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The Determination of Capital Controls: Which Role Do Exchange Rate Regimes Play?

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The Determination of Capital Controls: Which Role Do Exchange Rate Regimes Play?

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Abstract
This paper investigates the role of exchange rate regime choices in the determination of capital controls in transition economies. We first use a simultaneous equations model to allow direct interactions between decisions on capital controls and on exchange rate regimes. We find that exchange rate regime choices strongly influence the imposition or removal of capital controls, but the feed-back effect is weak. We further estimate a single equation model for capital controls with exchange rate regime choices as independent variables, and we find that there is a hump-shaped relationship between exchange rate regime flexibility and capital control intensity.

Keywords: Capital controls; Exchange rate regimes; Transition economies
JEL Codes: E42; F21; F33; P24.

1 Introduction

The turbulence in the international financial markets and the reoccurrence of currency crises in the 1990s have once again sparked a debate on the merits of increased international capital mobility. The fact that international capital movements played an important role in recent financial and currency crises has lead many academic researchers and policy advisors to reassess the implications of capital mobility, especially for the viability of various exchange rate regimes. Some authors argue for a "bi-polar" solution for the choice of exchange rate regimes and recommend adjustment of exchange arrangements to the new environment of heightened capital mobility (Eichengreen, 1994; Fischer, 2001). Other authors warn against the excessive volatility in the financial markets associated with free capital movements and advocate imposing capital controls to limit capital mobility. With capital movements under check, intermediate exchange arrangements (conventional pegs, crawling pegs or bands, and target zones) remain a viable and attractive option for many countries (Wyplosz, 2001; Williamson, 2000).

These two strands of research both rely on the proposition that exchange rate stability and monetary policy autonomy are not jointly achievable under free capital mobility, the so-called "impossible trinity," but they look at it from different angles. The "bi-polar" view emphasizes the trade-off between exchange rate stability and monetary

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autonomy given free capital mobility and questions the viability of intermediate exchange rate regimes without the support of capital controls. An implication of this view is a possible hump-shaped relationship between the flexibility of exchange rate regimes and the intensity of capital controls: While fixed and flexible regimes can live with high capital mobility, intermediate regimes are expected to be associated with higher intensity of capital controls. The views favoring capital controls challenge the desirability of unrestricted international capital movements in the first place. They argue that restrictions on capital mobility may be required to achieve second-best solutions in the face of capital market distortions, and that the choice of the exchange rate regime should take existing restrictions into account.

The empirical literature has so far neglected the interdependence between the choice of exchange rate regimes and restrictions on capital mobility as well as the possibility of a non-monotonic relationship between the two. In this paper we attempt to fill this blank in an analysis of the determination of capital controls in transition economies during the 1990s.[1] In order to integrate the analysis of the two topics, we construct a simultaneous equations model to describe the joint determination of capital controls and the choices of exchange rate regimes. After establishing the recursive structure of that model empirically, we estimate a single-equation model for capital controls, which explicitly allows for a non-monotonic effect of the rigidity of exchange rate regimes on the intensity of capital controls.

The rest of the paper is organized as follows. Section 2 provides a brief review of the theoretical underpinnings of capital controls as well as the existing empirical evidence. Section 3 discusses the measurement of capital controls and explains their determinants. The simultaneous equations model for both capital controls and exchange rate regime choices is introduced in Section 4, while the single equation model for capital controls is presented in Section 5. Some conclusions are summarized in Section 6.

2 Capital Controls: Theory and Evidence

2.1 Theoretical Arguments[2]

Preexistence of Distortions and the Second-best Argument

Traditional literature justifies the imposition of capital controls on the grounds of preexisting distortions in the capital market such as asymmetric information and limited rationality (Mathieson and Rojas-Suarez, 1993). “Throwing sand in the wheels” of the financial markets, such as imposing capital controls, can reduce financial market volatility caused by such distortions (Eichengreen et al., 1995). Another distortion is that, due to political instability and poor protection of property rights (Tornell and Velasco, 1992; Mathieson and Rojas-Suarez, 1993), countries may be subject to high country risk premia when borrowing in international capital markets. Capital controls help prevent capital outflows and retain domestic savings in the economy to avoid the high cost of foreign financing. Another distortion is connected to inefficiencies of the tax system, especially the inability of the authorities to tax income from foreign sources, which may motivate capital outflows for tax evasion (Razin and Sadka, 1991). In the context of such distortions, capital controls are viewed as policy instruments to achieve a second-best solution.

[1] The transition economies under investigation are Albania, Armenia, Azerbaijian, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

[2] See Dooley (1996) for an excellent survey of the relevant literature on capital controls.

Multiple Equilibria and First-Best Arguments

Recent studies on self-fulfilling currency crises imply that capital controls can even be first-best solutions, since they limit the ability of private agents to attack fundamentally sound exchange rate pegs in the first place. Without the protection of capital controls, a fixed exchange rate, though consistent with economic fundamentals, may not be sustainable, if market perceptions of its viability change (Obstfeld, 1986; Dooley, 1996). The existence of multiple equilibria in foreign exchange markets with the same set of fundamentals justifies the imposition of capital controls to make sudden changes in private expectations less likely.

Political Economy

Research in the tradition of political economy relates the imposition of capital controls to partisan conflicts and public finance considerations. If Leftist parties draw support mainly from the labor class, while Rightist parties tend to receive support from capital owners, left-wing governments are more likely to tax capital incomes and, for this purpose, to impose capital controls than right-wing governments (Quinn and Inclán, 1997; Epstein and Schor, 1992). Since capital controls help maintain the tax base for both capital levies and the inflation tax, governments with difficulties in financing their expenditures from other revenue sources may find them useful in managing public finance.

2.2 Empirical Evidence[3]

Many empirical studies consider only the presence or absence of capital controls and capture it by a dummy variable (Alesina et al., 1994; Grilli and Milesi-Ferretti, 1995). Some studies use a more refined measure of capital account openness proposed by Quinn (1997), which is based on a careful reading of national regulations on international capital transactions and a differentiated coding of various degree of capital control intensity (Quinn and Inclán, 1997; Dailami, 2001). Most recent studies take advantage of a much more detailed classification of capital transactions by the IMF, and use the disaggregated information about the existence of controls on each category to construct almost continuous indices for the intensity of capital controls (Johnston and Tamirisa, 1998).

Several studies include variables reflecting partisan conflicts as determinants of capital controls and find that left-wing governments and majority governments are more likely to impose capital controls (Alesina et al., 1994; Quinn and Inclán, 1997). Many studies find that distortions in the tax system, especially its low efficiency, are a common determinant of capital controls (Milesi-Ferretti, 1998; Dailami, 2001). Large governments and heavy debt burdens are found to make the existence of capital controls more likely (Grilli and Milesi-Ferretti, 1995; Berger et al., 2001). As far as economic institutions are concerned, central bank independence is found by some studies to be positively associated with capital account openness, supporting the view that an independent central bank makes it difficult for the government to generate seignorage revenue and, hence, less necessary to impose capital controls to secure the tax base for inflation taxes (Alesina et al., 1994; Epstein and Schor, 1992). From the perspective of crises prevention, countries with higher risk of currency crises due to pegged or tightly managed exchange rates or high current account deficits are found to be more prone to impose capital controls (Johnston and Tamirisa, 1998; Berger et al., 2001).

There are two methodological problems in this empirical literature. One is the roughness of measuring the intensity of capital controls. Since refined measures of capital controls are available only for a limited number of countries (e.g. Quinn's index) or for

[3] Eichengreen (2001) reviews the literature on the measurements, causes, and effects of capital account liberalization. Also see Dooley (1996).

some particular years (e.g. Johnston and Tamirisa's measure for the post-1996 period), most studies rely on a simple dummy variable to capture the presence of capital controls.

The other problem is the likely endogeneity of exchange rate regimes to capital controls, since some studies find that capital controls make pegged exchange rate regimes more likely to be adopted and more sustainable (Edwards, 1996; Berger et al., 2000). Treating exchange rate regime choices as exogenous variables could create a simultaneity bias in the estimation.

3 Measurement and Determinants of Capital Controls

3.1 An Index of Capital Controls

Measuring the intensity of capital controls is difficult (Eichengreen, 2001). While a dummy variable for capital controls is simple but rough, more sophisticated measures have much smaller country and time coverage, which limits their usage substantially. In this paper, we construct our own index of capital controls for 25 transition economies in the 1990s, based on information from the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* (*AREAER*). Starting with the 1997 *AREAER* (for 1996), the IMF began to provide information about the presence or absence of controls on ten or eleven types of capital transactions.[4] Based on this disaggregated information, our measure of capital controls is derived by dividing the number of capital transactions subject to controls by the total number of capital transactions considered in the analysis.[5] For the early 1990s, we use the relevant information from earlier issues of *AREAER* to construct the measure in the same way. This approach produces an index of capital controls (CAP) for the empirical analysis. Higher values denote more intensive controls on capital transactions.[6] The index is continuous and allows for more convenient treatment in empirical analysis. It captures not only the existence, but also the intensity of capital controls, albeit in an indirect way. In practice, restrictions on one type of transaction can be circumvented through other transactions not subject to controls. Therefore, the effectiveness of each control measure is larger, if other types of transactions are subject to controls as well. A larger value of our index thus does not merely reflect more types of control being imposed, it is also a proxy for higher degree of intensity of the existing controls.

Figure 1 shows the distribution of our index of capital controls (CAP) in 25 transition economies during 1990-1999. In the upper panel the index is shown in its original form. The horizontal axis shows the index values, ranging from 0 for fully open capital

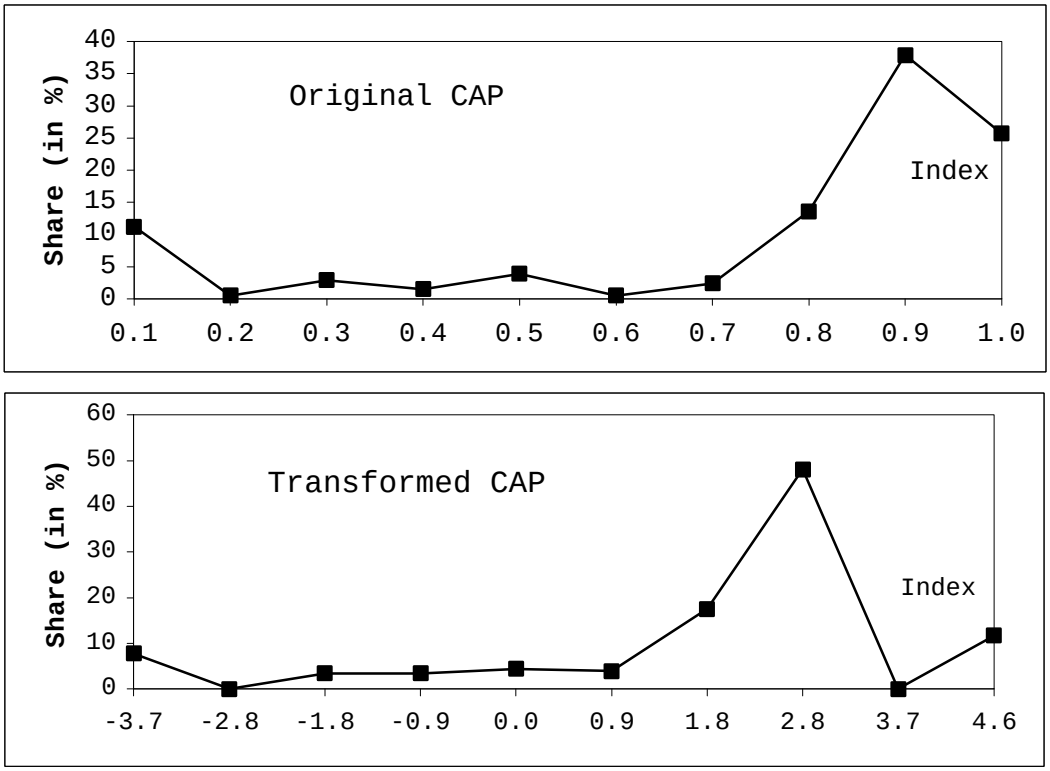
[4] The 1997 *AREAER* identifies ten categories of capital transactions that may be subject to controls. They are controls on (1) capital market securities, (2) money market instruments, (3) collective investment securities, (4) derivatives and other investments, (5) commercial credits, (6) financial credits, (7) guarantees, sureties, and financial backup facilities, (8) direct investment, (9) liquidation of direct investments, and (10) real estate transactions. Starting with the 1998 *AREAER* an additional type of control is identified, namely controls on personal capital movements.

[5] For some countries or years information on some types of controls are missing, or the existing information is inconsistent. We treat these transactions as subject to controls. While this treatment certainly biases the measure toward more closed capital account, it is justified by the observation that these transactions are less developed and less important in the relevant countries, possibly due to less developed capital market. This is in turn consistent with a more closed capital account.

[6] Johnston and Tamirisa (1998) also use the detailed information from IMF's *AREAER* to construct measures for the intensity of capital controls, which are defined as the number of existing controls, both for overall capital account and for each type of capital transactions. The only difference between their measure and our index is that we normalize the number of observed controls by the total number of potential controls. This normalization is appropriate for our data due to changing number of types of capital transactions, while Johnston and Tamirisa (1998) only consider one single cross section for 1996, so the change in the number of potential controls is not an issue.

accounts to 1 for fully closed ones. The vertical axis reports the sample share of various realizations of the index. The figure shows that 11 percent of the total of 206 country-year observations have very open capital accounts (index values not exceeding 0.1.) At the opposite end, 38 percent of all cases have largely closed capital controls (index values between 0.8 and 0.9). Another 26 percent of cases has almost full capital controls with index values above 0.9. It is clear from Figure 1 that the index is dominated by the observations with nearly closed capital accounts.

Figure 1: Distribution of the Index of Capital Controls (CAP)



Since the index by construction is bounded between 0 and 1, it cannot be used directly as a dependent variable in regression analysis. To solve this issue we first replace the boundary values 0 with 0.01 and 1 with 0.99, respectively, and then transform the data according to the formula log[x/(1-x)].[7] The sample distribution of the transformed index is depicted in the lower panel. This transformed CAP will be used in the following empirical analysis.

3.2 Determinants of Capital Controls

The literature has identified various potential determinants of the choice of capital controls. Detailed definitions and data sources of the variables are given in Appendix I.

[7] We also experiment with other alternatives, e.g. replacing 0 (1) with the mean between 0 (1) and the second lowest (highest) index value before the transformation. The empirical results with this type of transformed index, however, are very similar to those reported here, showing that our results are robust to different ways of transformation.

Exchange Rate Regimes

We define exchange rate regimes (ERR) on the basis of the IMF's classification, which distinguishes eight different regimes.[8] For each country, the exchange rate regime prevailing at the end of a year is used as *the* regime for that year.[9] To simplify the analysis of the simultaneous determination of capital controls and exchange rate regime choices, we aggregate the 8 regimes into three groups: fixed, intermediate, and flexible regimes. Obviously, this aggregation involves some degree of arbitrariness, as the division between any two adjacent regime groups is not always conceptually clear-cut.[10] Making use of the full classification of eight regimes, however, is difficult in the empirical analysis, as some cells would end up having very few observations. In the empirical work below, the choice of ERR is represented by an index variable assuming values of one, two, and three, with higher values for more flexible exchange rate regimes.[11]

Institutional and Structural Features

Within this group of explanatory variables, the first important feature identified by the empirical literature is the degree of central bank independence (CBINDEP). With a dependent central bank, the government can easily influence the monetary policy stance and is more likely to rely on seigniorage revenue, which requires capital controls as necessary compliments. The data on CBINDEP for the transition economies is an index of the legal independence of the central banks constructed by Cukierman et al. (2000), with higher values assigned to more independent central banks.

A second institutional determinant for capital controls is a country's acceptance of Article VIII of the IMF's *Articles of Agreement*. The acceptance of Article VIII signifies the opening of the current account, which may lead to the loosening or removal of some capital controls, especially those on trade-related capital flows. Moreover, maintaining current account convertibility opens some legal channels for private agents to circumvent the existing capital controls, reducing their effectiveness. All these suggest that an Article VIII status may be more conducive to capital account liberalization. A dummy variable (ART8) is designed to capture this effect. It takes a value of one in the year when a country accepts the Article VIII obligation and after, and zero otherwise.

The third variable measures the health or fragility of the financial institutions. With strong and well-functioning financial markets, countries are better equipped to cope with flows of capital and more able to benefit from free capital movements. In contrast, underdeveloped or weak financial institutions, a legacy of past financial depression in the transition economies, need more intensive protection against foreign competition, which calls for capital controls to buy time for financial reform. Our proxy for financial fragility in the transition economies (FINREF) is the index of financial reform compiled by the European Bank for Reconstruction and Development (EBRD). The higher the EBRD index,

[8] These are official exchange rate regimes reported by the national authorities to the IMF. Due to space limit we do not report results based on de facto exchange rate regimes, which are generally consistent with those reported here, especially when the determination of capital controls is investigated.

[9] An alternative is to use the "main" exchange rate regime, which lasts at least six months in a given year, as the exchange rate regime for that year. The difference between the "main" exchange rate regimes and the end-of-year regimes is generally ignorable, and empirical results with the "main" regimes are almost identical to those reported here. Moreover, the identification of the "main" regime is difficult if a country changes its exchange rate regime exactly in the middle of a year, e.g. the Bulgarian switch from an independent float to a currency board arrangement on July 1, 1997.

[10] For example, whether the conventional fixed-but-adjustable pegs should be classified as fixed or intermediate regimes is a debatable issue.

[11] Johnston and Tamirisa (1998), for example, include an exchange regime index in their analysis. The index takes integer values from 1 (for fixed regimes) to 5 (for free floating regimes).

the better the quality of financial institutions measured by the standard in matured market economies, and the less protection required in the form of capital controls.

Public Finance Considerations
Countries with inefficient tax systems or narrow bases may wish to impose capital controls to allow the government to collect sufficient revenues. This suggests that tax system efficiency and the size of the government should be considered as determinants of capital controls. Because the efficiency of the tax system is difficult to measure in a straightforward way, we use the share of tax on income, profits, and capital gains in total tax revenue (INCOMTAX) as a proxy. A higher share of income taxes reflects not only an enlargement of the tax base, but an improvement of efficiency in taxation as well. The larger the government, the stronger incentive to maintain or intensify capital controls to secure sufficient government revenues. We use the share of general government expenditures in GDP (GOVEXP) as a measure for the government size.

External Payments
Large current account deficits increase the desirability of capital controls to avoid balance-of-payments difficulties and to ensure that sufficient foreign exchange resources be retained domestically (Grilli and Milesi-Ferretti, 1995). Current account balances (CURRACCT) are measured in percent of GDP, with positive (negative) values denoting surpluses (deficits).

Another variable here is external indebtedness, measured by the ratio of external debt to GDP (DEBT). Heavy external debt may force the government to impose capital controls to ensure the retention of foreign exchange revenues for debt-servicing purpose (Berger et al., 2001).

4 A Simultaneous Equations Model for Capital Controls and Exchange Rate Regime Choices

4.1 Model and Estimation Procedure

The structural form of our simultaneous equations model consists of two equations:[12]

$$CAP = ERR^*\gamma_1 + X_1\beta_1 + u_1, \quad (1)$$

$$ERR^* = CAP\gamma_2 + X_2\beta_2 + u_2, \quad (2)$$

where CAP is our (transformed) capital control index and ERR* is the latent variable associated with ERR, the observed discrete exchange rate regime (ERR) choices. X_1 is a row vector of determinants of capital controls, and X_2 contains determinants of exchange rate regime choices. The error terms, u_1 and u_2, are both independently and identically distributed (i.i.d.) normal with zero mean and finite variance and are independent of each other. The first equation describes the choice of capital controls, the second the choice of the exchange rate regime. A fundamental difficulty is that the latter is a discrete choice. According to our model, this choice depends on the unobserved variable ERR*, which can be thought of as a measure of exchange rate flexibility. The latent variable ERR* is linked to the observed choice of exchange rate regime by the following rule:

$$ERR = 3 \quad \text{for floating regimes,} \quad \text{if } ERR^* > c \ (c > 0), \quad (3a)$$

$$ERR = 2 \quad \text{for intermediate regimes,} \quad \text{if } 0 < ERR^* \leq c, \quad (3b)$$

$$ERR = 1 \quad \text{for fixed regimes,} \quad \text{if } ERR^* \leq 0. \quad (3c)$$

Here c is a positive threshold differentiating between flexible and intermediate regimes. The threshold differentiating between intermediate and fixed regimes is normalized to zero.

[12] For ease of exposition, the country and time subscripts are omitted.

It might be tempting to include the observed exchange rate regime choices ERR in (1) instead of its latent counterpart ERR*. But this would lead to a logical inconsistency of the model. As shown in Appendix II, if ERR is used in (1), consistency requires that either CAP is exogenous to ERR*, or ERR* exogenous to CAP, or both. This would exclude the interdependence of the two decisions suggested by the theoretical literature, which we wish to test for in the empirical analysis.

As discussed in Heckman (1978), the structural parameters in the model characterized by (1), (2), (3a)-(3c) are identifiable (up to some proportionality), if there is at least one variable in X_1 not included in X_2, and at least one variable in X_2 not included in X_1. But the system is over-identified if, say, more than one variable in X_1 are not included in X_2. Over-identification implies that the estimators are not unique. To assure unique and consistent estimation, Heckman (1978) suggests a two-stage estimation procedure, which we follow in our empirical analysis. To save space we only briefly sketch the estimation procedures here, detailed explanations can be found in Appendix II.

At the first stage we create appropriate instruments for the endogenous variables appearing on the right-hand side (RHS) of the structural equations. For the continuous index of capital controls, OLS can be applied; for the discrete exchange rate regime choices, we use probit maximum likelihood (ML) estimation. We use the fitted values of CAP and ERR* based on consistent estimates of the reduced-form coefficients as instruments.[13] At the second stage we replace CAP and ERR* in the structural equations by their respective instruments, and estimate the model with OLS or probit ML method to obtain consistent estimates of the structural coefficients.

The row vector X_1 contains the following explanatory variables for capital controls: central bank independence (CBINDEP), Article VIII acceptance (ART8), fragility of financial institutions (FINREF), tax system efficiency (INCOMTAX), government size (GOVEXP), current account balance (CURRACCT), and external debt stock (DEBT). Since the last five variables might be endogenous to capital account liberalization, these variables are instrumentalized by using their own one-year lagged values as instruments. Also included in X_1 are dummies for country groups and time periods. We construct three country-group dummies to account for group-specific fixed effects:[14] EUCAND1 for the first-round EU accession candidates, EUCAND2 for the second-round candidates, and CIS for the member countries of the Commonwealth of Independent States (CIS).[15] The remaining three countries (Albania, Croatia, and Macedonia) are therefore used as the reference group. Because accession to the European Union (EU) requires liberalization of capital accounts, we expect EU candidates, especially those advanced in this process, should have less capital controls than other transition countries. The time dummies are for the period 1990-1993 (PERIOD1) and 1994-1996 (PERIOD2).[16] The most recent period (1997-1999) is used as the reference. The first period corresponds roughly to the starting stage of transition, while the last one to the period of recurrent financial crises.

The row vector X_2 has the explanatory variables for the choice of the exchange rate regimes. The relevant literature (see von Hagen and Zhou (2002) for a review) suggests that the choice of exchange rate regimes depends on a number of country characteristics and

[13] For ERR*, it is actually the fitted value of the normalized latent variable. See Appendix II for details.

[14] We use group dummies instead of country dummies for two reasons: to detect groupwise heterogeneity and to save degrees of freedom.

[15] The differentiation between EUCAND1 and EUCAND2 is now less relevant, as most of the candidates will join the EU in May 2004. For the period under our investigation, however, this differentiation makes sense, since two groups of countries are usually different in their reform efforts and the speed of transition.

[16] Introducing annual dummies for each calendar year is inappropriate for our sample due to lack of data for some countries in the early years.

policy variables. Specifically, the size of the economy measured in terms of real GDP (GDP), the degree of openness (OPENNESS), and the commodity concentration (COMCON) play a role in the choice of an exchange rate regime. Since many of the countries in our data set have the EU as their main trade partner, we also use openness to the EU as an explanatory variable. Furthermore, our earlier empirical work (von Hagen and Zhou, 2002) shows that this choice is affected by the degree of financial market deepening measured in terms of the ratio of broad money (M2) to GDP (MONEY) and the availability of international reserve assets (RESERVE). We also include dummies for country groups and time periods. Except for the dummy variables, the explanatory variables are all instrumentalized by their own one-year lagged values to attenuate potential simultaneity of these variables.

4.2 Results

Table 1 reports the empirical results with three ordered exchange rate regime choices (ERR). Three specifications are estimated: (1) both currency boards and conventional pegs are treated as fixed regimes, both managed floats and free floats are regarded as floating regimes, and all the other regimes form the intermediate group; (2) conventional pegs are reclassified as intermediate regimes, others being unchanged; (3) both conventional pegs and managed floats are reclassified as intermediate regimes, others being unchanged. As can be seen from Table 1, for both dependent variables, the results change little across specifications, showing that our findings are robust to the alternative classifications of some controversial regimes.

It is clear from Table 1 that ERR choices strongly influence the choice of capital controls. The coefficient on ERR* is always positive and highly significant, showing that the intensity of capital controls increases in the desired flexibility of exchange rate regimes. This finding is consistent with the implication of the "impossible trinity" in the sense that, if countries switch from fixed regimes to intermediate ones, capital controls will be intensified to help sustain the exchange rate regimes. But our finding predicts a further tightening of capital controls when more flexible regimes are adopted. While this is not demanded by the "impossible trinity", it is consistent with the "fear-of-floating" phenomenon, the observation that many developing and transition economies declare floating rates as official regimes, but in practice control or manage the exchange rates heavily to avoid large volatility (Calvo and Reinhart, 2000). Countries following this practice still resort to capital controls to help manage their exchange rates. Moreover, a positive association between flexible exchange rates and capital controls could arise, when countries are driven off a fixed regime in a crisis during which capital controls are instituted to help manage the situation while the exchange rate is floated.[17]

Our results also show that greater central bank independence and the liberalization of current account contribute to the removal of capital controls, but larger size of the government and larger external debts make capital controls more intensive. These results are consistent with our expectations. Tax system efficiency does not seem to be an important determinant of capital controls in transition economies. The positive coefficients for FINREF and CURRACCT suggest that countries with stronger financial institutions or current account surpluses tend to have more closed capital accounts, which is against our expectations. A suggestive explanation of the former is governments in transition economies have imposed capital controls as part of a strategy to develop new financial institutions and markets under some protection from foreign competition and the volatility of international capital movements. Such a strategy would lead to a positive association between FINREF

[17] We thank an anonymous referee for pointing out this possibility.

and CAP during the reform process. The positive coefficient on CURRACCT may reflect reverse causality even after using lagged variables as instruments. If capital account liberalization leads to net capital inflows due to improved confidence of foreign investors in the recipient countries, lower-level capital controls could be associated with current account deficits.

Table 1: Results of the Simultaneous Equations Model

	Coeff.		*t-Ratio*	*Coeff.*		*t-Ratio*	*Coeff.*		*t-Ratio*
CAP									
ERR*	0.36	***	4.25	0.35	***	4.17	0.34	***	3.86
CBINDEP	-2.81	**	-2.20	-2.70	**	-2.12	-3.00	**	-2.34
ART8	-1.19	**	-2.80	-1.08	**	-2.47	-1.26	***	-2.90
FINREF	1.10	**	2.24	1.12	**	2.27	1.14	**	2.28
INCOMTAX	0.87		0.40	1.18		0.53	-0.44		-0.20
GOVEXP	7.88	***	4.42	7.70	***	4.22	7.45	***	4.05
CURRACCT	8.06	**	2.22	8.28	**	2.26	8.80	**	2.37
DEBT	1.08	**	2.39	1.23	***	2.70	0.85	*	1.94
EUCAND1	-1.17	*	-1.97	-1.07	*	-1.80	-0.62		-1.01
EUCAND2	-0.68		-1.34	-0.64		-1.24	-0.40		-0.71
CIS	0.75		1.29	0.73		1.25	1.18	*	1.89
PERIOD1	-0.35		-0.50	-0.40		-0.58	-0.84		-1.16
PERIOD2	-1.19	***	-3.31	-1.16	***	-3.24	-1.46	***	-3.93
R^2-adjusted	*0.27*			*0.27*			*0.27*		
F-value	*5.57*	***		*5.52*	***		*5.45*	***	
ERR									
CAP	-0.17		-1.08	-0.04		-0.23	-0.05		-0.29
OPENNESS	-0.23		-0.62	-0.81	**	-2.25	-1.36	***	-3.69
$OPENTOEU^2$	5.46	***	3.09	4.41	**	2.55	6.03	***	3.16
COMCON	6.13	**	2.52	6.40	**	2.55	6.28	***	2.68
GDP	0.08		0.54	-0.15		-0.87	-0.18		-1.10
MONEY	2.29	***	2.95	3.11	***	3.98	3.20	***	3.74
RESERVE	-0.70	***	-3.14	-0.65	***	-3.34	-0.55	***	-2.62
EUCAND1	-1.24	*	-1.89	-1.19	*	-1.73	-2.05	***	-2.67
EUCAND2	0.04		0.08	-0.20		-0.40	-0.25		-0.45
CIS	2.72	***	3.85	2.36	***	3.89	2.10	***	3.13
PERIOD1	0.44		0.92	0.59		1.10	1.47	***	2.77
PERIOD2	-0.02		-0.12	0.02		0.05	0.72	***	2.79
Log-likelihood	*-109.5*			*-94.1*			*-83.3*		
Correct pred. (%)	*72.2*			*74.1*			*75.9*		
Observations	*158*			*158*			*158*		
$H_0 : \tilde{a}_2 = 0$									
LR	1.19			0.06			0.09		
Wald	1.17			0.05			0.09		
LM	1.28			3.02	*		1.19		

Note: *, **, and *** indicate significance at 10%, 5%, and 1% level, respectively. For CAP determination, heteroscedasticity-consistent variance-covariance matrix is used. The ERR choices are ordered (thresholds not reported). Each model is estimated with constant terms for both structural equations.

The results for the country group dummies confirm our expectations that the EU candidates maintain more liberal capital accounts than other transition economies. This is particularly true for the first-round candidates, which had to open their capital accounts as part of the accession process. The coefficients on the period dummies suggest that the most recent period (1997-1999) witnessed an increase in the intensity of capital controls in transition economies, which might be related to the frequent occurrence of financial crises during this period.

Turning to the model for ERR choices, the first important result is that the choice of capital controls does not seem to influence the ERR choice significantly. Since a formal Hausmann (1983)-type exogeneity test is impossible due to the unobservability of the latent variable ERR*, we run likelihood-ratio (LR) tests, Wald tests, and Lagrange multiplier (LM) tests for the null hypothesis that $\tilde{a}_2=0$. The bottom panel of Table 1 shows that the test statistics are insignificant in almost all cases. Only the LM statistic for the second specification is marginally significant.

We conclude that empirically the choice of exchange rate regimes does not depend significantly on the intensity of capital controls. In view of the result that the choice of capital controls does depend significantly on the choice of exchange rate regime, the empirical model has a recursive structure. The interpretation is that the choice of exchange rate regimes precedes the choice of capital controls, and that governments tend to use capital controls to help manage their declared exchange rate regimes. The methodological implication is that we can treat ERR* as a predetermined variable in equation (1).

The results regarding the remaining variables are largely consistent with those in von Hagen and Zhou (2002). Countries which are highly open to foreign trade, diversified in commodity structure of trade, and have sufficient international reserves are more likely to adopt fixed-rate regimes. On the contrary, very high trade openness to the EU as well as financial deepening tend to make countries to select flexible exchange arrangements. Moreover, the CIS countries show a stronger preference for more flexible regimes than the other transition economies, while the first-round EU candidates seem to be more interested in stable exchange rates. As far as the evolution of exchange rate regimes is concerned, there is weak evidence only showing that exchange regimes are gradually evolving toward arrangements with more stable exchange rates.

5 A Single Equation Model for Capital Controls

The recursive structure of the model estimated in section 4 allows us to analyze the choice of capital controls using a single-equation model. In this section we use such a model to pursue the possibility of a non-linear relationship between the ERR choice and the intensity of capital controls.

5.1 Three Specifications of the Model

The first specification of a single equation model relates capital controls to exchange rate regime choices and other explanatory variables through the following equation:[18]

$$CAP = ERR\acute{a}_1 + ERR^2\acute{a}_2 + X_1\grave{e} + \mathring{a} \qquad (4)$$

where ERR is defined as before and $\mathring{a}$ is an i.i.d. normal error term. If governments choose low levels of capital controls for both very rigid and very flexible ERR, but high levels of controls for intermediate regimes, $\acute{a}_1$ should be positive and $\acute{a}_2$ negative.

The second specification of the model substitutes the observed regime choice (ERR) with its latent counterpart (ERR*). That is,

[18] For ease of exposition, the country and time subscripts are all omitted.

$$CAP = ERR^{*}\alpha_1 + ERR^{*2}\alpha_2 + X_1\beta + \varepsilon \quad (5)$$

This specification captures the idea that it is the *desired* exchange rate flexibility, which influences the intensity of capital controls. Here, ERR* is the latent variable estimated from our model developed in section 4, using equation (2) with $\gamma_2=0$.

Specifications (4) or (5) can detect a non-linear relationship, but do not directly point out which regime is associated with the most intensive capital controls. To achieve this objective we construct dummy variables for each regime, and allow them to assert different influences on capital control intensity. This leads to the third specification:

$$CAP = \Sigma_i^{N-1} ERD_i \delta_i + X_1\beta + \varepsilon \quad (6)$$

where ERD_i is the dummy for the i-th regime and δ_i the corresponding coefficient. Since we include a constant term in X_1, one regime dummy must be excluded to avoid perfect multicollinearity. The excluded regime is then used as the reference regime. For our analysis the exchange rate regimes are classified based on the IMF's eight-regime scheme, and we do not observe cases of currency unions in the transition economies in the 1990s, so we set N=7 and use managed floats as the reference regime.

5.2 Results

Table 2 reports the empirical results.

Table 2: Results of the Single Equation Model

	Coeff.		*t-Ratio*	*Coeff.*		*t-Ratio*	*Coeff.*		*t-Ratio*
ERR	3.22	**	2.18						
ERR^2	-0.67	*	-1.85						
ERR*				0.62	***	2.97			
ERR^{*2}				-0.11	*	-1.76			
CBA							-1.98	***	-3.36
PEG							-0.65		-1.42
HB							-0.26		-0.53
CP							0.30		0.52
CB							0.61		1.25
FF							0.05		0.10
CBINDEP	-1.75		-1.36	-2.29	*	-1.80	-1.74		-1.45
ART8	-1.48	***	-3.35	-1.28	***	-2.94	-1.37	***	-2.87
FINREF	0.66		1.35	0.79	*	1.65	0.58		1.22
INCOMTAX	-0.80		-0.37	1.03		0.46	-1.55		-0.72
GOVEXP	7.16	***	3.96	5.91	***	3.49	6.67	***	3.95
CURRACCT	12.36	***	2.96	7.43	**	1.98	11.88	***	2.78
DEBT	1.02	**	2.07	1.15	**	2.58	0.91	*	1.82
EUCAND1	-1.38	**	-2.35	-1.51	**	-2.47	-1.28	**	-2.39
EUCAND2	-0.80		-1.64	-1.27	**	-2.37	-0.56		-1.11
CIS	0.65		1.18	-0.22		-0.33	0.65		1.14
PERIOD1	-0.75		-1.06	-0.39		-0.57	-0.82		-1.21
PERIOD2	-1.30	***	-3.46	-1.21	***	-3.26	-1.24	***	-3.13
CONSTANT	-3.38	**	-2.19	-0.20		-0.18	0.67		0.59
R^2-adjusted	0.26			0.27			0.28		
F-value	5.21	***		5.02	***		4.39	***	
Observations	*168*			*157*			*168*		

Note: *, **, and *** indicate significance at 10%, 5%, and 1% level, respectively. Heteroscedasticity-consistent variance-covariance matrix is used.

The first point to note is that the exchange rate regime choices do influence the intensity of capital controls in a hump-shaped way. For both observed and desired exchange rate regime choices, the intensity of capital controls first increases in the flexibility of exchange rate regimes, as evidenced by the positive coefficient for ERR or ERR*, but then decreases when very flexible regimes are selected or intended, as can be inferred from the negative coefficients for the two squared terms. The most intensive capital controls are associated with intermediate regimes (ERR=2).[19] This non-linearity is significant in the data.

A closer look at the role of each exchange rate regime reveals that, compared to managed floats, hard pegs are associated with significantly more liberalized capital accounts, while crawling pegs and crawling bands require more intensive capital controls. All these results are consistent with the "hollowing-out" hypothesis, which argues that only hard pegs and very flexible regimes are viable if capital mobility is high. On the other hand, they also explain why we seldom observe this phenomenon in transition economies, since most countries with intermediate regimes maintain relatively more intensive capital controls to enhance their viability.

The results with other determinants are similar to those of the simultaneous equations model. Except for CBINDEP and FINREF, which lose significance in the first and the third column, all the variables reflecting institutional and structural features, public finance considerations, and external payments factors that are significant in Table 1 are still significant in Table 2 with the same signs as before. The differences between country groups detected by the simultaneous equations model are also apparent in the current framework. The time-profile for the intensity of capital controls shows that there is an intensification of capital controls in the late 1990s, confirming the results in Table 1.

6 Conclusions

We have examined the role of exchange rate regime choices in the determination of capital controls in transition economies. We develop a simultaneous equations model to account for the interactions between decisions on exchange rate regimes and on capital controls. While the exchange rate regime choices are discrete-valued variables, we develop a continuous index to measure the intensity of capital controls. The discrete-continuous simultaneous equations model is estimated using the two-stage estimation procedure suggested by Heckman (1978). After finding that exchange rate regime choices are not affected by decisions on capital controls, we develop a single equation model to analyze the non-linear influence from exchange rate regime choices on the intensity of capital controls.

The results of the simultaneous equations model show a strong influence from exchange rate regime choices on capital controls, while the feed-back effects from capital controls on exchange rate regime choices are absent. The weak response of exchange rate regime choices to capital account liberalization suggests that governments tend to utilize capital controls to help manage the exchange rate regimes, rather than adjusting the latter passively to accommodate the changing degree of capital mobility. This weak response also implies that the exchange rate regime choices can be used as an exogenous explanatory variable in the single equation model for capital controls.

[19] The value of the quadratic term ax^2+bx+c is maximized at $x^*=-b/(2a)$ if $a<0$. With $a=-0.67$ and $b=3.22$, we have $x^*=2.4$.

The results of the single equation model provide evidence for a non-monotonic relationship between capital controls intensity and exchange rate regime choices. The overall evidences suggest that intermediate regimes are typically associated with the most intensive capital controls, and hard pegs are associated with the most liberal capital accounts.

Both models show that strong central bank independence and current account liberalization are associated with substantially lower intensity of capital controls. In contrast, advances in the development of financial institutions, current account surpluses, and heavy burden of external debt are associated with tighter capital controls in transition economies. Turning to country groups, the EU accession candidates, especially those advanced in this process, maintain much more open capital accounts than the non-accession countries, most of them being member states of the CIS. There is also evidence that the crises-ridden late 1990s witnessed a slight tightening of capital controls in many transition countries.

Appendix I: Definitions of Variables and Data Sources

I.1 Exchange Rate Regimes

The exchange rate regime classifications are based on the eight-regime classification scheme of the IMF. The eight regimes are: (1) currency unions, (2) currency board arrangements, (3) conventional pegs, (4) horizontal bands, (5) crawling pegs, (6) crawling bands, (7) managed floats, and (8) free floats. The first regime type is not applicable to the transition economies. The ordered regime classification consists of three broad regime groups: fixed group with regime (2) and (3); intermediate group with regime (4), (5), and (6); floating group with regime (7) and (8).

Data on exchange rate regimes are from the following sources: the IMF, *International Financial Statistics* (various issues), *Annual Report on Exchange Arrangements and Exchange Restrictions* (1998), and *Exchange Rate Arrangements and Currency Convertibility: Developments and Issues* (1999).

I.2 Capital Controls

CAP is an index of capital controls, defined as the ratio of the number of capital transactions subject to controls to the total number of capital controls, transformed using the formula $x^*=\log[x/(1-x)]$ after replacing 0 with 0.01 and 1 with 0.99 in the original data series (x). Data on capital controls are from the IMF, *Annual Report on Exchange Arrangements and Exchange Restrictions* (various issues).

I.3 Explanatory Variables

ART8: Dummy for the acceptance of the obligations under Article VIII of the IMF's *Articles of Agreement*. For each country it takes the value of zero when it does not accept the obligations under Article VIII. If the acceptance is effected in the first half of a year, the dummy assumes the value of unity for this year and after. If accepted in the second half of a year, the dummy will begin to assume the value of unity in the next year. Data source is the IMF, *International Financial Statistics* (various issues).

CBINDEP: Index for the legal independence of central banks. Data are from Cukierman, Miller, and Neyapti (2000).

CIS: Dummy for the member countries of the Commonwealth of Independent States, including Armenia, Azebaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

COMCON: Commodity concentration of foreign trade, measured by the Gini-Hirschman coefficient defined below. Commodities are first defined at the one-digit SITC level (0-9) to create ten broad groups and then reclassified into seven main commodity categories. Denote exports of commodity i from country j by X_{ij} and country j's total export by X_j, the Gini-Hirschman coefficient for country j, C_j, is derived from $C_j^2 = \sum_i (X_{ij}/X_j)^2$. Data on commodity trade are from the International Trade Center.

CURRACCT: Current account surplus (+) or deficit (-) as a ratio of GDP. Data source is the IMF, *International Financial Statistics* (various issues).

DEBT: External debt stock, normalized by GDP. Data are taken from the EBRD, *Transition Report* (1999) and the IMF, *Country Report* (various issues).

EUCAND1: Dummy for the first-round EU accession candidates, including the Czech Republic, Estonia, Hungary, Poland, and Slovenia.

EUCAND2: Dummy for the second-round EU accession candidates, including Bulgaria, Latvia, Lithuania, Romania, and the Slovak Republic.

FINREF: Index of financial reform, measured by the average of the EBRD indices for banking reform and for non-banking financial institutions reform. Data source is the EBRD, *Transition Report* (2000).

GDP: Gross domestic products in current prices, in billions of US dollars and then in logarithms. Data are from the IMF, *World Economic Outlook* Database, September 2000.

GOVEXP: General government expenditures, normalized by GDP. Data are taken from the EBRD, *Transition Report* (1999) and the IMF, *Country Report* (various issues).

INCOMTAX: Share of tax on income, profits, and capital gains in total tax revenue. Data are from the IMF, *Government Finance Statistics Yearbook* (2000) and *Country Report* (various issues).

MONEY: Broad money, normalized by GDP. Broad money is the sum of "money" and "quasi-money". Data source is the IMF, *International Financial Statistics* (various issues).

OPENNESS: Degree of openness to foreign economies, measured by the ratio of total trade volume to GDP. Total trade volume is the sum of goods export (f.o.b.) and goods import (c.i.f.). Trade data are from the IMF, *Direction of Trade Statistics* (various issues). GDP data are from the IMF, *World Economic Outlook* Database, September 2000.

OPENTOEU: Degree of openness to the EU, measured by the share of trade with the EU in total trade. Data source is the IMF, *Direction of Trade Statistics* (various issues).

PERIOD1: Dummy for the period 1990-1993.

PERIOD2: Dummy for the period 1994-1996.

RESERVE: Ratio of non-gold international reserves to broad money. Data sources are the IMF, *International Financial Statistics* (various issues) and *Country Report* (various issues), and the EBRD, *Transition Report* (1999).

Appendix II: Logical Consistency and the Two-Stage Estimation Procedure

II.1 The Issue of Logical Consistency

To understand the concern about the logical consistency of the simultaneous equations model, we can rewrite the model, with ERR in place of ERR* in the first structural equation, as:

$$CAP = ERR\tilde{a}_1 + X_1\beta_1 + u_1, \quad \text{(A-1a)}$$

$$ERR^* = CAP\tilde{a}_2 + X_2\beta_2 + u_2. \quad \text{(A-1b)}$$

Substitute (A-1a) into (A-1b) for CAP, we have:

$$ERR^* = ERR\alpha + M + \varepsilon, \quad \text{(A-2)}$$

where $\alpha = \gamma_1\gamma_2$, $M = X_1\beta_1\gamma_2 + X_2\beta_2$, and $\varepsilon = \gamma_2 u_1 + u_2$. Since both u_1 and u_2 are i.i.d. normal, ε is also normal with $\Phi(\cdot)$ as the cumulative density function, then we have

$$\text{Prob}(ERR = 1) = \text{Prob}(ERR^* \le 0) = \Phi(-M-\alpha),$$
$$\text{Prob}(ERR = 2) = \text{Prob}(0 < ERR^* \le c) = \Phi(c-M-2\alpha) - \Phi(-M-2\alpha),$$
$$\text{Prob}(ERR = 3) = \text{Prob}(ERR^* > c) = 1 - \Phi(c-M-3\alpha).$$

The logical consistency of the model requires that the three probabilities must sum up to unity, which is equivalent to the condition

$$[\Phi(-M-\alpha) - \Phi(-M-2\alpha)] + [\Phi(c-M-2\alpha) - \Phi(c-M-3\alpha)] = 0. \quad \text{(A-3)}$$

It is clear that, if $\alpha>0$ ($\alpha<0$), the results of both brackets will be positive (negative), so (A-3) can be true if and only if $\alpha = \gamma_1\gamma_2 = 0$. This leads in turn to the collapse of the simultaneous structure. Therefore, unless we assume that at least one variable is exogenous ($\gamma_1=0$ and/or $\gamma_2=0$), the simultaneous equations system characterized by (A-1a) and (A-1b) is not logically consistent.

Another case where the logical consistency can be a concern is the model with exchange regime dummies appearing in the structural equation for capital controls. Since we are interested in the possible non-linear responses of capital controls to exchange rate regime choices, it is tempting to include dummies for fixed and flexible regimes in the equation for capital control determination. That is,

$$CAP = ERR_1\tilde{a}_{11} + ERR_3\tilde{a}_{13} + X_1\beta_1 + u_1, \quad \text{(A-4a)}$$
$$ERR^* = CAP\tilde{a}_2 + X_2\beta_2 + u_2, \quad \text{(A-4b)}$$

where ERR_1 and ERR_3 are dummies for fixed and floating regimes respectively. Again insert (A-4a) into (A-4b) to obtain

$$ERR^* = ERR_1\alpha_1 + ERR_3\alpha_3 + M + \aa, \quad \text{(A-5)}$$

where $\alpha_1 = \gamma_{11}\gamma_2$, $\alpha_3 = \gamma_{13}\gamma_2$, and M and $\aa$ are the same as before. Now the three probabilities can be expressed as

$\text{Prob}(ERR_1 = 1 \text{ and } ERR_3 = 0) = \text{Prob}(ERR = 1) = \text{Prob}(ERR^* \le 0) = \Phi(-M-\alpha_1)$,
$\text{Prob}(ERR_1 = ERR_3 = 0) = \text{Prob}(ERR = 2) = \text{Prob}(0 < ERR^* \le c) = \Phi(c-M) - \Phi(-M)$,
$\text{Prob}(ERR_1 = 0 \text{ and } ERR_3 = 1) = \text{Prob}(ERR = 3) = \text{Prob}(ERR^* > c) = 1 - \Phi(c-M-\alpha_3)$.

Logical consistency of the model requires that the following condition holds for any M:

$$\Phi(-M-\alpha_1) - \Phi(-M) + \Phi(c-M) - \Phi(c-M-\alpha_3) = 0. \quad \text{(A-6)}$$

It can be shown that (A-6) will be true for any M if and only if $\alpha_1 = \alpha_3 = 0$. The sufficiency is obvious. To prove the necessity, note that (A-6) implies the following relationship:

$$\alpha_1 = - M - \Phi^{-1}[\Phi(-M) - \Phi(c-M) + \Phi(c-M-\alpha_3)], \quad \text{(A-7)}$$

which depends on M for given c if $\alpha_3 \neq 0$. This is contradictory, however, to the fact that both α_1 and α_3 are constant parameters independent of M. As a result, α_3 must be zero, which means that α_1 must be zero, too. Since $\alpha_1 = \alpha_3 = 0$ is equivalent to $\gamma_{11}\gamma_2 = \gamma_{13}\gamma_2 = 0$, we reach the same conclusion drawn from the first case.

II.2 The Two-Stage Estimation Procedure

In the first stage, we derive and estimate the reduced form of the model, which consists of the following two equations:

$$CAP = X_1\Pi_{11} + X_2\Pi_{12} + \nu_1 = X\Pi_1 + \nu_1, \quad \text{(A-8a)}$$
$$ERR^* = X_1\Pi_{21} + X_2\Pi_{22} + \nu_2 = X\Pi_2 + \nu_2, \quad \text{(A-8b)}$$

where $\Pi_{11} = \beta_1/(1-\gamma_1\gamma_2)$, $\Pi_{12} = \gamma_1\beta_2/(1-\gamma_1\gamma_2)$, $\Pi_{21} = \gamma_2\beta_1/(1-\gamma_1\gamma_2)$, $\Pi_{22} = \beta_2/(1-\gamma_1\gamma_2)$, $\nu_1 = (u_1+\gamma_1 u_2)/(1-\gamma_1\gamma_2)$, and $\nu_2 = (\gamma_2 u_1+u_2)/(1-\gamma_1\gamma_2)$. X contains all the different exogenous variables from X_1 and X_2, and Π_1 and Π_2 are the two vectors of the reduced form coefficients.

We estimate (A-8a) by ordinary least square (OLS) method to obtain a consistent estimator of Π_1, denoted by $\hat{\Pi}_1$, and estimate (A-8b) by probit maximum likelihood (ML) method. If we denote the standard deviation of ν_2 by σ_2, (A-8b) can be rewritten as:

$$ERR^{**} = ERR^{*}/\sigma_2 = X(\Pi_2/\sigma_2) + \nu_2/\sigma_2 = X\Pi_2^{*} + \nu_2^{*},$$

where $Var(\nu_2^{*}) = 1$. The consistent estimator for Π_2^{*} is denoted by $\hat{\Pi}_2^{*}$. Then we have $\widehat{CAP} = X\hat{\Pi}_1$ as the appropriate instrument for CAP and $\widehat{ERR^{**}} = X\hat{\Pi}_2^{*}$ for ERR^{**}.

In the second stage we substitute the instruments for the endogenous variables on the right-hand side of the structural model. The structural equation for capital controls is now:

$$CAP = (\gamma_1\sigma_2)(ERR^{*}/\sigma_2) + X_1\beta_1 + u_1 = (\gamma_1\sigma_2)ERR^{**} + X_1\beta_1 + u_1.$$

Use $\widehat{ERR^{**}}$ as the instrument for ERR^{**}, we can obtain OLS estimators for the structural parameters: $\gamma_1\sigma_2$ and β_1. The structural equation for exchange rate regimes is:

$$ERR^{*}/\sigma = (\gamma_2/\sigma)CAP + X_2(\beta_2/\sigma) + u_2/\sigma,$$

where σ denotes the standard deviation of u_2 so that $Var(u_2/\sigma) = 1$. Applying $\widehat{CAP}$ as the instrument for CAP, probit ML can generate estimators for the structural parameters: γ_2/σ and β_2/σ.

References

Alesina, Alberto, Vittorio Grilli, and Gian Maria Milesi-Ferretti, 1994, "The Political Economy of Capital Controls," in Leonardo Leiderman and Assaf Razin eds., *Capital Mobility: The Impact on Consumption, Investment, and Growth* (Cambridge and New York: Cambridge University Press).

Berger, Helge, Jan-Egbert Sturm, and Jacob de Haan, 2000, "An Empirical Investigation into Exchange Rate Regime Choices and Exchange Rate Volatility," CESifo Working Paper No. 263.

Berger, Helge, Jan-Egbert Sturm, and Jacob de Haan, 2001, "Capital Controls and Exchange Rate Regimes: An Empirical Investigation," CESifo Working Paper No. 433.

Calvo, A. Guillermo, and Carmen M. Reinhart, 2000, "Fear of Floating," mimeo, University of Maryland.

Cukierman, Alex, Geoffrey P. Miller, and Bilin Neyapti, 2000, "Central Bank Reform, Liberalization and Inflation in Transition Economies: An International Perspective," CentER Discussion Papers No. 106, Tilburg University.

Dailami, Mansor, 2001, "Financial Openness, Democracy, and Redistributive Policy," The World Bank Working Paper No. 2372.

Dooley, Michael P., 1996, "A Survey of Literature on Controls over International Capital Transactions," IMF *Staff Papers*, Vol. 43, No. 4, pp. 639-687.

Edwards, Sebastian, 1996, "The Determinants of the Choice Between Fixed and Flexible Exchange-rate Regimes" NBER Working Paper No. 5756.

Eichengreen, Barry, 1994, *International Monetary Arrangements for the 21st Century* (Washington DC: Brookings Institution).

Eichengreen, Barry, 2001, "Capital Account Liberalization: What Do the Cross-Country Studies Tell Us?" forthcoming in *The World Bank Economic Review*.

Eichengreen, Barry, James Tobin, and Charles Wyplosz, 1995, "Two Cases for Sand in the Wheels on International Finance," *Economic Journal*, Vol. 105 (January), pp. 162-172.

Epstein, Gerald A., and Juliet B. Schor, 1992, "Structural Determinants and Economic Effects of Capital Controls in OECD Countries," in Tariq Banuri and Juliet B. Schor eds., *Financial Openness and National Autonomy: Opportunities and Constraints* (Oxford: Oxford University Press).

Fischer, Stanley, 2001, "Exchange Rate Regimes: Is the Bipolar View Correct?" mimeo, IMF.

Grilli, Vittorio, and Gian Maria Milesi-Ferretti, 1995, "Economic Effects and Structural Determinants of Capital Controls," IMF *Staff Papers*, Vol. 42, No. 3 (September), pp. 517-51.

Hausman, Jerry A., 1983, "Specification and Estimation of Simultaneous Equation Models," in Z. Griliches and M. D. Intriligator eds., *Handbook of Econometrics*, Vol. I (Amsterdam: North Holland).

Heckman, James, 1978, "Dummy Endogenous Variables in a Simultaneous Equation System," *Econometrica*, Vol. 46, No. 6 (July), pp. 931-959.

Johnston, R. Barry, and Natalia T. Tamirisa, 1998, "Why Do Countries Use Capital Controls?" IMF Working Paper No. 98/181.

Mathieson, Donald J., and Liliana Rojas-Suarez, 1993, Liberalization of the Capital Account: Experiences and Issues, IMF Occasional Paper No. 103.

Milesi-Ferretti, Gian Maria, 1998, "Why Capital Controls? Theory and Evidence," in Sylvester Eijffinger and Harry Huizinga eds., *Positive Political Economy: Theory and Evidence* (Cambridge: Cambridge University Press).

Obstfeld, Maurice, 1986, "Rational and Self-fulfilling Balance-of-Payments Crises," *American Economic Review* Vol. 76 (March), pp. 72-81.

Quinn, Dennis, 1997, "The Correlates of Change in International Financial Regulation," *American Political Science Review*, Vol. 91, No. 3 (September), pp. 531-51.

Quinn, Dennis P., and Carla Inclán, 1997, "The Origins of Financial Openness: A Study of Current and Capital Account Liberalization," *American Journal of Political Science*, Vol. 41 (July), pp. 771-813.

Razin, Assaf, and Efraim Sadka, 1991, "Efficient Investment Incentives in the Presence of Capital Flight," *Journal of International Economics*, Vol. 31 (August), pp. 171-81.

Tornell, Aaron, and Andres Velasco, 1992, "The Tragedy of the Commons and Economic Growth: Why Does Capital Flow from Poor to Rich Countries?" *Journal of Political Economy*, Vol. 100 (December), pp. 1208-31.

Von Hagen, Jürgen, and Jizhong Zhou, 2002, "The Choice of Exchange Rate Regimes: An Empirical Analysis for Transition Economies," ZEI Working Paper B02-03, University of Bonn.

Williamson, John, 2000, *Exchange Rate Regimes for Emerging Markets: Reviving the Intermediate Option* (Washington DC: Institute for International Economics).

Wyplosz, Charles, 2001, "Exchange Rate Regimes: Some Lessons from Post-War Europe," CEPR Discussion Paper No. 2723.

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