

DETERMINANTS OF EXCHANGE  
RATE REGIME CHOICE IN CIS  
COUNTRIES

by

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National University of “Kyiv-Mohyla Academy”  
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Abstract

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This work is devoted to the investigation of mechanisms of exchange rate regime choice in CIS countries. It pays special attention to the role of fiscal policy, namely to the use of inflation tax. The fiscal pressure is introduced into the theoretical model by including government budget financing constraint. The theoretical model implies that government expenditures have positive impact on flexibility in the countries with high employment ambition. Empirical findings confirm this conclusion: in CIS countries (with high employment ambition) government expenditures are found to have positive influence on the flexibility of the regime, in contrast with CEE countries.

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## GLOSSARY

**CIS** - The Commonwealth of Independent States (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan).

**CEE** - Central and Eastern Europe Countries

**Fixed regime** - Exchange rate regime under which government (monetary authority) preannounces the exchange rate and commits itself to the support of this rate.

**Flexible regime** - Exchange rate regime under which the exchange rate is set freely by market forces and government does not intervene.

## *Chapter 1*

### INTRODUCTION

The problem of choosing the exchange rate regime is widely discussed today. Even many years after the crush of Bretton-Woods system 49 countries-IMF members choose fixed exchange rate regimes, and 15 have intermediate arrangements (IMF, 2002). While most of the advanced countries have long ago chosen floating regime or monetary union, the developing countries tend to experiment with different exchange rate arrangements.

When a country chooses exchange rate regime, it actually faces a trade-off between the external competitiveness and price stability. More generally, one can state that the trade-off is the resistance to real shocks vs. the resistance to nominal shocks. The famous exchange rate trilemma states the impossibility of having open capital markets, monetary independence and pegged exchange rate at one and the same time. To avoid such strict trade-offs many developing countries implemented intermediate exchange rate regimes. Advantages of such regimes were offset by the uncertainty on financial markets with spillovers to the banking sectors. After numerous currency crises “two-corner” solution became popular, offering the choice between free floating and strict fixation.

For transition countries special problems exist. On the one hand, fixed exchange rates guarantee a level of certainty, but do not exclude banking crises. On the other hand, there exists a phenomenon of “fear to float”: significant devaluation of exchange rate may have negative effects on the foreign debt of the country and on the price stability. The “original sin” of financial instability worsens these effects. Moreover, if a country had faced high inflation in recent years, devaluation may have no positive effect on real variables [Bordo, 2003].

All above explains why the choice of exchange rate regime in transition countries does not follow the pattern suggested by classical theories. The theory of optimal currency areas [Mundell, 1961] predicts that small open economies (like most of transition countries) will tend to have fixed regimes. The actual data does not support this hypothesis: exchange rate regimes are highly heterogeneous across transition countries. Furthermore, these countries tend to change arrangements over time.

The central goal of this research is to find the main determinants of exchange rate regime in CIS countries. Many recent researches have been done in this direction for developing countries [Papaioannou, 2003; Juhn and Mauro, 2002; Iwata and Tanner, 2003], and for transition countries [Klyuev, 2001, 2003; Domac et al, 2001; von Hagen and Zhou, 2002]. Still, models developed for transition countries of Central and Eastern Europe do not give good results for CIS countries [Klyuev, 2001]. Authors claim that the problem lies in the policy inconsistency in these countries, so that the framework “credibility versus flexibility” can not be successfully applied. We argue that the credibility concept is not applicable because the monetary authorities can not be assumed independent from fiscal influence.

We see 2 main problems in other studies that do not allow getting a good model for CIS countries:

- they are built on the explicit assumption of independence of monetary policy that is not appropriate in CIS countries;
- most of them use not actual, but officially announced exchange rate regimes, while there exists a discrepancy between *de facto* and *de jure*, and this discrepancy could be very serious in transition countries.

We build simple theoretical model that is grounded on the maximization of social utility function subject to government expenditures constraint. By introducing the government expenditures constraint we control for the fiscal pressures on exchange rate policy. We argue that in CIS countries fiscal effect on exchange rate arrangement is present which stems from the dominance of fiscal policy over the monetary policy. Namely, governments will choose the flexible exchange rate regime to accommodate the use of inflation tax.

In empirical part we will use panel data regression analysis on two groups of transition countries: CIS and CEE countries. That will allow me not only to find determinants of the regime choice common to both groups, but also to figure out the possible differences in exchange rate policy formation between two groups.

We will use the estimated de facto natural classification of regimes proposed by Reinhart and Rogoff (2003): authors employ monthly data on market-determined parallel exchange rates and develop extensive chronologies of the history of exchange arrangements and related factors, such as exchange controls and currency reforms; that enables them to create a well-grounded system of exchange rate classification that has become widely used recently.

The rest of the work proceeds as follows: in Chapter 2 we review the existing literature; in Chapter 3 we develop the simple theoretical model describing the process of exchange rate policy-making in presence of fiscal dominance and describe other possible determinants and their expected impact; in Chapter 4 we describe the methodology and data used for the empirical estimation; also we report the results of empirical estimation and their interpretation; and in Chapter 5 the conclusions are presented.



## *Chapter 2*

### LITERATURE REVIEW

#### **2.1 Determinants of exchange rate regimes: theory**

The discussion around the proper choice of exchange rate regimes started long ago. Even before the crash of Bretton-Woods system, when the majority of the world had to follow the adjustable peg to dollar, economists analyzed consequences of different exchange arrangements. Today the world is faced with diversity of regimes among countries, but in 1950's the economic thought was strangling to find the best exchange rate regime for everybody. The debate was started by Milton Friedman in 1953. In his paper he denied the conventional view (that floating rates are highly unstable and not persistent to psychological factors, and hence they are inferior to fixed rates) and presented the new case for floating regime (Friedman, 1953). He underlined the main advantages of floating: independence of monetary policy and resistance to real shocks. This development turned the debate into consensus, and in the early 1960s most of economists became the supporters of the floating arrangements (Flanders and Helpman, 1978).

Mundell (1963) and Fleming (1962) extended his analysis. They developed a model, where the choice of exchange regime depends mainly on the type of shocks prevailing and on the level of capital mobility. If real shocks (such as shifts in external markets or terms of trade) prevailed and country had opened capital markets, floating was the best choice. In the presence of nominal shocks the fixed regime is preferable. The main implication of Mundell-Fleming model is the "impossible trinity" proposition: all countries have to choose 2 out of three

available options: open capital markets, independence of monetary policy and fixed exchange rate.

At the same time the classical theory of exchange rate choice was born. In their works Mundell (1961), Kennen (1969) and McKinnon (1963) developed the theory of optimal currency areas. They realized that fixed exchange rates could often lead to current account imbalances, but still proposed a case when the fixed rates would be optimal. The theory used the new approach to the problem: it did not attempt to prove that some particular regime is the best for all; instead, the authors determined the long-run characteristics of the economy that made the fixing of exchange rates optimal. Optimal currency area (OCA) is defined by Mundell (1961) as “a domain within which the exchange rates are fixed” (where it is optimal to have fixed exchange rate or monetary union). The authors defined following characteristics that make a fixed regime preferable:

- high factor mobility (while floating exchange rates provide a convenient nominal adjustment for real shocks, under fixed arrangements economy would also easily adjust in real terms if the factor mobility is high); this factor also includes the concepts of diversity in production and skills;

- high openness, measured as the ratio of imports to GDP, of the economy (greater the openness - more inflationary are the changes in nominal exchange rate);

- small size of the economy (a small country is a price-taker on the world market, so the fixed exchange rate minimizes the vulnerability of exports to domestic price changes);

- substantial domestic monetary shocks (fixed exchange rates can successfully neutralize internal monetary shocks; but if the nominal shocks are of external nature – the floating is preferred);

- high level of financial development in the presence of real external shocks (financial development is increasing the resistance of the economy to the various types of shocks; thus, it reduces the relative advantage of fixed arrangements under nominal shocks and reduces the relative advantage of floating under real shocks).

To this list Heller (1978) added the inflation differential – difference between the inflation rate of the country and the average inflation of its main trading partners. He assumed that the countries with large inflation differentials would adopt floating regimes, as it would be difficult for them to maintain fixed exchange rate.

Lately the theory of OCA has developed further. Willett (2001) presents a perfect overview of recent developments. One of them states that initiation of OCA itself affects the factors as trade openness and other, so that there is a degree of certain endogeneity between the fixed arrangements and these factors. Other new developments are basically inspired by the creation of European Monetary Union, but they are beyond the scope of interest of this work.

Further theoretical developments were basically concentrated on policy determinants of exchange rate regimes. High inflation of 1970s-1980s inspired the idea that exchange rate could be used as a nominal anchor in fighting with inflation. Barro and Gordon (1983) provide a useful analysis of discretionary monetary policy. Their results imply that, with rational expectations, monetary expansion does not reduce unemployment, but bring in the high inflation. Discretionary monetary policy faces the problem of time inconsistency. The paper suggests that some precommitment or monetary rule should be used to prevent such outcomes. And the fixed exchange rate turned out to be the best nominal anchor – it is easily monitored and verified. The effect of exchange-rate based anchor is empirically supported by Gosh et al (2002): under fixed exchange

rates inflation is lower due to both lower monetary expansion and to the greater confidence to the currency (the credibility effect). It also enforces the government to run the fiscal policies consistent with it, as inconsistent policies can have destructive effects on the regime, thus lowering the credibility of the government, and consequently lowering its chances to get reelected. Tornell and Velasco (1995) on the other hand argue that exchange-rate-based stabilization programs help to postpone the devastating effects of inconsistent fiscal policy. Calvo and Vegh (1999) support them noting that the choice between monetary and exchange rate anchor is the choice between early and late recession. Barro and Gordon analysis underlined one more strong point of fixed regime - credibility. It turned out to be so important that today the most discussed tradeoff is not fixed vs. floating, but credibility vs. flexibility. Still the country may escape facing this tradeoff by creation of independent central bank that can maintain low inflation and floating at one and the same time.

Credibility concept gave rise to the conventional view on the relation of exchange rate and fiscal policies. This view states that increased government expenditures generate inflation expectations, undermining the monetary policy credibility. To solve its credibility problem and suppress inflation, monetary authority introduces fixed regime. By this action it also imposes the constraint on the ability of the fiscal authority to use inflation tax. By this view there exists a negative link between the government expenditures and the flexibility of chosen exchange rate regime. It is important to underline that this conclusion is highly dependent on two assumptions: government expenditures are exogenously given (do not depend on the monetary policy) and monetary authority is independent.

Tornell and Velasco (2000) relaxed the assumption of the exogeneity of government expenditures, i.e. made them depend on monetary (exchange-rate) policy. They developed dynamic general equilibrium model, where they showed that flexible regimes will impose more fiscal discipline, hence creating positive

association between government expenditures and flexibility of the regime. This result is based on the idea that the fixed regime allows to postpone the negative macroeconomic consequences of loose fiscal policies to the future, while flexible regime reveals them immediately. So if the government has time-inconsistent preferences and discounts events after some point of time by higher discount rate, it faces fewer costs under fixed regime. The authors provided evidence supporting their view.

The credibility issue stressed on the historical and political characteristics of the country; it led to the new views on the determinants of exchange rate regime choice like central bank independence, index of authorities' temptation to inflate, and political stability (Cukierman, Webb and Neyapti, 1992; Edwards, 1996; Tornell and Velasco, 1995). Several models on the political economy of exchange regime choice were developed (Milesi-Ferretti, 1995; Edwards, 1996a; Yan Sun, 2002). Mostly these models use social welfare optimization in the framework of tradeoff between inflation (under flexible exchange rate) and unemployment (under fixed regime).

In the paper by Magud (2003) the theoretical model for the choice of an exchange rate regime for a small open economy indebted in foreign currency is developed. It shows that the ability of the floating regimes to insulate from the real shocks depends on the openness of the economy: for relatively closed countries floating regimes perform worse. The author supports his conclusions by empirical results. His results contradict the OCA theory, but work better for the developing countries.

## 2.2 Empirical Findings

The empirical findings on the determinants of exchange rate regimes are numerous and controversial. The results usually depend on the sample of countries taken, period of time, method of estimation, the classification of regimes used and assumptions of econometric model. For example, openness turns out to be associated significantly with fixed arrangements in the work by Honkapohja and Pikkarainen (1994), and not associated with any particular regime in more recent work by Poirson (2001). Same discrepancies are common for other variables.

In empirical works often many macroeconomic variables (not suggested by optimal currency areas theory) are included. It is explained by the fact that most of them are based on the social welfare approach and thus include into regressions the inflation, financial reserves and unemployment rate. The incorporation of inflation into the regression is ambiguous – its explanatory power depends on the monetary and fiscal policy of the government; moreover, inflation in many cases is endogenous.

Two empirical works with the most extended datasets (Honkapohja and Pikkarainen (1994); Juhn and Mauro (2002)) do not find any robust determinants of exchange rate regimes. Citing Juhn and Mauro (2002):

“We survey previous studies showing that, taken as a whole, the literature is inconclusive. Drawing on a large dataset with many potential explanatory variables and a variety of exchange rate regime classifications, we test old and new theories and confirm that no robust empirical regularities exist”.

And Papaioannou (2003) comes to the same conclusion basing on the sample of Central-American countries: all significant factors do not appear to be robust.

On the other hand, Edwards (1996b) basing on comparably large dataset concludes that measure of political instability, measures of the probability of abandoning fixed regimes and indexes of relative importance of real targets for the government are the most important explanatory variables; this finding supports the political economy approach. More recent work by Poirson (2001) also uses the large sample of countries, but the period is now 1990-98, while most of the other works are based on the period starting after the break of the Bretton-Woods system. She also discovers the large influence of political factors, exchange rate risk exposure, dollarisation and adequacy of foreign reserves. Out of the OCA criteria capital mobility turns out to be most significant.

Among the problems facing empirical research on exchange rate regime are simultaneity and discrepancy between the de-facto and de-jure regimes. The problem of simultaneity can be resolved in different ways, for example by estimating the system of simultaneous equations, but in the contests of decision on the exchange rate regime too many macroeconomic variables would be used, which will result in the plentiful of equations to be estimated. The easiest solution is to instrumentalize all explanatory variables by their lagged values. Such a setup assumes that the exchange rate regime choice is ex-post optimal (authorities choose the exchange rate regime for the period on the basis of previous period performance).

The problem of discrepancy between the de-facto and de-jure regimes is harder to solve. Poirson's study (2001) suggests that large discrepancies exist. These discrepancies are mainly explained by 'fear of floating' (government announces floating regime, but fears to allow the large fluctuations of exchange rate and intervenes into the market to smooth the fluctuations) and 'fear of pegging' (country actually supports the pegged regime, but does not announce it, fearing the speculative attacks). Nice example is Ukraine: in the early years of transition Ukraine announced target zone exchange regime, but the target zone

was changing so fast that the actual regime can be easily characterized as floating; for the last two years, despite the announced floating, exchange rate is supported by the NBU interventions and held at the constant rate – by definition it is fixed regime. To take into account these discrepancies many authors made an attempt to develop algorithms for de-facto classifications of exchange rate arrangements. Levy-Yeyaty and Sturzenegger (2002) developed de-facto classification based on the behavior of three classification variables (stemming from the classical definitions of floating and fixed regimes): changes in nominal exchange rate, the volatility of these changes and volatility of foreign reserves. They propose the cluster analysis where floating regimes are associated with high exchange rate volatility and low volatility of reserves, and construct a database of de-facto regimes for all IMF countries from 1973 till 2000. The other classification (used in this work) is developed by Reinhart and Rogoff (2003). Their approach is more sophisticated and differs in two main points. First, they employ the data on parallel (dual, “black-market”) exchange rates that are present extensively not only in developing countries, but also in industrialized. The authors show that dual exchange rate markets have more economic importance and are thus better indicators of exchange rate regimes. Second, they develop broad chronologies of the exchange rate arrangements history (history of exchange rate controls and currency reforms). That allows the authors to construct an algorithm for exchange rate regime classification that they call natural. They also make some interesting conclusions about exchange rate history: even after Bretton-Woods breakdown peg and crawling peg are the most popular regimes in the world during 1970-2001; the official regime classification turns out to be just a little better than the random one; they also introduce a category of “freely-falling” – when inflation is high and the exchange rate constantly devaluates, this category turns out to be relatively crowded indeed, especially for transition economies. The development of new classification schemes allows to reestimate the influence



of regimes on the main macroeconomic indicators (growth and inflation) and to make new conclusions about different regimes effectiveness.

### **1.3 Transition and the choice of exchange rate regime**

The fact that developing countries differ from developed in their choice of exchange rate regime has long been recognized. There are several explanations to it: first of all this is so-called “original sin” – financial instability stemming from the absence of the lender of last resort; other is the large external indebtedness that leads to the fear of floating. Developing countries are subject to large inflows and outflows of capital; as a consequence they are vulnerable to world capital market shocks. Due to the reasons above foreign debt, international reserves and support by the international financial organizations can be very important determinants of exchange rate regimes in emerging countries.

The remedy regime for developing countries is still not found, and actually may not exist. After the currency crisis in some Asian countries and in Russia the questions of appropriate exchange regime choice for developing and transition countries have become the subject of debate. The admirers of the hard pegs for the emerging countries had to review their beliefs after the Argentina’s currency board collapse. Those who still support hard pegs, believe that the only right choice of peg is dollarization, but the evidence supporting the view that dollarization is stabilizing for capital markets is poor and controversial (Edwards, 2002).

Transition countries are even more special. They face the open international markets without prior experience in exchange rate management, with repressed inflation, fiscal deficits and foreign debt. The situation for former Soviet Union (FSU) countries was worsened by the fact that new states (and

central banks) have emerged sharing a single currency without common coordination. The management of exchange rates in transition is very important and differs from the long-run policies. Still the theoretical findings are poor in this area. Most of the papers are descriptive and do not make an attempt to model the choice of exchange rate regime in transition. One of such works is a work by Sachs (1996). He criticizes sharply the policy of IMF with regard to transition countries: he argues that advising FSU countries to delay introduction of separate currencies led to a delay in stabilization and to the outburst of inflation. After the adoption of separate currencies IMF advised the FSU countries to float. Sachs argues that it was caused by IMF reluctance to support the pegged regimes by funds, which again contributed to extremely high inflation rates. Sachs proposes his own variant of stabilization: first eliminate inflation by maintaining pegged regimes, and then move to floating for a long-term growth. But this pattern is not available for the most transition countries as they do not have sufficient foreign reserves to protect the peg.

There are several empirical works that analyze the determinants of exchange rate regimes in transition. The best work is the study by Klyuev (2001). He develops a theoretical model (based on the framework created mainly by Edwards (1996a,b)), which centers on the tradeoff between the inflation curbing and trade expansion. His main assumption is that transition countries use the exchange rate as a nominal anchor to fight inflation. Empirical results (based on de-jure classification of regimes) confirm his main theoretical finding that the choice of exchange rate regime depends non-linearly on inflation. Growth of inflation first causes the rise in flexibility of regime to maintain price competitiveness on external markets; but as inflation grows further, fixed regime needs to be implemented to fight possible negative consequences of inflation. The other results are: low international reserves suggest floating regimes, as well as high unemployment. The results turn out to be robust for Central European

countries; the work as a whole is very well written and well-grounded, but Klyuev's model conclusions do not find empirical support in CIS countries. The author explains it by policy inconsistency in these countries. We explain it by the fact that CIS countries do not satisfy the assumptions of the model, namely they do not use exchange rates as nominal anchors to import credibility and their monetary authority can not be assumed independent. On the contrary, they rather use the policy described by de Kock and Grilli (1993): faced with substantial budget deficits and poor international reserves they choose floating arrangements to accommodate the use of seigniorage tax for budget financing.

The other empirical works are the work by Von Hagen and Zhou (2002) and Domac et al (2001). The main goal of Von Hagen and Zhou's work was to explain the discrepancies between de-facto and de-jure regimes for transition countries. They confirm many OCA criteria; their finding is that higher fiscal deficits lead to the adoption of fixed arrangements. Domac et al (2001) find the determinants of exchange rate regimes on the first step of Heckman's procedure in order to investigate the impact of regimes on inflation and growth. Their main new finding is that there exists a threshold in foreign reserves, above which the countries tend to avoid fixed regimes (high reserves by itself increase the credibility, and fixing exchange rate has little marginal effect). They contradict with Von Hagen and Zhou by finding that lower budget deficits lead to more rigid regimes. They also find that more freedom in private sector entry leads to larger propensity to fix (in this case the country is less dependent on "imported" growth from international markets). Therefore these works did not reveal the robust connection between fiscal policies and flexibility of the regime.

None of the empirical works above discuss the possible peculiarities of CIS countries in framework of exchange rate policy, while the work of Klyuev (2001) and many arguments from Sachs (1996) suggest serious differences. Many studies have done empirical research on the determinants of exchange rate policy in

transition countries. None of the studies succeeded in explaining choice of exchange rate regime in CIS: Klyuev's (2001) theoretical model predictions do not find empirical support for CIS; other studies simply include CIS dummy that turns out to be significant and to have positive impact on the flexibility of the regime. Why CIS countries tend to choose more flexible regimes (even after controlling for reserves, debt and other important determinants)? This is the main question of this thesis.

## *Chapter 3*

### THEORETICAL FRAMEWORK

#### **3.1 Theoretical Modeling in Presence of Fiscal Pressure**

As already mentioned in Section 2, conventional view predicts negative relationship between government expenditures and flexibility of the regime. The intuition behind this is as follows: in times of expanding fiscal policies monetary authority introduces fixed exchange rate regime to tame down inflation expectations and to resolve its credibility problem. Conventional view assumes the exogeneity of government expenditures and the independence of monetary policy, and its conclusions depend heavily on these assumptions.

The assumption of independent monetary authority is not appropriate in CIS countries. In this section we build a simple static theoretical model that relaxes this assumption: monetary policy is subject to fiscal pressures. This allows capturing the main hypothesis of this work: governments use floating arrangements to facilitate the use of inflation tax to finance government expenditures. Indeed, it could be socially optimal for the government to finance the government expenditures through the use of inflation tax.

The theoretical framework was developed by Edwards (1996). This is a simple model that mostly uses linear forms to describe the relationships between the variables. To introduce the fiscal effects into the model, we include the budget financing constraint into the model. We assume that fiscal policy is more important for the politicians and they first set their fiscal goals and then adjust the exchange rate policy to accommodate those goals; hence government expenditures are exogenously given and unproductive. The reasons for the importance of fiscal policies are:

- government expenditures are the main instrument of financing rent-seeking activities of the government, including subsidies and tax exemptions for the privileged companies;

- the increase in government expenditures (especially of their social part) is usually welcomed by the electorate, thus increasing the chances of reelection (this effect is aggravated by the low economic education level in the CIS countries).

The model proceeds as follows: policy-makers minimize the expected value of the loss function, faced with government budget financing constraint. The economy reacts to the government's decision and "replies" by values of unemployment and inflation. As the government can evaluate the economy's reaction, it can evaluate the expected value of objective function under different regimes and chooses the regime that minimizes the losses.

The loss function of the government is:

$$L = \mu(u - u^*)^2 + \pi^2 \quad (1)$$

$\mu, a > 0$

$u$  – unemployment rate,

$u^*$  - target level of unemployment,

$\pi$  – inflation rate,

$g$  – government expenditures share in the GDP.

The loss function represents traditional social welfare loss function, that is convex in unemployment and inflation (the influence of unit increase in inflation or unemployment is higher when it starts from the higher base). The parameter  $\mu$

reflects the government's employment ambition – the importance of unemployment in its preferences.

The government needs to finance its expenditures. It can be done in two ways: by usual (income) taxation or by seigniorage (inflation tax). This is reflected by the following constraint:

$$\bar{g} = s + \tau \quad (2)$$

$s$  – the income from seigniorage as the share in GDP

$\tau$  – tax proceeds as the share of GDP

$\bar{g}$  – the exogenously given value of the share of government expenditures in GDP

The budget financing constraint with exogenous government expenditures makes the outcome of the model ineffective, compared to the outcome where the government expenditures are also set to minimize the loss function.

The economy is described by the following equations:

$$u = u' - \theta(\pi - w) + \varphi(x - x') + \gamma\tau \quad (3)$$

$$\pi = \beta d + (1 - \beta)w \quad (4)$$

$$s = \eta\pi \quad (5)$$

$$w = E(\pi) - \lambda E(x - x') \quad (6)$$

$$\theta, \varphi, \gamma, \beta, \eta, \lambda > 0$$

$u'$  – natural level of unemployment

$w$  – rate of wage increase

$x$  – adverse external shocks (terms of trade and world price shocks),

$$E(x) = x', \text{Var}(x) = \sigma^2$$

$d$  – depreciation rate (zero under fixed regime)

Equation 3 determines the rate of unemployment: it will be below the natural level  $w'$  if inflation exceeds the wage increase (real wage falls) and if external shocks are below their mean; tax increase lowers the marginal revenue product of labor, lowering the demand for labor and increasing unemployment.

Equation 4 states that inflation is composed of two effects: external effect caused by depreciation (imported goods become more expensive), and internal effect by wage increases. These two effects are weighted by the openness coefficient  $\beta$  that is calculated as the ratio of imports to GDP.

Equation 5 reflects the direct relationship between seigniorage and inflation.

Equation 6 describes the rational wage increase setting: it depends on the expected inflation and expected external shocks.

The model assumes that the sequence in which decisions are made is as follows: first wage increases are determined before  $d$ ,  $x$  or  $\pi$  are observed; then the government (that already presets government expenditures and observes  $w$ ,  $x$  and  $\pi$ ) decides on its exchange rate policy, which minimizes the loss function. They do it by evaluating the minimum value of the loss function under each regime and then choosing the regime with the lowest associated loss.



Under fixed exchange rate the solution is simple: fixed exchange rate allows the government to solve its credibility problem, so inflation and expected inflation are zero:

$$\pi = 0$$

$$u = u' + \varphi(x - x') + \gamma \bar{g}$$

The solution under floating rates is much more complicated and not presented here (it will be presented in appendix), but it is simple to predict the most important result of the model:

$$L_{fixed} - L_{floating} = \pi_{flex}^2 + \mu(u_{flex} - u^*)^2 - \mu(u_{fix} - u^*)^2$$

Depending on different values of  $\mu$  (employment ambition) government expenditures can have different impact on the choice of the regime: if  $\mu$  is sufficiently large, increase in government expenditures can lead to the higher propensity to float. The result is due to the fact that while under fixed rates all the burden of taxation affects unemployment, under floating some of its influence is absorbed by inflation through seigniorage. The sign of the government expenditures effect crucially depends on the assumption that the politician evaluates real goals higher than nominal. The difference between the values of the loss function can be viewed as the latent variable for ordered logit regression.

The theoretical framework developed here is quite simple and pursues the goal to introduce the impact of government expenditures in the simplest – possible way. It does not capture all the numerous effects affecting the exchange rate policy. The static setup of the model can be justified by the uncertainty in the economic and political expectations in case of transition. The model is based on the number of simplifying assumptions:

- the preannounced exchange policy is followed by the government – no escape clauses are included;
- the only available regimes are fixed and floating, while in reality governments face the wide variability of choices.

But still the model is useful for the basic understanding of fiscal effects on exchange rate policies, and additional sophistication will not alter the main results.

To summarize, fiscal expansion may have two different effects on the flexibility of the regime. First effect (let's call it credibility effect) is reflecting the effort to use the exchange rate anchoring as a way to impose discipline on fiscal authorities and to stop inflation (Tornell and Velasco (1995)); it is consistent with the credibility approach to the exchange rate setting; the effect of fiscal expansion on the flexibility of the regime is hence negative.

The second possible effect could be present if the monetary authority is not; governments use floating arrangements to facilitate the use of inflation tax to finance government expenditures; as a result fiscal expansion will have positive influence on the flexibility of the regime. This fiscal effect is expected to diminish with development of economic freedom and deregulation of the economy in the country, but its magnitude also greatly depends on political "habits" of the government and its political history. None of the empirical studies tried to distinguish between these two kinds of fiscal effects described above.

### **3.2 Other determinants of exchange rate regime**

As the theoretical model developed in the previous subsection is simplified and does not pursue the goal to capture all the possible determinants of the choice of exchange rate regime, it is useful to summarize main theoretical

determinants other than government expenditures separately. They can be separated into three main groups:

### 1. OCA determinants:

- **openness of the country** (defined as the ratio of trade or imports to the GDP): this measure shows the exposure of the country to the nominal shocks from the outside, hence greater openness leads to the need of nominal protection, increasing the probability of choosing the fixed arrangement; so it has a negative impact on flexibility;
- **economic flexibility and factor mobility** (usually proxied by GDP per capita), the greater economic mobility provides faster and less painful adjustment to the real shocks, hence diminishing the need for real shock protection by flexible exchange rate regimes; as a result economic flexibility will have negative effect on the exchange rate flexibility.

### 2. Other macroeconomic determinants:

- **international reserves** of the economy: for the countries of transition and developing countries, which have no lender of the last resort, the absence of reserves sufficient to maintain fixed arrangement could be the main reason for choosing more flexible regimes; consequently the increase in international reserves will have a negative impact on the flexibility of the regime;
- **international indebtedness** of the country: most of transition countries have no opportunity to borrow on the domestic markets, and thus international debt is growing, the phenomena of ‘fear of floating’ arises: countries are afraid to float (and possibly devalue) their currencies as it will increase their foreign debt in the local currency;

thus the greater indebtedness has a negative effect on the flexibility of the regime;

- **inflation rate:** as postulated by Klyuev (2001) when inflation increases at the low levels, it needs to be accommodated by the flexible regime for the sake of external competitiveness (to offset the rise in domestic prices by currency depreciation); but as the rates of inflation become too high, inflation itself becomes the problem, that needs to be solved with the help of some nominal anchor such as fixed arrangement; therefore inflation is expected to have a non-linear effect on the flexibility of the regime;
- **current account balance:** the current account deficit creates the pressure on the exchange rate to devalue, increasing the probability of choosing flexible exchange rate regimes; on the other hand current account creates a positive environment for fixed arrangements; hence current account balance is expected to have a negative impact on the flexibility of the regime;
- **growth rate:** higher growth in transition countries is basically driven by the international, not domestic demand; as a result higher growth rate leads to more flexible arrangements needed to offset the possible negative shocks of external demand; higher growth rate has a positive impact on the flexibility of the regime;
- **foreign direct investment inflows:** large foreign direct investment creates a pressure for the government to maintain the fixed arrangement not to devalue profits of international investors and not to make them leave the country; the significance of this effect greatly depends on the government's wish to hold the attracted investors; the foreign investment inflows also provide the international currency inflows thus

accommodating the adoption of fixed arrangements; foreign direct investment inflows have a negative effect on the flexibility of the arrangement.

### 3. Economic development indicators:

- **financial development** measure (usually proxied as a ratio of broad money M2 to GDP): higher degree of financial development provides more instruments and more motivation for speculative attacks on the peg, for that reason financial development is expected to have positive influence on the flexibility of the regime;
- **economy regulation** (deregulation) measure: it does not have any direct effect on the regime choice, but it affects the propensity to use exchange rate policy as a supportive to the fiscal policy; we expect the fiscal effect to increase and credibility effect to diminish with the increase in regulation of the economy.

## *Chapter 4*

### EMPIRICAL PART

#### **4.1 Data Description and Methodology**

The main goal of empirical research is to test the validity of theoretical conclusions by testing the significance of the different determinants in explaining the variation of the regimes. In particular we are interested in finding out the dominant effect between fiscal and credibility effects, and the difference of these effects in CEE and CIS countries. The empirical model does not stem directly from the theoretical model. Rather it is an attempt to find evidence supporting the presence of the theoretically predicted relation between the flexibility of the regime and the government expenditures after controlling for all possible determinants of the exchange rate choice.

The dataset is the unbalanced panel. The empirical model will be the model explaining the choice of exchange rate arrangements in CIS and CEE countries in years 1995-2001. The sample period includes the years during which CIS countries experienced a slowdown as well as the years of economic growth in CIS. This statement is supported by the fact that regulation index shows variation not only across countries, but also over time (in CIS countries the increase in deregulation during 2000-2001). This allows checking for the sensitivity of fiscal effect to the changes in policy environment. Sample period also covers the Asian and Russian financial crisis of 1997 and 1998.

The countries of interest are 11 CIS countries (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan and Ukraine) and 11 CEE countries (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia), total of 22 countries. We include Baltic states into CEE group, because they were much more successful in implementation of reforms

compared to other former Soviet Union countries. The use of the panel dataset of two groups of transition countries allows comparing the effect of the rise in government expenditures on the regimes in CEE and CIS countries that differ in the value of employment ambition of the governments. CEE countries put less weight on unemployment (Boeri and Terrell, 2002, provide a vast evidence on lower levels of unemployment in CIS countries during transition period), hence the increase in government expenditures is expected to have negative effect on the flexibility of the regime in CEE countries).

We use random effects ordered probit procedure (a module written for STATA by Guillaume R. Frechette). The use of fixed effects with maximum likelihood estimation of ordered logit is impossible due to incidental parameters problem. We also use pooled OLS ordered probit (assuming no random effects) and random effects (assuming continuity of dependent variable and the same distance between different regimes) as the robustness checks.

The dependent variable is the de-facto classified natural regimes ordered by the flexibility (so it can be viewed as the flexibility of the regime). We will use the estimated natural regimes from Reinhart and Rogoff (2003). They are basing on the dual exchange rate markets and on the history of exchange rate policy to build the algorithm of natural classification. The algorithm scheme is provided in Appendix 2. The regimes are coded with the increase in flexibility: 1 for pegged regimes, 2 for limited flexibility arrangement, 3 for managed floating, 4 for freely floating and 5 for freely falling, new category introduced by authors that indicates the free devaluation of currency during periods of high inflation. As a robustness check we also use the 15 group classification (by the same authors). It diminishes the degrees of freedom but increases the variation in dependent variable. The increase in variability is not very significant; while the degrees of freedom diminish by 10 due to new cutpoints that have to be estimated. The total number of observations for the exchange rate regimes is 161 observations. Among them

41 observation correspond to fixed exchange arrangements, 44 to limited floating, 25 to managed floating, 41 for freely floating and 10 for freely falling arrangements. The data does not show any common trends: countries seem to be quite independent in setting their exchange rate regimes. Some countries started with fixed arrangements and then switched to floating, others started with floating and ended up with pegging, and some do not show any time trends. The only common trend (but not for all countries) is the tendency to switch to more flexible arrangements during 1997-1998 – the period of Asian and Russian financial crisis. Because of lack of observations on other variables during the estimation only 116 observations on regimes are used, but the proportion of different regimes remains roughly the same (see Appendix 3).

To avoid the simultaneity problem we instrumentalize all the macroeconomic explanatory variables by their lagged values (this approach to the endogeneity problem is quite common in empirical works on exchange rate regime choice). Other way this can be viewed as the assumption that governments decide on their exchange policy based on previous year indicators. The only variables that we plan to include as non-lagged are institutional indices, such as regulation index and CIS dummy. These variables are not lagged because they do not have the endogeneity problem. We use government consumption expenditure as a proxy for fiscal expansion (this variable is most frequently used as a measure of government expansion in construction of different indices, for example in Heritage Foundation fiscal burden index and government intervention index). The ideal proxy would be budget deficit but due to the lack of observations on this variable the random effects ordered probit estimation is impossible. The main explanatory variables [names in brackets] are (expected influence on flexibility of the regime in parentheses):

- government consumption expenditure [gov] as a share of GDP, %; a proxy for fiscal expansion (the expected sign is ambiguous, depends on



the prevailing effect; still we expect that for CEE countries with low employment ambition government consumption expenditures have negative effect on the flexibility of the regime );

- the interaction of CIS dummy with government expenditures [inter\_cis]: to see whether government expenditures have some different effect in CIS (positive sign is expected)
- the interaction of government expenditures with regulation index [inter]: index reflecting regulation level of the economy, high levels correspond to high regulation; we expect the credibility effect to increase (fiscal effect to diminish) with the deregulation of the economy (positive sign is expected);
- openness of the economy [open] measured as the ratio of trade (exports + imports) to GDP, %; (negative influence on flexibility);
- the total debt service [debt] as a share of exports of goods and services, %; (expected sign is negative due to fear of floating);
- inflation, [infl] consumer prices, annual %; (positive effect is expected)
- squared inflation [sqinfl], %, (negative effect is expected)
- GDP per capita [gdp] as a proxy for economic flexibility, US dollars, (positive influence on flexibility)
- foreign direct investment inflows [fdi] as share of GDP, %, (negative effect is expected);
- an indicator of financial development[m2], measured M2 as share of GDP, %, (positive influence on flexibility);

- current account balance [ca] as a share of GDP, %, (negative expected sign);
- growth rate [growth], %, (positive effect is expected);
- gross international reserves [reserv] in months of imports, (expected negative sign on the flexibility of the regime);
- CIS dummy [dummy], we expect it to be insignificant after controlling for the difference in fiscal effect.

All macroeconomic variables are taken from the World Development Indicators Database. The regulation index is provided by Heritage Foundation, it is based on several factors: licensing requirements to operate the business, corruption within the bureaucracy, labor regulations and other regulations that impose a burden on business and create the environment for rent-seeking activities of bureaucracy. The scores range from 1 to 5 with lower score of 1 corresponding to the nonexistent corruption and uniform minimal regulations and higher score of 5 corresponding to the widespread corruption and various and random regulations of high level.

The descriptive statistics of data and correlation matrix of explanatory variables can be found in Appendices 4 and 5.

## **4.2 Estimation Results**

In the first random effects ordered probit regression we include all the explanatory variables described in the previous section. Then we omit the insignificant variables and (basically grounding on the AIC and BIC criteria) come with the final parsimonious model. The omission of irrelevant variables does not change the signs and the significance of other variables. We omit the foreign

direct investment variable and CIS dummy after the first regression (the level of significance of the CIS dummy is 0.969). The results of the first, full regression are summarized in Appendix 6. In Table 1 we present the results of the final parsimonious regression because these are the main results of empirical research.

First we will discuss the most interesting results of estimation that concern the effects of government expenditures on the flexibility of the regime. Government expenditures turn out to have negative and significant effect on the choice of the regime overall, so the credibility effect of fiscal expansion dominates. At the same time the CIS dummy interaction with the government expenditures has a positive and significant impact on the exchange regime flexibility. This means that the presence of positive fiscal effect distinguishes CIS countries from the CEE countries. The interaction of government expenditures with regulation index also has positive and significant effect: the deregulation of the economy creates favorable environment for the credibility effect and suppresses positive fiscal effect. The summarized effect of government expenditures in CIS countries is positive and significant at 1% level of significance (we computed it as a sum of following coefficients:  $gov + inter\_cis + inter * mean(regulation | CIS)$ ). In CEE countries the corresponding coefficient is significantly negative. These empirical results fully support our hypothesis: CIS countries have higher propensity to float because of the presence of fiscal effect of government expansion. The insignificance of CIS dummy confirms that we have fully explained the before unexplained tendency of CIS countries to maintain more flexible arrangements.

As for other variables, no surprises are present: all the signs are as expected. The foreign direct investment is omitted probably because its impact worked through the increase in international reserves, and the reserves are already controlled for. OCA theory turns out to work quite well: both economic openness and economic mobility have expected impact on regimes. This

contradicts with some recent theoretical and empirical findings that economic openness may have the opposite effect.

Random Effects Ordered Probit		Number of obs =	116
		LR chi2(12) =	58.03
Log likelihood	-111.62841	Prob > chi2 =	0.000
Dependent variable: reg	Coef.	z	P>z
gov	-0.3362345	-4.55	0.000
inter_cis	0.2692221	5.72	0.000
inter	0.0467456	3.44	0.001
infl	0.0069725	2.24	0.025
sqinfl	-6.66E-06	-1.81	0.071
reserv	-0.4298805	-3.21	0.001
debt	-0.0543265	-2.94	0.003
ca	-0.0953396	-3.92	0.000
growth	0.0647402	2.04	0.041
gdp	0.0011055	4.86	0.000
open	-0.0490038	-5.98	0.000
m2	0.0881265	4.43	0.000
_cut1	-3.393048	-3.61	0.000
_cut2	-1.220282	-1.33	0.184
_cut3	0.0724658	0.08	0.936
_cut4	1.870237	2.03	0.042
rho	0.7509921	12.33	0.000

**Table 1** The results of parsimonious random effects ordered logit regression. Dependent variable: exchange rate regime, ordered by flexibility

The variables that have great importance in developing countries naturally turn out to be important for transition also: large international reserves imply the use of fixed arrangement, and high debt also negatively influences the flexibility of arrangement (fear of floating phenomenon is present).

Inflation has a non-linear effect on the regime choice, as predicted and shown by Klyuev (2002): when inflation increases at the low levels, it needs to be accommodated by the flexible regime for the sake of external competitiveness (to offset the rise in domestic prices by currency depreciation); but as the rates of inflation become too high, inflation itself becomes the problem, that needs to be solved with the help of some nominal anchor such as fixed arrangement.

The degree of financial development also turns out to be significant: high degree of financial development is associated with flexible arrangements, because of fear of speculative attacks during the peg.

The significant negative effect of current account balance shows the evidence in support of the fact that CIS and CEE countries use their exchange rate policy as a tool to increase external competitiveness. At the same time the sign shows that the endogeneity is successfully eliminated (usually floating regimes are associated with current account surpluses and the correlation is positive, so the sign could be positive or insignificant if endogeneity were present).

The insignificance of the 3rd cutpoint suggests that the difference between 3rd and 4th categories (managed floating and freely floating) is minor. As a robustness check we also provide the estimation were these categories are merged. Main results concerning the effects of government expenditures are robust to specification and estimation method (see Appendix 6 for robustness tests). The effects of government expenditures are significant and of expected signs in the regressions estimated by random effects and by ordered logit. Also

they do not change their signs or significance if all other controls are excluded one by one from the random effects ordered logit regression. We can conclude that empirical results confirm the existence of stable positive influence of government expenditures on the flexibility of the exchange rate regime in CIS countries.

## *Chapter 5*

### CONCLUSIONS

This work is devoted to the investigation of mechanisms of exchange rate choice in CIS countries. We argue that the CIS countries differ in a context of fiscal impact on exchange rate policy; so special attention is paid to the fiscal effects and direction of their influence.

To examine the effects of fiscal policy the framework by Edwards (1996a) is extended by including budget financing constraint. Monetary authority is not assumed to be independent, as in conventional approach. As a result, the implications of the model differ from the conventional view: increase in government expenditures could cause the adoption of floating regime, if the employment ambition of the government is sufficiently high. Intuitively: if government puts low importance on inflation (as compared to unemployment), it could be optimal to use the inflation tax to finance government expenditures; the adoption of floating regime is needed to accommodate the use of seigniorage.

To test the model implications empirically the panel data on CEE and CIS countries is used. These groups are different in the values of their employment ambition: it is significantly higher in CIS countries (see Boeri and Terrell, 2002); so we can expect that in CIS government expenditures will have positive effect on the flexibility of the regime. We use the ordered logit technique with random effects. The results of empirical analysis confirm the implications of the model: government expenditures have different effect on flexibility in CIS and CEE countries. In CIS countries government expenditures have positive impact on flexibility. As for other determinants of exchange rate regime, no unexpected results are found. The determinants that are special for developing countries (such as foreign reserves, foreign debt service and current account) are important.

The OCA criteria are also important: open countries tend to choose fixed regime; high economic mobility promotes the use of more flexible arrangements. The findings are robust.

So we can conclude that the evidence provided supports the initial hypothesis: governments in CIS countries choose flexible regimes to accommodate the use of inflation tax.



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## Appendix 1

### **The solution of the theoretical model**

Substituting nominal wage increase into inflation formula we get:

$$\begin{aligned}\pi &= \beta d + (1 - \beta)d = d \\ s &= \eta d\end{aligned}$$

First equation actually states the PPP relation.

Now we can substitute taxation by government expenditures minus seigniorage and get the formula for the loss function under flexible regime in terms of depreciation rate:

$$L_{float} = \mu[u' - u^* + \varphi(x - x') + \gamma(g - \eta d)]^2 + d^2$$

Minimizing the loss function in depreciation rate yields the first order condition:

$$\begin{aligned}2\mu[u' - u^* + \varphi(x - x') + \gamma(g - \eta d)](-\eta\gamma) + 2d &= 0 \\ d^* &= \frac{\mu\eta\gamma[u' - u^* + \varphi(x - x') + \gamma g]}{\mu\gamma^2\eta^2 + 1}\end{aligned}$$

where  $d^*$  is the optimal depreciation rate.

Note that the second order condition on minimization is also satisfied, because the objective function is convex.

We can conclude that optimal depreciation rate increases in government expenditures  $g$  and in government employment ambition  $\mu$ .

Next step would be to compare the loss functions under different regimes.

$$\begin{aligned}L_{fix} - L_{float} &= \mu[u' - u^* + \varphi(x - x') + \gamma(g)]^2 - \mu[u' - u^* + \varphi(x - x') + \gamma(g - \eta d^*)]^2 - \\ &- d^{*2} = \mu[(2u' - 2u^* + 2\varphi(x - x') + 2\gamma g - \gamma\eta d^*)(\eta d^*)] - d^{*2}\end{aligned}$$

The main question of interest is how the difference in loss between fixed and floating regimes (propensity to fix) would change with increase in government expenditures. Let's differentiate the difference with respect to government expenditures:

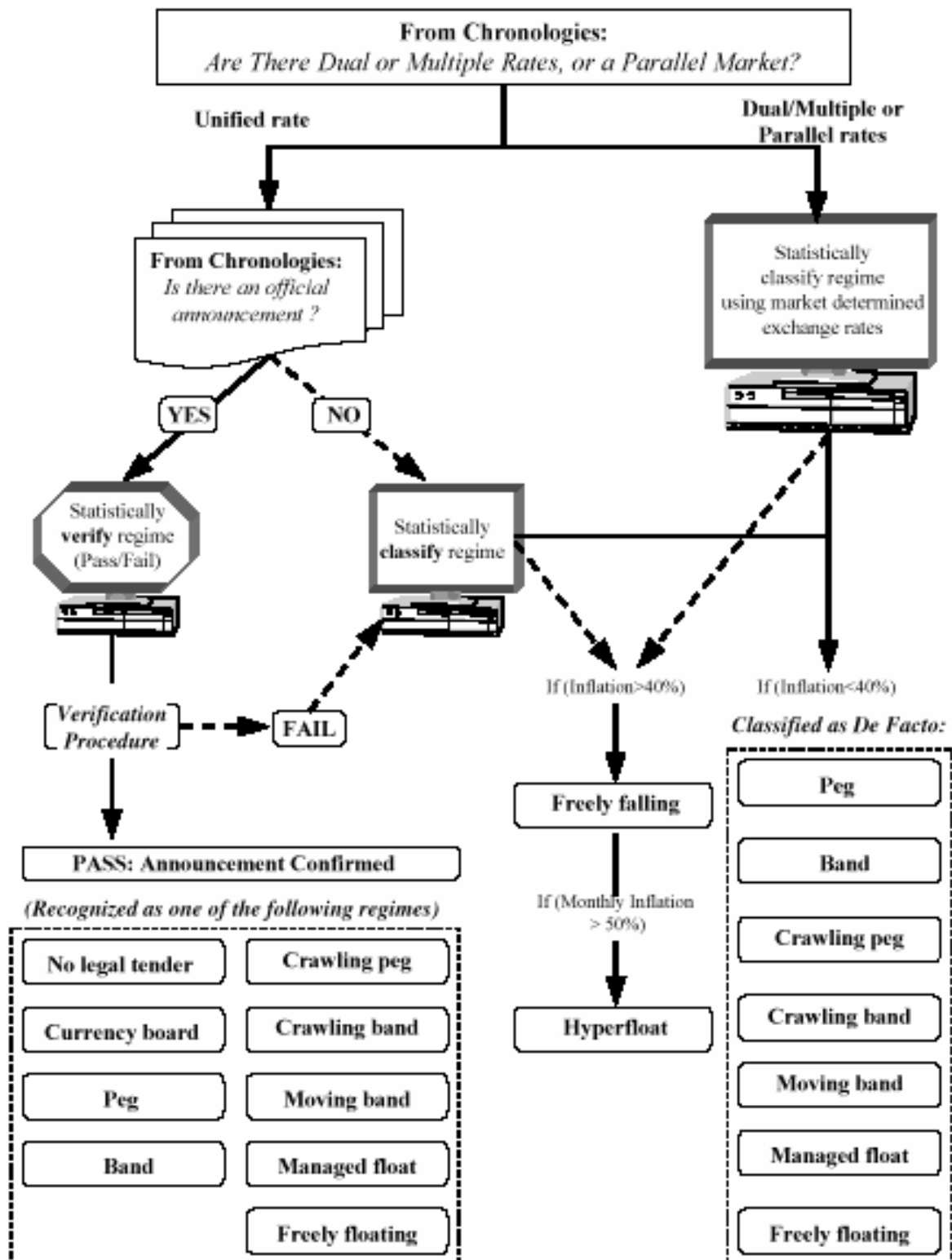
$$\begin{aligned} \frac{\partial(L_{fix} - L_{float})}{\partial g} &= \mu \frac{\partial(2g - \eta d^*)}{\partial g} \eta d^* + \\ &+ \mu \eta \frac{\partial d^*}{\partial g} (2u' - 2u^* + 2\varphi(x - x') + 2\gamma g - \gamma \eta d^*) - 2d^* \frac{\partial d^*}{\partial g}; \\ \frac{\partial d^*}{\partial g} &> 0; \\ \frac{\partial(2g - \eta d^*)}{\partial g} &= \frac{\partial}{\partial g} \left( \frac{g(2 + \mu \eta^2 \gamma^2) - \mu \eta^2 \gamma (u' - u^* + \varphi(x - x'))}{\mu \eta^2 \gamma^2 + 1} \right) > 0; \end{aligned}$$

So the sign of derivative depends on the value of  $\mu$ : for high enough values of  $\mu$  it could be positive. It means that for high values of employment ambition the propensity to float rises with the rise in government expenditures.

## Appendix 2

### The algorithm of exchange rate classification

(from Reinhart and Rogoff (2003))



## Appendix 3

### Exchange rate regimes statistics

Full sample:

reg	Freq.	Percent	Cum.
1	41	25.47	25.47
2	44	27.33	52.80
3	25	15.53	68.32
4	41	25.47	93.79
5	10	6.21	100.00
Total	161	100.00	

Estimated sample:

	Freq.	Percent	Cum.
1	29	25.00	25.00
2	34	29.31	54.31
3	25	21.55	75.86
4	23	19.83	95.69
5	5	4.31	100.00
Total	116	100.00	

## Appendix 4

### Data descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
gov	154	16.89398	5.400165	5.690266	29.43445
inter_cis	154	7.590682	8.390406	0	27.39892
inter	135	56.2093	20.03424	20.56859	117.5684
infl	135	136.3456	522.3513	-8.592579	4962.217
sqinfl	135	289419.9	2188227	.4388656	2.46e+07
reserv	145	2.989537	1.660533	.3753721	8.604998
debt	142	12.37872	9.502703	0	49.49343
ca	156	-6.456141	7.963495	-32.65457	18.04339
growth	160	2.230407	10.59135	-30.9	85.9
gdp	161	2353.362	2266.377	314.552	11652.76
open	158	98.33172	29.79961	45.38146	191.7022
m2	144	25.38694	17.25944	4.831954	71.2731
fdi	161	3.815533	3.990259	-.1752219	28.13491

## Appendix 5

### Variables correlations with significance levels

	gov	inter_s	inter	infl	sqinfl	reserv	debt	ca	growth	gdp	open	m2	fdi
gov	1.0000												
inter_cis	-0.0150	1.0000											
inter	0.8532	0.6735	1.0000										
infl	0.0000	-0.0846	0.2048	1.0000									
sqinfl	0.3290	0.1072	0.4922	0.0373	1.0000								
reserv	-0.0923	0.1028	0.6800	0.9239	0.0000	1.0000							
debt	0.2870	0.2356	0.6800	-0.2342	-0.2353	-0.1594	0.4000	1.0000					
ca	0.0237	0.0000	0.0069	0.0068	0.0690	0.0000	0.4000	0.0490	1.0000				
growth	-0.2774	-0.2814	-0.2352	-0.1710	-0.1215	0.0000	0.0000	0.0576	0.1790	1.0000			
gdp	0.0009	0.0008	0.0083	0.0839	0.0320	-0.0490	-0.0556	0.0643	0.0839	0.0320	1.0000		
open	0.1497	0.1935	0.4623	0.3406	0.7169	0.5581	0.5111	0.4623	0.3406	0.7169	0.5581	1.0000	
m2	0.0300	-0.3186	-0.0636	-0.3199	-0.0782	0.1341	0.1665	-0.3053	0.1043	0.2729	0.0075	0.2117	1.0000
fdi	0.7123	0.0001	0.4636	0.0002	0.3673	0.1079	0.0477	0.0001	0.1043	0.2729	0.0075	0.2117	1.0000
	0.3537	-0.5869	-0.0495	-0.1651	-0.0990	0.2025	0.2424	0.2729	0.1043	0.2729	0.0075	0.2117	1.0000
	0.0000	0.0000	0.5688	0.0556	0.2531	0.0146	0.0037	0.0006	0.1895	0.0006	0.0076	0.0076	1.0000
	0.3724	-0.0794	0.0793	0.1078	0.0867	-0.1568	-0.1681	0.0147	0.0075	0.2117	1.0000	0.2674	1.0000
	0.0000	0.3327	0.3603	0.2131	0.3175	0.0596	0.0479	0.8567	0.9260	0.0076	0.0076	0.2674	1.0000
	0.3201	-0.6246	-0.1615	-0.1678	-0.1138	0.2797	0.2671	0.1903	0.1148	0.6417	0.2674	1.0000	1.0000
	0.0001	0.0000	0.0654	0.0535	0.1921	0.0008	0.0020	0.0238	0.1708	0.0000	0.0012	0.0345	1.0000
	-0.1294	-0.0891	-0.1477	-0.1478	-0.1034	0.0993	0.0424	-0.3763	0.0411	-0.0764	-0.0080	-0.0345	1.0000
	0.1096	0.2718	0.0873	0.0871	0.2325	0.2347	0.6167	0.0000	0.6056	0.3356	0.9202	0.6814	1.0000



## Appendix 6

### Robustness checks:

Robustness check with different estimation methods:

Full model (random effects ordered logit)			Parsimonious model (random effects ordered logit)		Random effects (continuous dependent variable)		Ordered logit without panel effects	
reg	Coef.	P> z	Coef.	P> z	Coef.	P> z	Coef.	P> z
gov	-.3074674	0.000	-.3362345	0.000	-.1048303	0.002	-.1272044	0.010
inter_cis	.2069226	0.004	.2692221	0.000	.0762761	0.001	.1226698	0.000
inter	.0463535	0.002	.0467456	0.001	.0143464	0.074	.0187537	0.061
infl	.0052084	0.129	.0069725	0.025	.0021437	0.224	.006433	0.018
sqinfl	-5.02e-06	0.198	-6.66e-06	0.071	-1.80e-06	0.296	-6.39e-06	0.044
reserv	-.3284518	0.033	-.4298805	0.001	-.2080437	0.010	-.3447427	0.003
debt	-.0447424	0.016	-.0543265	0.003	-.0249735	0.016	-.0027838	0.850
ca	-.1090955	0.001	-.0953396	0.000	-.0398744	0.005	-.0178566	0.289
growth	.0399484	0.278	.0647402	0.041	.0128222	0.500	.0285841	0.307
gdp	.0007039	0.006	.0011055	0.000	.0003047	0.066	.0002555	0.059
open	-.0432501	0.000	-.0490038	0.000	-.0188661	0.000	-.0343547	0.000
m2	.0955643	0.000	.0881265	0.000	.0365848	0.002	.0685083	0.000
fdi	-.0548835	0.143	-----	-----	-----	-----	-----	-----
dummy	-.0513059	0.969	-----	-----	-----	-----	-----	-----
AIC:	260.9147		<b>257.2568</b>		290.639		283.0531	
BIC:	313.2330		<b>304.0679</b>		331.9429		327.1106	

Robustness check with different dependent variable classifications:

Model with exchange rate regimes classified in 15 categories			Model where freely floating and managed floating are merged into one category		
reg15	Coef.	P> z	reg	Coef.	P> z
gov	-.3445872	0.000	gov	-.3605289	0.000
inter_cis	.2509396	0.000	inter_cis	.2588221	0.000
inter	.0610339	0.000	inter	.0499754	0.006
infl	.0048313	0.093	infl	.0034187	0.389
sqinfl	-4.63e-06	0.180	sqinfl	-4.13e-06	0.372
reserv	-.490626	0.000	reserv	-.4214008	0.024
debt	-.033684	0.037	debt	-.0660077	0.009
ca	-.0543062	0.004	ca	-.0792431	0.004
growth	.0174051	0.550	growth	.0341875	0.407
gdp	.000886	0.000	gdp	.0010665	0.000
open	-.0513053	0.000	open	-.0481064	0.000
m2	.10177	0.000	m2	.1020503	0.000

