation is based on the binary dummy variables of the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).
De jure capital account openness (Edwards)	Edwards (2007)	Index that combines the measures from Quinn (2003) and Mody and Murshid (2005) [both are based on the information provided by the AREAER] and information from country-specific sources.
Global capital account policy	Own calculation based on Chinn and Ito (2002, 2006)	Weighted sum of the Chinn-Ito index of capital account openness over all countries excluding the country under consideration, where the weights decrease in geographic distance and sum up to one.
Real GDP per capita	World Bank (2009)	GDP is measured as gross domestic product in constant international dollars with the year 2000 as base. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. This measure of GDP is divided by the population, which counts all residents regardless of legal status or citizenship.
Trade openness	World Bank (2009)	Openness is defined as the sum of exports and imports divided by GDP. Data are expressed in per cent.
Government size	World Bank (2009)	Government size is defined as general government final consumption expenditure, which includes all government current expenditure for purchases of goods and services, relative to current GDP.
Current account balance	World Bank (2009)	Current account balance is the sum of net exports of goods and services, net income and net current transfers. Data are divided by GDP.
De jure fixed exchange rates, dummy	Ghosh et al. (2002) and own update based on AREAER	Equals one if one of the following finer categories applies: dollarized, currency board, monetary union, single currency peg, published basket peg and secret basket peg.

Appendix C (continued)

Variable	Source	Description
De jure intermediate exchange rates, dummy	Ghosh et al. (2002) and own update based on AREAER	Equals one if one of the following finer categories applies: cooperative system, crawling peg, target zone, unclassified rule-based intervention, managed float with heavy intervention, unclassified managed float and other floats.
World interest rate	World Bank (2009)	World interest rates are proxied by the U.S. real interest rate. This is defined as the lending interest rate adjusted for inflation as measured by the GDP deflator.
Democracy	Marshall and Jaggers (2008)	Democracy is measured by a score, which combines the information of indicators of democracy and autocracy (POLITY2 variable). It ranges from +10 (strongly democratic) to -10 (strongly autocratic).
Freedom	Freedom House (2008)	Index of political rights from the Freedom in the World survey. It measures the freedom of the electoral process, political pluralism and participation and the functioning of the government. The numerical ratings lie between 1 and 7, with 1 representing the most free and 7 the least free case.
Currency crisis, index	Own calculations based on World Bank (2009)	The identification of a currency crisis is based on an exchange market pressure index. The calculation follows the procedure as described in Eichengreen et al. (1996).