EXCHANGE RATE REGIMES AND GROWTH PERFORMANCE IN TRANSITION

by

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Abstract

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The paper investigates the *ex post* impact of exchange rate regime choices on the growth process and performance in the sample of 22 transition countries, employing both a new *de facto* classification of regimes based on the actual behaviour of the dual exchange rate market in the economy and a *de jure* official classification scheme. Our main finding is that exchange rate regimes exert a positive influence on economic growth process. Furthermore, fixed exchange rate arrangements appear to be superior over intermediate and flexible ones by delivering higher growth and lower volatility. In terms of economic growth process, the *credibility effect* from the adoption of fixed exchange rate regime seems to work for transition economies. We found evidence that not only the current regime *per se* is relevant for economic growth, but also the spillover effects from the previous regime collapse last for sufficiently long time. Our work highlights the overall importance of exchange rate policy with the focus on the exchange rate regime choice consequences when opting for economic policy.

TABLE OF CONTENTS

LIST OF FIGURES

Number *Page*

LIST OF TABLES

Number *Page*

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GLOSSARY

Exchange Rate Arrangement with no Separate Tender.[1]	The currency of another country circulates as the sole legal tender (formally, dollarization), or the member belongs to a monetary or currency union in which the same legal tender is shared by the members of the union.
Currency Board Arrangement	A monetary regime based on an explicit legislative commitment to exchange domestic currency for a specified foreign currency at a fixed exchange rate, combined with restrictions on the issuing authority to ensure the fulfilment of its legal obligation
Conventional pegged arrangement	The country fixes its currency at a fixed rate to another currency or a basket of currencies
Pegged exchange rate within horizontal bands	The value of the currency is maintained within certain margins of fluctuation of at least ±1% around a formal or a de facto fixed central rate
Crawling peg	The currency is adjusted periodically at a fixed rate or in response to changes in selective quantitative indicators, such as past inflation differentials
Crawling band	The value of the currency is maintained within certain margins around a central rate, which is adjusted periodically at a fixed rate or in response to changes in selective quantitative indicators
Managed floating with no preannounced path for the exchange fate	The monetary authority actively intervene to ifluence the long-term trend of the exchange rate without a predetermined exchange rate path or without having a specific exchange rate target
Independently floating	The exchange rate is determined in the exchange rate market without monetary authorities intervention.

[1] All definitions are taken from International Monetary Fund's Report on *Exchange Rate Arrangements and Monetary Restrictions*, various issues.

Chapter 1

INTRODUCTION

Determinants and consequences of the exchange rate regimes (ERR) choices appear to be one of the most heavily discussed economic policy subjects since the collapse of the Bretton Woods system in the early 1970s. Early theoretical studies have concentrated mainly on the trade-off between independence and credibility implied by different regimes, as well as the impact of monetary and real shocks on them. However, due to the recent episodes of financial crises (namely, the Mexican tequila crisis of 1994–95, the East Asian crises of 1997, the Russian crises of 1998, and the Argentinean crisis of 2001), the attention has been refocused on the issue which "currency regime is right for all countries or at all times" (Frankel, 1999), thus concentrating on the price stability – growth choice in the context of globalization and increasing instability of capital markets [2].

In the late 1990s, the importance of these issues has been greatly enhanced for transition economies when a new wave of discussion was provoked by the EU accession process launched in 1998. 12 years of transition provide a good opportunity for a comparative study of the variety of regimes (ranging from "the corner solutions", i.e. pegs and floats, till "intermediate" regimes based on the classification that depends on different degrees of flexibility) applied by transition economies. The choice of the ERR was one of the decisive issues faced by them and became not only an academic problem, but also a real policy dilemma.

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[2] See, for example, Frankel (1999) or Mussa et al. (2000).

The need to satisfy the well-known "*Maastricht Criteria*" (where exchange rate criteria and positive economic growth are the ones of primary importance) cannot be underestimated for advanced transition countries that began to seek EU – and EMU – membership, as well as for their less lucky neighbours. Therefore, it makes sense to consider how transition countries seeking convergence can match these criteria before entering EU by evaluating different policy options and choosing the one that ensures satisfaction of the two requirements simultaneously.

Do exchange rate regimes affect economic growth? Are there any specific features of the linkage between ERR and growth for transition countries? The primary purpose of the present study is to address these issues by the comparison of growth performance and exchange rate policy across different transition economies. The secondary goal of the paper is to contribute to the empirical literature by evaluating different dimensions of possible links between ERR and economic growth.

We aim to investigate the *ex post* impact of ERR on real GDP growth and output volatility and to provide sectoral level analysis on the growth performance in a sample of selected transition economies. The investigation is based on the estimation of an empirical growth model that controls for traditional growth determinants (such as population growth, investment, human capital, etc.), changes in the external environment (e.g., terms of trade), and additional variables.

The remainder of the paper is organized in the following way. The next chapter presents the review of the related literature and the outline of the theoretical framework that forms the basis of our empirical investigation. In Chapter III, we outline empirical methodology, while in Chapter IV we describe exchange rate classification schemes, and present some stylized facts about the data. Estimation results and verification of their robustness is given in Chapter V. Chapter VI provides some concluding remarks.

Chapter 2

LITERATURE REVIEW

The choice of ERR is a topic in economic policy discussion that has been studied and debated for more than fifty years and has become the subject of numerous research papers. From a theoretical point of view, it should be emphasized that economic theory offers relatively little amount of linkage between ERR and economic growth process. This section presents an attempt of the summary of several studies that focus on the effect of the ERR on growth performance along with a brief list of theoretical considerations. However, one note immediately arises: although some stylised facts are beginning to crystallize, the findings of the studies cannot be generalised since views on the linkages between ERR and economic growth are strongly controversial.

The major effect of ERR on growth performance can be transmitted through two channels: *directly*, through the property of adjustment to shocks, and *indirectly*, by affecting other variables such as investment and trade.

Concerning shock absorption property, flexible exchange rate arrangements seem to have an advantage over fixed one. Exchange rate movements under flexible regimes coupled with independent monetary policy can act as shock absorbers. On the other hand, under fixed arrangements, (short-run) price rigidity and the absence of exchange rate adjustments hamper external shock absorption, resulting in price distortions, prevention of the efficient allocation of resources across sectors, and the rise of unemployment. Thus, we may expect a higher expected output volatility, decrease in economic efficiency,

and, thus, a lower economic growth[3]. However, McKinnon (1981) argues that fixed ERR perform better in terms of output stability in the presence of nominal shocks, while flexible rates perform better in the presence of real shocks. This observation suggests that countries suffering from supply-side shocks should choose flexible exchange rates, while countries with large monetary and financial market disturbances (i.e., nominal shocks) should fix their exchange rates.

The evidence concerning this effect were first presented in a seminal work of Friedman (1953) in which he formulated his hypothesis of a flexible exchange rate facilitating adjustment process in an economy characterised by nominal rigidities. Moreover, Broda (2002) found the evidence that responses to a (negative) terms-of-trade shock differed significantly across regimes. He applied structural VAR methodology to analyse the responses of real GDP, real exchange rates and prices to terms of trade shocks under different regimes for 75 developing countries in the post-Bretton Woods period. According to the estimated impulse response functions for the case of the fixed ERR a 10% permanent fall in terms of trade results in 3-year decline in real GDP; however, in the case of more flexible ERR no such statistically significant relationship was found. Furthermore, Fischer (2001) states that all the countries that experienced a currency crisis had fixed exchange rate regimes[4].

The indirect influence of ERR on growth performance occurs through other factors that affect economic growth[5]. First, ERR can affect economic growth through their effects on the rate of physical capital accumulation. Under a

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[3] Using a sample of 24 OECD countries over the period from 1961 to 1997, Kneller and Young (2001) find a significant negative relationship between output volatility and long-run growth. The relationship, however, greatly depends on the time dimension of the data.

[4] The linkage between fixed regimes and currency crashes, however, is rather ambiguous. An IMF study of developing countries over the period 1975-1996 find that nearly 50% of 116 currency crashes (defined as a depreciation of at least 25 per cent and a 10 per cent increase in the rate of depreciation over the previous year) were under flexible regimes (IMF 1997).

[5] Note that in our empirical specification we cannot separate the effects of variables on growth that are caused by the ERR nature from those that are caused by other factors. Thus, any indirect effects of ERR would be captured by the coefficients on the explanatory variables.

fixed exchange rate regime, investment will tend to be higher as a result of a reduction in uncertainties, real interest rates, and exchange rate variability. Second, ERR can affect economic growth through their effects on international trade. Generally, it is agreeable that trade should be higher under fixed ERR due to reduction in policy uncertainty and exchange rate volatility and, thus, in costs of trade (see, for example, Bailliu (2002) for further details).

To sum up, theory offers such a great amount of possible connections between regimes and growth that it is rather hard to make any general conclusions; thus, the research remains mainly an empirical matter. However, at a high level of generality, fixed ERR may promote faster growth by means of investments acceleration and higher trade volumes through decreasing policy uncertainties and increasing a country's macroeconomic stability, while floating ones are associated with higher flexibility and may act as shock absorbers, thus also fostering economic growth.

The empirical literature on the effects of ERR on growth performance can be grouped under two categories, namely, *country specific studies* and *multi-country studies*. Country specific researches provide a limited amount of evidence concerning the nature and magnitude of the impact of ERR on growth since a particular type of evidence immediately follows by a counter example in another study. For instance, according to Mills and Wood (1993), who studied major macroeconomic series in Britain since the mid-nineteenth century, ERR did not affect any real economic performance in the United Kingdom. On the contrary to that, the study conducted by Iwata and Tanner (2003), who examined the choice of ERR and its effects on growth and inflation in three emerging markets (Brazil, Mexico, and Turkey) using a structural VAR approach by characterizing a country's ERR as a dynamic response to capital account shocks, suggests that the shocks, their nature and magnitude indeed can have an impact on macroeconomic performance.

The analysis of the correlation between ERR and economic growth on the multi-country level was pioneered by Baxter and Stockman (1988), who empirically investigated the differences in time-series behaviour of key economic aggregates under alternative exchange rate systems, using a post-war sample of 49 countries. Apart from greater variability of real exchange rates under flexible nominal exchange rate systems in comparison to the pegged ones, little evidence of systematic differences in the behaviour of other macroeconomic variables under alternative exchange rate arrangements was found.

Another study was conducted by Ghosh et al. (1995), who examined the connection between the type of a country's ERR and two major macroeconomic variables – inflation and growth – using a data set of all IMF-reporting countries for the period 1960-1990. The authors computed unconditional and conditional means (obtained from OLS estimates of simple equations) for the selected variables in the samples where countries were grouped according to the degree of flexibility of their nominal exchange rate. The study found out that the strongest results concern inflation: even after controlling for the effects of money growth and interest rates, the inflation rate is significantly lower and less volatile under fixed ERR than under more flexible arrangements. Concerning growth rates, they found little evidence about systematic differences since "investment is somewhat higher and trade growth is somewhat lower under pegged regimes". However, they found that the volatility of output is significantly higher under fixed exchange rate arrangements than under flexible ones. The authors concluded that fixed regimes were characterized by lower inflation but greater output fluctuations. Their more recent study (Ghosh et al., 1997) confirms the results with the help of panel data regressions technique. This is also consistent with Hoffmaister et al. (1997), who came to the conclusion that output fluctuations exhibited the same pattern across different country samples over the period 1971-93.

Moreover, an IMF study (1997), extending the period of analysis to the mid-1990s, reveals similar results: over the period under study, developing countries with fixed ERR had substantially lower and less volatile inflation compare to the countries with more flexible arrangements; however, growth performance comparison failed to find a clear link between growth and exchange rate arrangements. Domac et al. (2001), using a data set of transition economies, also came to the conclusion that it is not possible to make definite statement about particular ERR being superior to another in terms of growth performance; however, as the authors noted, policy actions and other macroeconomic variables indeed had different impacts on growth under different exchange rate regimes.

However, these findings are subject to the *regime specification error*. For example, Levy Yeyati and Sturzenegger (1999) noted that the failure to identify a relationship between ERR and growth could be the result of measurement error in the classification of the exchange rate arrangements: most studies till mid-90s have used an official classification of ERR published by the IMF in Exchange Arrangements and Exchange Restrictions, Annual Report, while *de facto* ERR may differ from the declared ones[6]. From theoretical point of view this behaviour can be explained by the phenomenon called*"fear of floating"*. Calvo and Reinhart (2000) were the first who detected this phenomenon in practice, noting that emerging economies actively intervene in foreign exchange markets in order to reduce substantial volatility of the exchange rate.

Most studies that distinguished between the *de jure* and *de facto* exchange rate arrangements provide considerable amount of empirical evidence that ERR indeed influences economic growth. For example, Levy-Yeyati and Sturzenegger (2001), who studied the link between exchange rate regimes and growth using annual data for the period 1974-1999 with *de facto* classification of regimes based

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[6] Exchange rate systems classification schemes are discussed in Section 4.1 in more detail.

on the actual behaviour of the relevant macroeconomic variables, explained the failure of the previous results by specific features of industrial economies. Their main findings are the following: "Fixed exchange rate regimes are associated with a lower per capita output growth rate. The estimates range from .7% to 1% per year according to the specification… For industrial economies the exchange rate regime is unrelated to growth performance." The is consistent with empirical findings of Mundell (1995), who investigated the growth rates of industrial countries before and after collapse of Bretton Woods system and found that the Bretton Woods period, characterized by the prevalence of fixed ERR, was associated with faster growth on average.

A similar results was obtained by Amvouna (1998), who investigated African economies since 80s using panel data regressions and came to the conclusion that the choice of the exchange rate regime was significant in affecting growth and trade performances in the selected countries. However, a study conducted by Kalu (1998) contradicts these finding by stating that for African economies devaluations have a positive impact on economic activity both in the short and in the long run not depending on the type of the exchange rate arrangement and, thus, ERR "matters to the extent that countries are hit by and have to absorb large supply shocks".

Interesting findings were obtained by Bailliu et al. (2002), who estimated the impact of ERR on growth using a panel-data model of 60 countries over the period from 1973 to 1998 and found the evidence that more flexible ERR were associated with higher economic growth, but this link took place only for the economies that were open to capital flows and had well-developed financial markets. Hence, the authors conclude that it is the strong monetary framework rather than different exchange rate arrangements that influences growth.

The preceding discussion identifies several major methodological problems facing researcher conducting cross-country comparisons of nominal regimes. First, as already was pointed out, distinctions between declared ERR and

functioning ERR can be an important source of error. Furthermore, the data set on regimes specification is be rather limited since in order to make things comparable all the studies were based on a dual (i.e., fixed versus flexible) or triangle classification scheme that incorporates fixed, intermediate, and floating ERR. This simplification can lead to important differences in the classification of the same regime across papers since a country's regime may mistakenly be attributed to different categories, thus resulting in invalid inferences about its consequences. Second, there is the longstanding problem of "*reverse causality*" of the choice of exchange rate regime or, simply speaking, the problem of endogeneity[7]. The key question is whether fixed exchange rates encourage economic growth – say, by low inflation and low price variability? Or do countries with rapid GDP growth choose fixed ERR to further decrease relative price volatility and, thus, increase investment flows? Third, almost all papers assume that all ERR were consistent with other macroeconomic policies and, thus, sustainable. Consequently, there arises an implicit problem of *regime switching* where macroeconomic consequences of an old regime are assumed to be associated with the new one (Edwards and Savastano, 1999).

The above noted problems may constitute possible sources of the difficulties of empirical studies for finding any clear link between growth and the exchange rate arrangements. Although recent studies have made attempts to deal with endogeneity, other questions need to be resolved. Thus, the empirical evidence on the effects of ERR on economic activity would seem rather inconclusive and a large field of actions stills remains.

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[7] Several authors, for example, Edwards and Savastano (1999) refer to the problem of causality (endogeneity) of regime choices as "*reverse causation*"; however, we prefer to use generally accepted term, namely, *reverse causality*.

Chapter 3

THE EMPIRICAL FRAMEWORK

In this section we present the empirical framework we use to explain growth process of a country and describe the econometric specifications and methods employed for estimating our cross-country growth equation. As the basis for our empirical estimation, we adopt the well-known Barro and Sala-i-Martin (1995) growth framework that is used in most modern empirical growth studies[8]. Here, a country's growth process is viewed as a function of two sets of variable – *state* variables that explain initial position of the country and *control* variables that characterizes the country's differences in steady-state levels compared to others. Specifically, GDP growth rate of country *i* for time period *t* can be summarized as follows:

$$\Delta GDP_{it} = f(State_{it}; Control_{it}) \qquad (1)$$

The growth relation in (1) is consistent with both major growth theories, namely, neoclassical growth models and endogenous growth theory. For example, according to the neoclassical theory, the equation (1) can be used to determine what accounts for differences in transitional growth rates across countries in the convergence process to their steady states. Moreover, being compatible with endogenous growth theories, it can be used to explain differences in steady-state growth rates across countries. However, despite all appealing theoretical foundations behind (1), its empirical testing can be complicated due to the ambiguity in the choice of explanatory variables (mainly, *control* variables) that presumably account for growth process.

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[8] See Barro and Sala-i-Martin (1995) for various theoretical explanations and model behind this equation.

The growth framework in (1) serves as the basis for desired econometric estimation. Specifically, we employ the following econometric model:

$$y_{it} = \alpha_{it} + X_{it}\beta + \varepsilon_{it} \qquad (2)$$

where *y* stands for the variable in question – real GDP per capita growth rate, output volatility or long run real GDP per capita growth rate – of a country *i* in time period *t,* α_{it} is a country-specific effect, X_{it} is a row vector of growth determinants measured at the end of period *t,* that could possibly include, D_{it}, a row vector of country-specific and regional dummies in period *t,* and ε_{it} is the disturbance term.

Equation (2) can be consistently estimated with OLS if $E(X_{it}, \alpha_{it}) = 0$ and $E(X_{it}, \varepsilon_{it}) = 0$ for *t=1,2…T*. However, both conditions are likely not to be valid, for independent variables often set with dependent simultaneously, and, in addition to that, country-specific effects might be correlated with ERR dummy as well as other variables.

Hence, as was discussed in section II, empirical studies of the impact of ERR regimes on economic performance are subject to several major drawbacks, among which endogeneity of the explanatory variables and measurement errors in regime specifications are of primary importance from econometric point of view. To overcome these difficulties, we employ a methodological strategy designed to deal with endogeneity problems[9].

Thus, the main method we use in the estimation of (2) is the implementation of instrumental variables two-stage least squares (2SLS) procedure. This approach was suggested by White (1984) and accounts for endogeneity of exchange rate regime dummies and heteroskedasticity arising

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[9] Other methodologies can be employed, namely, pooled OLS, GMM. Among them GMM estimation is considered to be the most efficient; however, it major potential drawback in the interpretation of the equilibrium correction term. See Baillui *et al.* (2002), Levy-Yeyati and Sturznegger (2001), Ghosh et al. (1997) for the application of these techniques.

from the use of unbalanced panel (for further detail about sample see section 4.2).

For the estimation we employ the following two-stage estimation procedure. On the first stage we estimate ordered probit regression of the regime index (see section 4.1) on the variables employed in the main equation, plus the set of additional controls, and find predicted probabilities of the regime. On the second stage, we use the estimated probabilities as the instruments for the regime dummies in our main equation in question..

The IV estimator is asymptotically consistent and efficient[10]. The country-specific effect, α_{it}, is designed to capture unobservable characteristics that vary across countries but not over time. It could be either *a fixed* effect (i.e., a constant that varies for each country), or a *random* effect (i.e., a random variable with mean α and variance σ_{α}^{2}).

[10] See Greene (2002) for further explanations.

C h a p t e r 4

DATA DESCRIPTION

4.1 Exchange Rate Regimes and Their Properties

ERR classification became a crucial and challenging task for those who are trying to evaluate the impact of ERR on economic performance. Two options are available for classification schemes, namely, a *de jure* approach based on the officially declared commitment of the monetary authorities and a *de facto* approach based on the actual behaviour of the exchange rate and its volatility. Most studies till mid-90s have used an official classification of ERR published by the IMF in *Exchange Arrangements and Exchange Restrictions, Annual Report*. This classification is almost entirely based on countries' self-reporting, i.e. it is considered to be *de jure* classification scheme (despite the fact that it was modified in 1999 by adding the IMF's own judgements). The use of this approach is based on the premise that declaring a regime has posterior credibility effect that influences real sector of economy.

Ghosh et al (1997) slightly modified this approach by starting with the official classification and later dividing fixed regimes into "frequent" and "infrequent" adjusters according to fact whether they experienced changes in parity or in weights (in case of basket pegs) during the year under study. "Frequent" regimes are defined as regimes with more than one change per year; correspondingly, all other fixed regimes are defined as "infrequent" adjusters.

However, many countries actually maintain their currency's exchange rate within narrow bands vis-à-vis a major currency (such as the U.S. dollar, euro, etc.) and, thus, their *de facto* ERR may be inconsistent with the declared ones. Such a problem was resolved in a number of papers that developed their own

classification scheme. The most famous ones are Levy-Yeyati and Sturzenegger (1999) and Calvo and Reinhart (2000). Their second approach which employs unofficial, *de facto*, ERR classifications is justified on the grounds that for different reasons including lack of credibility and '*fear of floating'* countries actively intervene into their markets[11]. Therefore, it make sense to create a *de facto* classification scheme based on the observed behaviour of the exchange rate, international reserves and exchange rate changes. For example, Levy-Yeyati and Sturznegger (1999) use cluster analysis of exchange rate and international reserves volatility to classify the countries in their sample into five categories: fixed, dirty float/crawling peg, dirty float, float, and inconclusive. According to their paper, the experience of the 1990's shows significant representation of regimes falling into category of "soft pegs" and "hard floats", but almost equal amount in each of the three categories give little evidence for the "*corner hypothesis*".

Finally, the recent study by Reinhart and Rogoff (2002) construct a completely new 15 category classification scheme based on dual and parallel currencies for all IMF reporting countries for the past half-century using chronological tables of the exchange rate history. One distinctive feature of their paper is that they distinguish between floating by countries that experienced high inflation from floating by others. Their classification scheme confirms evidence of Levy-Yeyati and Sturznegger (1999) concerning "soft pegs" and "hard floats" in a way that for the last two decades more than 50 % of *de jure* floats were in fact pegs and vice versa.

Given the described measurement problems with the official classification in *Exchange Arrangements and Exchange Restrictions, Annual Report,* published by IMF, and recognizing the difficulties in attempts to determine the "true" classification in a different way, our approach in this paper is to employ two different

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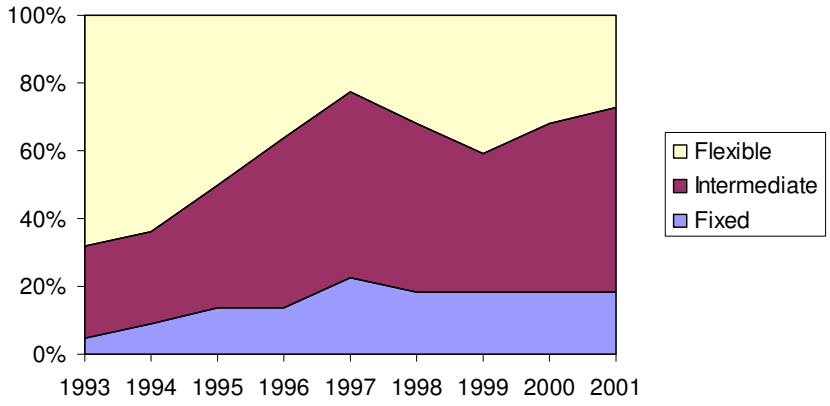
[11] See Calvo and Reinhart (2000) and Reinhart (2000) for the explanation of the different reasons of "*fear of floating*".

classification schemes Specifically, we use the IMF scheme (by using modified methodology described by IMF to revalue regimes before 1999), hereafter, IMF, to capture the effect of official commitment and database constructed by Reinhart and Rogoff (2002), hereafter, RR. At a general level, the IMF *de facto* classification scheme yields results that are quite comparable to the RR classification – approximately two thirds of all regimes were classified in the same way. Hence, we view these classification schemes as complementary and adopt a three-category classification consisting of fixed, intermediate and floating regimes by using four indexes. Our binary index *FIX* takes the value of one if country has a fixed exchange rate regime in particular year, and zero otherwise. In a similar way, a binary index *INT* (*FLEX*) takes the value of one if the exchange rate regime is an intermediate (flexible) regime – crawling pegs, crawling bands, and the like (managed floats and freely floats). And an ordinal three-way variable *REGIME* combines indexes described above. It takes a value of one if the country in question has a fixed regime in particular year. It takes a value of two if the country has an intermediate regime, and a value of three if the country has a flexible exchange rate. The indexes were constructed annually for the whole sample (1993-2001). Appendix II presents the data on IMF and RR classification along with descriptive statistics and transition matrixes for the exchange rate regimes.

Figures 1 and 2 show the distribution of exchange rate regimes over the sample period (1993-2001) with regard to the classification scheme. As can be seen, in comparison to the RR classification, the *de jure* classification significantly underestimates the number of intermediate exchange rate regimes, while overstating the number of floaters. The phenomenon of *fear of floating,* that forces monetary authorities of the country in question to fix its exchange rate rather than permit it to float freely, does indeed exist in transition economies, especially at the late stage of transition (1998-2001). Further comparison of the Figures 1 and 2 reveal that fewer countries are at the *two-corner* extremes than it

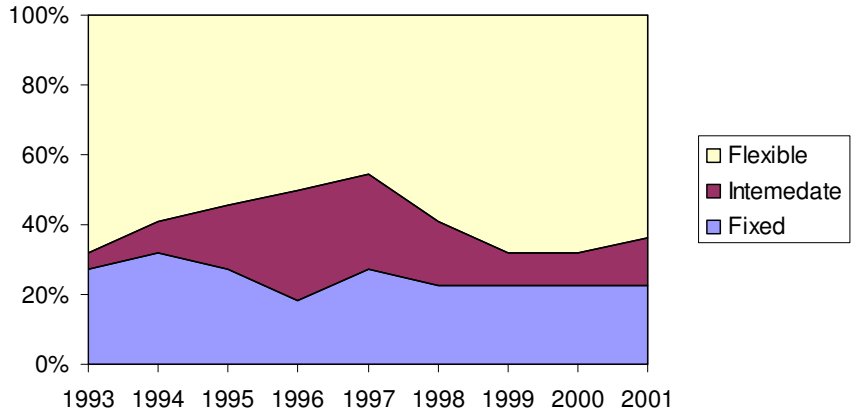
was implies by their official declaration. De facto fixed ERR accounts for approximately one forth of all de facto regimes, and this share remains relatively stable in recent years. The proportion of flexible ERR is decreasing over time to nearly one third of all de facto regimes. These trends imply the transition economies began to prepare for the EU (and EMU) entrance requirements.

Figure 1. Distribution of exchange rate regimes over time (RR classification)



Source: Reinhart and Rogoff (2002), the author's own calculations.

Figure 2. Distribution of exchange rate regimes over time (IMF classification)



Source: Reinhart and Rogoff (2002), the author's own calculations.

4.2 Descriptive Statistics

The sample used consists of annual observations for 22 transition countries over the period 1992-2002. Data sources and variable definitions are given in the Appendix I. With the exception of the exchange rate regimes indexes, index of civil liberties and educational indices, the data were obtained from the World Bank databases. Descriptive statistics under different regimes are given in the Appendix III.

One of the major challenges we had to deal with was the problem of definition of tradables and nontradables. In our work, we completely agree with the remark of Obstfeld and Rogoff (1996) who commented that division of tradables as goods (that can be traded outside domestic markets) and nontradables as services (cannot be traded on international markets due to, say, large transportation costs or barriers to entry) is too simple and lead to biased results. However, often more detailed analysis cannot be performed, especially when dealing with macro aggregated data, which is exactly our case. In order to choose the most appropriate proxies, we impose two additional assumptions. First, we do not take into account agricultural sector, for prices in agriculture are often set by the government and production is driven by some other conditions (i.e., by weather or vegetation periods) than those we aimed to study here. Second, financial services must be considered as tradables, for they began to be traded actively with the birth and development of financial sector and financial intermediaries in transition economies. Thus, we use value added in industry and financial services sectors (as percentage of GDP) as a proxy for tradables, and value added in construction and other services sector as a proxy for nontradables.

Since we do not intend to re-examine results of existing growth literature, we choose what we regard as a relatively non-controversial empirical specification of the growth regression[12]. The set of explanatory variables (namely, *control* ones)

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[12] The baseline specification follows closely Ghosh et al. (1997)

is fairly standard: the investment ratio to GDP (proxy for physical capital accumulation), tertiary school enrolment as a proxy for human capital (expect to be negative), openness and terms of trade adjustments (represents external sector development), the fiscal balance to GDP ratio (represents government sector development), and population growth. The set of dummies include exchange rate indexes (that should reveal the effect of the exchange rate arrangement on the dependent variables), lagged ERR indexes (that may resolve the problem of *regime switching*) as well as dummy for EU accession candidates.

The analysis presented in Table 1 shows the mean decomposition of growth of real per capita GDP growth (*GDPGC*) and its volatility (*SD_GDPGC*), measured as the three-year centered running standard deviation of the growth rate over the period under study, along with P-values of the mean comparison test. Observations were grouped by regime according to both the de jure IMF and the de facto RR classifications. The table includes the 198 observations for which data is available.

Table 1. Real GDP per capita growth (overall sample)

		RR classification			**IMF classification**		
		Fixed	Intermediate	Floating	Fixed	Intermediate	Floating
Mean		4.8311	3.60545	-1.9394	2.5598	4.07847	.373759
P-value	Fixed						
	Intermediate	0.1177			0.0913		
	Floating	0.0000	0.0000		0.0072	0.0000	
S.D.		4.1630	5.30468	9.15219	6.1684	3.26812	8.67544
P-value	Fixed						
	Intermediate	0.1059			0.4255		
	Floating	0.0000	0.0000		0.0000	0.0000	

As can be seen from the table, under RR classification scheme, transition countries with fixed ERR had better growth performance, compared to those that intermediate and flexible ones. In particular, the mean annual real per capita growth rate decreases from 4.83% for fixers to -1.93% for the group of floats, according to the *de facto* classification scheme. In terms of volatility of

GDP growth, countries with fixed exchange rates exhibit the lowest figures, whereas those with flexible rates experienced the highest volatility during the period under consideration. According to the official classification, intermediate exchange rate arrangements substantially overperform both floating and fixed exchange rate regimes in terms of average growth rates as well as in terms of volatility of the growth rates. However, the results of the flexible exchange rate arrangements analysis reveal that under both classification schemes the regime in question greatly underperforms the other regimes, which is confirmed by mean comparison tests.

Table 2. Growth Performance of Acceding and non-acceding countries (RR Classification)

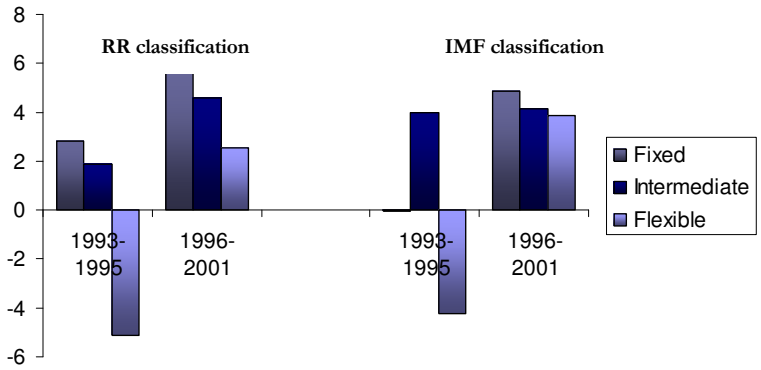
		Fixed	Intermediate	Floating
Acceding	Mean	5.311023	4.334465	1.10847
	Median	6.060383	4.503521	1.125066
	Standard deviation	2.773315	0.80872	2.461205
Non-acceding	Mean	4.2826	3.487236	-2.46193
	Median	5.479579	4.21116	-0.928
	Standard deiation	5.40187	5.706598	9.77097

Table 2 presents results of the growth performance of EU acceding and non-acceding countries. As can be seen from the table, on average, acceding countries have approximately 1% higher growth under fixed and intermediate ERR (RR classification) than non-acceding countries that chose the same regime. On the contrary to that, non-acceding countries that accepted flexible exchange rate arrangements experienced on average negative growth and almost 7% higher volatility than accession candidates. The results would be addressed later in attempts to empirically explain the striking difference across countries in question.

An alternative attempt of data analysis is reported in Figure 3. Here, we divide the time period into two sub-periods, namely, actual transition stage (1993-1995) and late transition period (1996-2001), according to alternative classification schemes. Figure 3 reveals that the growth rates are substantially

higher for the second period and confirms the overall trends of the Table 1. Under *de jure* classification (right panel), growth rates do not exhibit much variability for the second period, but de facto classification (left panel) reveal pronounce differences growth rates for both periods.

Figure 3. Growth Performance at Different Stages of Transition (Average across the Whole Sample)



It should be noted that the presented figures of Table 1-2 and Figure 3 are merely simple statistical results without controlling for other relevant factors. It is, therefore, not possible to elaborate on how much of the better growth performance was due to the particular exchange rate regime adopted in a country and how much was due to other factors. However, the statistical analysis anticipates the empirical results of this paper.

Tables 1-3 of Appendix III provide more detailed information by presenting the evolution of selected economic indicators of transition countries under different ERR over the period under study. Figure 1 through 2 of Appendix III present the country decomposition of the GDP growth trends and reveals that the actual recovery from the output collapse began only in the late stage of transition (approximately, in the year of 1996).

C h a p t e r 5

EMPIRICAL RESULTS

5.1 Growth regressions

The robustness of our preliminary data analysis is explored by running a fixed-effects instrumental variables two-stage least squares for all panel data observations[13]. In addition to variables that are listed in section 4.2, another set of control factors is used in all estimates regressions. This is the set of time dummies that meant to capture common shocks across countries. Fixed effects functional form is chosen in order to measure unobserved country characteristics that might reflect important issues of policy credibility and institutional development. The implication of this approach is that growth performance in terms of ERR is examined by changes that occur within a country rather than between countries.

We employ three baseline classification scheme, by means of which we intent to investigate the growth performance in transition. The first specification includes all control variables and exchange rate regime dummies. The specification in meant to measure the effect (or, basically, direction of the effect) of the regime *per se*. Second specification includes both contemporaneous regime dummies and their one year lagged values to account for the problem of regime switching. In the third baseline regression, interaction terms of regime dummies with EU candidates dummy are present, for this will allows us to investigate the differences in performance across acceding and non-acceding countries. First-stage estimates, that is, predicted values of ERR dummies by ordered probit procedure used as instruments are omitted for brevity.

Regression results of GDP growth equation in its different classifications are presented in Table 1 of Appendix IV. Our primary interest here is the results obtained while employing RR classification scheme to account for regime measurement error. All estimation results were checked for robustness to specification[14].

As can be seen from the table, the control variables behave largely as expected. Real per capita growth (dependent variable *GDPGC*) is positively correlated with investment-to-GDP ratio, fiscal balance, the rate of the terms of trade adjustment, tertiary school enrolment used as a proxy for human capital and negatively correlated with population growth and openness. Initial GDP was dropped from the regression as a result of differencing. However, the significance of the coefficients depend upon specification employed, while coefficients on investment and government sector development (fiscal balance as percentage of GDP) are found to be statistically significant in four out of six models, which is not surprising given growth theory predictions[15].

Concerning regime dummies, all results should be interpreted with great caution. Coefficients should be interpreted as direction of the effects (or performance) of the exchange rate regime, conditional on other control variables and relative to the excluded category[16]. We report only the results using FLEX as the omitted category.

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[13] The instrument list for regime dummies includes all exogenous variables plus first-stage estimates, lagged inflation, lagged domestic credit provided by banking system, and lagged GDP growth.

[14] In terms of specification robustness, we added variables such as inflation, ratio of M2 to GDP, and some additional variables. We also test the functional form of the main equation by using the Hausman and Breusch-Pagan tests. For additional robustness checks see also Section 5.4.

[15] Recently, theory predictions were tested by an empirical study of Easterly (2001), who using the averaged over four-year periods dataset of 138 countries over 1965–95 and came to the strange results. He found that during periods of positive GDP growth rates, investment increased only 6 per cent and concludes that on empirical level during the short and the medium run increases in investment are "neither necessary nor sufficient" conditions for the growth.

[16] If this is the case that a set of indexes (dummies) represents the full range of possibilities, then one of the possibilities must be excluded to account for collinearity. The excluded regime can be viewed as the baseline category to which the others are compared.

The coefficients of the regime dummies are consistent with the findings of the previous chapter. The results based on the *de facto RR* classification reveals that, on average, *growth rates are significantly higher for countries that have adopted fixed exchange rate regimes than for countries with more flexible arrangements*. The regime dummies that measures contemporaneous effect of exchange rate regime are all statistically significant. IN addition to that, the results of the regression with IMF official classification employed shows the absence of the statistically significant link between ERR and growth, which can be attributed to and partially explained by the biased nature of that classification. Moreover, lagged FIX dummy is also significant indicating that, on average, countries in transition take into account not only regime in year *t,* but also regime at year *t-1,* that is, regime switching issue does indeed exist in transition. The last model disaggregates the effect of the regime for acceding and non-acceding countries in attempt to shed the light on statistical results of the Section 4.2. The interaction terms turn out to be insignificant in both classifications employed; moreover, the Wald test does not reject individual and joint hypotheses of them being not statistically significant from zero. The findings suggest that after taking into account the effects of controlled variables there no statistically significant and, thus, economically meaningful difference in regime performance of acceding and non-acceding countries[17].

The obtained results contradict previous findings (see Levy-Yeyati, Eduardo and Federico Sturzenegger, 2001), which can be explained by the nature of the

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[17] Of particularly interest is the sigh of the EU dummy itself. The empirical results suggest that after taking into account all other macroeconomic variables, acceding countries, on average, will experience a decline in growth rates in the range of 0.5%-0.8%, depending on classification employed. The obtained results can be partially explained by strong requirements of accession process that force the applicant to sharply control macroeconomic indicators of a country, sometimes giving up economic growth as the main objective of macroeconomic policy in struggle for the control over other indicators. For example, Romania in 2003 experienced a 4.7% which was accompanied by two digit disinflation and 6.5% of GDP current account deficit. Reducing the current account deficit and bringing inflation down to a single-digit level will require the give up of economic growth target unless the demand and external markets development conditions would favour such a policy.

transition economy with its great uncertainty, high exposure to risk and rapid changes in the economic environment. First, all rational players at the markets due to high uncertainty take into account both current and past information conveyed by the exchange rate regime. Second, the *credibility effect*, which is basically uncertainty and risk reduction, of adopting fixed exchange rate regime is indeed really high for transition economies, which accounts for higher economic growth.

5.2 Volatility of growth regressions

To examine the relationship between volatility of output and ERR, we run the same several regressions with the same specifications used before, which is aimed to exploit the link between the volatility of real per capita output growth (*SD_GDPGC*) measured as three-year running standard deviation of real GDP per capita growth and the set of regime dummies and other control factors described above. Again, we include year dummies, but omit them for brevity.

The results are reported in Table 2 of Appendix IV for both classifications. For the whole sample, the coefficients of investment-to-GDP ratio, tertiary school enrolment, the rate of the terms of trade adjustment (*TOT_adjust*), and fiscal balance-to-GDP ratio are negative indicating that increase of those variables is associated with decline in volatility of output. The signs of population and openness are positive, indicating that increase in those variables is associated with higher volatility of output. The results are well show the best correlation with economic theory predictions. For example, more open economy is more vulnerably to speculative attacks and exogenous shocks which may account for higher volatility of output. Moreover, fiscal balance and terms of trade adjustment variables are statistically significant across all specifications which might imply that fiscal policy and trade/exchange rate policy indeed account for changes in real economy and, thus, should not be dismissed by a country's authorities.

The table also reveals that regime dummies are not statistically significant, while the lagged regime dummies are, indicating that the relevant influence of ERR on the performance of volatility of GDP growth may be attributed only to the previous year regime. As can be seen from the Table 3, fixed ERR are associated with lower output volatility (comparing to the flexible ones) under both classifications which confirms the statistical analysis results. Again, as in the case of growth regression the decomposition of sample for acceding and non-acceding countries turn not to be successful in terms of the statistically significant results, suggesting that the differences in the influence of ERR on output volatility among those countries are minor and can be discarded while choosing (and predicting the consequences of) the regime for EU accession candidate and non-acceding country.

Thus, in contrast with the literature predictions, the evidence on the relationship between volatility of the GDP growth and exchange rate regimes in transition is in fact driven by the specific features of the countries under study. Namely, fixed exchange rate regimes reduces uncertainty and, thus, decreases volatility, while the shock absorption property of the floaters seems not to fully work in transition.

However, one note immediately arises; namely, the result might be due to the potential drawbacks of the *de facto* classification employed in the paper. The very nature of the classification is that it include countries with floating ERR that experience large shocks, and, thus, great exchange rate volatility, and simultaneously tend to exclude countries with fixed exchange rate arrangements and similar shocks by classifying them as floating ones. Thus, further robustness of the results is need and will be attempted in the Section 5.4.

5.3. Sector level regressions

Finally, we considered the relationship between exchange rate regimes and sectoral performance which is approximated by growth of value added of

tradables (industry and financial services) and non-tradables (construction and other services). The results are presented at the Table 3 (tradables) and 4 (nontradables) of Appendix IV for various classifications employed.

As can be seen from the Table 3 for tradable sector, the coefficient on the investment-to-GDP ratio, fiscal balance-to-GDP, and openness are significant in almost all classifications and positive, indicating that increase in those variables is associated with higher growth of output in tradable sector, which corresponds to theory predictions. However, negative signs of the regime dummies (which are mostly significant) in Table 3 contradicts our previous conclusions about the nature of the relationship between ERR and growth that we have drawn on a country aggregate level. Data shows that with respect to the behaviour of the tradable sector, fixed and intermediate regimes seem to deliver lower value added growth than floating ones (which is our baseline category). With respect to the lagged regime dummies, only FIX in table 4 (tradable) appears to be significant at 5% level with positive sign, which is consistent with our previous findings. Again, inclusion of interaction terms does not bring statistically significant results. The results claim that exchange rate regime does influence the growth rates of tradables; however, the regime per se (that is, the regime in year *t*) is the most important for considerations. Moreover, the results of the *Wald* test for joint significance of the regime dummies (reported in the Table) does reject the hypothesis that the coefficients near them simultaneously equal to zero.

Table 4 presents the results of the estimation of baseline regressions for the non-tradable sector. The coefficients on investment-to-GDP, and tertiary school enrolment are positive and significant in almost all of the specifications. The coefficients near population growth, openness, TOT adjustment, and fiscal balance are all negative and almost all not significant, giving the reasons for an assumption that the growth process in nontradable sector is guided by microeconomic factors to a greater extent than by macroeconomic or external

conditions. Albeit the results differ greatly from those for tradables in terms of signs, ERR dummies all but two are insignificant, which is fully consistent with literature predictions. Furthermore, the Wald test does not reject the hypothesis that the coefficients near regime dummies *per se* are statistically insignificant. The insignificance of the results can be partially explained by the measurement errors in the dependent variable due to unavailability of the data and are subject to criticism.

Thus, the findings suggest that nontradable sector is not affecting by the exchange rate regime choice to the extent that economy and tradable sector are. Given the nature of the goods in the very sector, which are sold primarily in domestic markets, the result gives no rise to doubts.

5.4. Robustness check

To further assess the validity of our results, this section is aimed to check the robustness of our results. The subsequent Table 3 summarizes the main tests which were conducted for the sake of robustness. As RR classification is of our primary concern, all the tests included check of the results of regressions that employed it. IMF classification scheme was treated as supplementary scheme, needed to reinforce conclusions.

All the tests do not reject the main findings of the paper, thus supporting the idea of the validity of results. The tests conducted have a slight effect on the size of estimated coefficients without changing the signs and significant of the variables of interest. Of primary importance here is test of inclusion two-year lagged ERR dummies for the sake of regime switching issue check. While conducting the test, the significance of regime dummies fell sharply and two-years lagged dummies remained the only significant among dummies of interest. The signs were reversed. The results of the test in the part suggest that volatility associated with more flexible exchange rate arrangements might be due to the redundant effect of the old regime (presumably, the fixed one) switch or

collapse. This idea gives the basis for the statement that the regime switching issue doe exist in transition economies, and the effects of the old regime last for sufficiently long time.

Table 3. Robustness checks of the results

Robustness test	Explanations	Results
Use two- and three years lagged regime dummies	Regime switch issue (performance after the collapse of the regime is mistakenly attributed to the replacing regime)	Not robust results for volatility, implying that the volatility associated with flexibility might be the result or effect of the previous regime collapse/switch
Run cross-section regression using averages (with regimes dummy averaged under the principle of the highest percentage)	Evaluate long-term influence on growth rather than short-period impact	Robust, except the volatility regression (significance)
Include lagged inflation	Countries that have weak fundamentals choose to peg in order to increase credibility	Robust
Drop EMU candidates countries for the period 1998-2001	More advanced countries might drive results	Robust
Run regression for the later stage of transition	The results might be driven by rapidly changing environment of the early transition	Robust, and the significance decreases substantially due to the limited number of observations
Use International Country Risk Guide (ICRG) index instead of FE and run RE[18]	ICRG index might capture institutional development better	Robust, and ICRG index is not significant

[18] This procedure was suggested by Rogoff et al.(2003).

Chapter 6

CONCLUDING REMARKS

Using a panel-data set of 22 countries over the 1993–2001 period, this paper aimed to provide evidence on the consequences of the choice of a particular exchange rate regime in terms of economic growth. In contrast to the studies' findings, our results suggest that for transition countries exchange rate regimes do matter for growth development. In comparison to intermediate and flexible exchange rate arrangements, fixed exchange rate regimes appear to be superior, delivering higher growth and lower volatility. Furthermore, our results suggest that it is the previous exchange rate regime, rather than the current one, that is important for assessing the economic growth performance of alternative exchange rate regimes.

This specific link may be explained by the nature of the transition economy with its great uncertainty, high exposure to risk and rapid changes in the economic environment. In terms of economic growth, the credibility effect from the adoption of fixed exchange rate regime seems to be really high for transition economies.

We also disaggregate the effect of the regime for acceding and non-acceding countries in attempt to shed some light on the fundamentals of economic policy of EU accession candidates. The findings suggest that after taking into account the effects of controlled variables there no statistically significant and, thus, economically meaningful difference in regime performance of acceding and non-acceding countries. The obtained results can be partially explained by strong requirements of accession process that force the applicant to sharply control macroeconomic indicators of a country, sometimes giving up economic growth as the main objective of macroeconomic policy in struggle for the control over the other fundamentals.

At this point, however, it is hard to make conclusions regarding the exchange rate policy that opts for delivering better economic growth outcomes in transition. One should interpret the results very carefully, taking into account the limitation of the dataset. Nonetheless, the findings tend to support advocates of the view that the credibility and risk reduction associated with fixed regimes should not be discarded when choosing the regime for a country. In view of EU application process and the entrance requirements, countries that opt for accession should move toward fixing their exchange rate against the euro; this policy is consistent with our empirical results.

BIBLIOGRAPHY

Aizeman, J. (1991). *Foreign Direct Investment, Productive Capacity and Exchange Rate Regimes.* NBER Working Papers, No.3767 .

Amvouna, Anatolie Marie (1998). *Determinants Of Trade And Growth Performance In Africa: A Cross-Country Analysis Of Fixed Versus Floating Exchange Rate Regimes.* African Economic Policy Discussion Paper, No. 18, July.

Bailliu J., Lafrance R., and J.-F. Perrault (2002). *Does Exchange Rate Policy Matter for Growth?* Bank of Canada, Working Paper, No. 2002-17.

Barro, R.J. and X.X. Sala-i-Martin. 1995. *Economic Growt*h. New York, Montreal: McGraw-Hill.

Baxter, M. and A. Stockman (1989), *Business Cycles and the Exchange Rate-Regime: Some International Evidence,* Journal of Monetary Economics, vol. 23, pp. 377-400.

Beck, N., Katz, J., 1995, *What to Do (and not to Do) with Time-Series Cross-Section Data*, American Political Science Review.

Berger, Helge, Jan-Egbert Sturm, and Jakob de Haan (2000). An Empirical Investigation into Exchange Rate Regime Choice and Exchange Rate Volatility; CESifo Working Paper No. 263.

Bordo, Michael (2003). *Exchange Rate Regime Choice in Historical Perspective*; NBER Working Paper No. 9654 (Cambridge, Massachusetts: National Bureau of Economic Research).

Broda, Christian (2000). *Terms of Trade and Exchange Rate Regimes in Developing Countries*, Mimeo, MIT, December.

Calvo, Guillermo and Carmen Reinhart (2000). *Fear of Foating*, Mimeo University of Maryland.

Calvo, Guillermo, and Carmen Reinhart (2002). *Fear of Floating.* Quarterly Journal of Economics, Vol. 117, No. 2, pp. 379–408.

Domac I., Peters K., and Y. Yuzefovich. (2001) *Does the Exchange Rate Regime Affect Macroeconomic Performance? Evidence from Transition Economies*, The World Bank, Poverty Reduction and Economic Management Sector Unit, July.

Edwards, Sebastian (1996), *The Determinants of the Choice Between Fixed and Flexible Exchange-Rate Regimes,* NBER Working Paper, No: 5756.

Edwards, Sebastian (1996). *The Determinants of the Choice Between Fixed and Flexible Exchange-Rate Regimes*; NBER Working Paper No. 5756 (Cambridge, Massachusetts: National Bureau of Economic Reaserch).

Edwards, Sebastian and Eduardo Levy–Yeyati (2003). *Flexible Exchange Rates as Shock Absorbers;* NBER Working Paper No. 9867 (Cambridge, Massachusetts: National Bureau of Economic Research).

Edwards, Sebastian, and Miguel A. Savastano (1999). Exchange Rates In Emerging Economies: What Do We Know? What Do We Need To Know? NBER Working Paper, No. 7228.

Fischer, S., 2001, *Exchange Rate Regimes: Is the Bipolar View Correct?*, Distinguished Lecture on Economics in Government, AEA Meetings, New Orleans. Data, American Political Science Review.

Frankel, Jeffrey A. (1999). *No Single Currency Regime is Right for All Countries or At All Times*, Princeton University, International Finance Section, Essays in International Finance, No. 215 (August).

Friedman, Milton, 1953, *Essays in Positive Economic*s, University of Chicago Press, Chicago.

Ghosh, Atish R., Anne-Marie Gulde, Jonathan D. Ostry and Holger C. Wolf (1997), *Does the Nominal Exchange Rate Regime Matter?,* NBER Working Paper, No. 5874.

Ghosh, Atish R., Anne-Marie Gulde, Jonathan D. Ostry and Holger C. Wolf (1995). *Does the Nominal Exchange Rate Regime Matter?* IMF Working Paper, No. 95/121.

Ghosh, Atish, Anne-Marie Gulde, and Holger Wolf (2003). *Exchange Rate Regimes: Choices and Consequences*; Cambridge, Massachusetts: MIT Press.

Hausmann, Ricardo, Ugo Panizza, and Ernesto Stein (2001). *Why Do Countries Float the Way They Float?* Journal of Development Economics Vol. 66, pp. 387–414.

Hoffmaister, Alexander W., Jorge E. Roldós and Peter Wickham (1997). *Macroeconomic Fluctuations in Sub-Saharan Africa.* IMF Working Paper*,* No. 97/82.

International Monetary Fund (1997), *Exchange Rate Arrangements and Economic Performance in Developing Countries,* Chapter 4 of the World Economic Outlook, Washington, D.C., October.

Iwata, Shigeri, and Evan Tanner. *Pick Your Poison: The Exchange Rate Regimes And Capital Account Volatility In Emerging Markets.* IMF Working Paper, No. 03/92.

Juhn, Grace S., and Paolo Mauro (2002). *Long-Run Determinants of Exchange Rate Regimes: A Simple Sensitivity Analysis*; IMF Working Paper 02/104, Washington: International Monetary Fund.

Klau, Mark (1998). *Exchange rate regimes and inflation and output in Sub-Saharan countries*. BIS Working Paper, No. 53.

Krolzig, H.-M. (1997). *International business cycles: Regime shifts in the stochastic process of economic growth.* Applied Economics Discussion Paper 194, Institute of Economics and Statistics, University of Oxford.

Levy-Yeyati, Eduardo and Federico Sturzenegger (2001). *To Float or to Trail: Evidence on the Impact of Exchange Rate Regimes*, mimeo, Universidad Torcuato Di Tella, available at www.utdt.edu/~ely.

Levy-Yeyati, Eduardo, and Federico Sturzenegger (1999). *Deeds vs Words: Classifying Exchange Rate Regimes*, mimeo, Universidad Torcuato Di Tella, available at http://www.utdt.edu/~ely.

Masson, Paul (2001). *Exchange Rate Regime Transitions*; Journal of Development Economics, Vol. 64 (April), pp. 571–86.

Mills, Terence C., and Geoffrey E. Wood (1993). *Does the Exchange Rate Regime Affect the Economy*? Federal Reserve Bank of St. Louis Review; July/August, pp. 3–20.

Mundell, R.A. (1961). *A Theory of Optimum Currency Areas*, American Economic Review, 51(3), pp. 657-665.

Mundell, Robert. (1995). *Exchange Rate Systems and Economic Growth.* Revista de Politica Economica, Vol. 85, No. 6, pp. 1-36.

Mussa, Michael, Paul Masson, Alexander Swoboda, Estaban Jadresic, Paolo Mauro and Andrew Berg (2000). *Exchange Rate Regimes in an Increasingly Integrated World Economy*; IMF Occasional Paper 193.

Obstfeld, Maurice and Kenneth Rogoff (1996). *Foundations of International Macroeconomics*, MIT Press.

Poirson, Hélène (2001). *How Do Countries Choose Their Exchange Rate Regime?* IMF Working Paper 01/46; Washington: International Monetary Fund.

Reinhart and K. Rogoff (2002). *The Modern History of Exchange Rate Arrangements: A Reinterpretation*, NBER Working Paper.

Reinhart, Carmen M., and Kenneth Rogoff (2004). *The Modern History of Exchange Rate Arrangements: A Reinterpretation*; Quarterly Journal of Economics (forthcoming).

Rogoff, Kenneth S., Aasim M. Husain, Ashoka Mody, Robin Brooks, and Nienke Oomes (2003). *Evolution and Performance of Exchange Rate Regimes*. IMF Working Paper No.03/243.

Tornell, A. and A. Velasco (2000). *Fixed versus Flexible Exchange Rates: Which Provides More Fiscal Discipline*, Journal of Monetary Economic, 45, pp. 399-436.

Von Hagen, Jürgen, and Jizhong Zhou (2002). *The Choice Of Exchange Rate Regimes: An Empirical Analysis For Transition Economies*, ZEI Working Paper B02-03.

White, Halbert (1984). *Asymptotic Theory for Econometricians*, New York

APPENDIX I: DEFINITIONS OF VARIABLES AND SOURCES OF DATA

List of countries (22 total): Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Macedonia, Moldova, Poland, Romania, Russian Federation, Slovak Republic, Slovenia, Ukraine

Note: Tajikistan, Turkmenistan and Uzbekistan were excluded from the sample due to data problems.

Variable	Definition and sources
GDPGC	GDP per capita growth (annual %) (Source: WDI)
SD_GDPGC	Three-years centered running standard deviation of real GDP per capita growth, own calculations
Tradables	Industry and financial services, value added (% of GDP) (Source: Vienna Institute for International Economic Studies, Handbook of statistics, 2003)
Non-tradables	Construction and other services, value added (% of GDP) (Source: Vienna Institute for International Economic Studies, Handbook of statistics, 2003)
Dc_Bank	Domestic credit provided by banking sector (% of gdp) (source: WDI)
Fiscal Balance	Fiscal Balance (% of GDP) (Source: WDI)
G	General government final consumption expenditure (% of GDP) (Source: WDI)
Invest_GDP	Gross capital formation (% of GDP) (Source: WDI)
Inflation	Inflation, consumer prices (annual %) (Source: WDI)
M2	Money and quasi money (M2) as % of GDP (Source: WDI)
Population	Population growth (annual %) (Source: WDI)
School_tert	School enrollment, tertiary (% gross) (Source: WDI)
Openness	(Export+import)/2 (% of GDP) (Source: WDI)
TOT_adjust	Terms of Trade Adjustments (constant LDC) (Source: WDI)
GDPC_89	GDP per capita, PPP adjusted (Source: WDI, own calculation)
Debt	External debt (% of GDP) (Source: WDI, own calculation)

APPENDIX II: EXCHANGE RATE REGIMES IN SELECTED TRANSITION COUNTRIES

Table 1. *De Jure* Exchange Rate Regimes in Selected Transition Countries

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
EU Accession Candidates: Central and Eastern European Countries										
Bulgaria	8	8	8	8	8	2	2	2	2	2
Czech Rep.	3	3	3	3	4	7	7	7	7	8
Estonia	2	2	2	2	2	2	2	2	2	2
Hungary	3	3	3	6	6	6	6	6	6	4
Latvia	(8)	(8)	3	3	3	3	3	3	3	3
Lithuania	(8)	(8)	2	2	2	2	2	2	2	2
Poland	5	5	5	6	6	6	6	6	8	8
Romania	8	8	8	8	8	8	7	7	7	6
Slovak Rep.	3	3	3	3	4	4	7	7	7	7
Slovenia	7	7	7	7	7	7	7	7	7	7
Other Central and Eastern European Countries										
Albania	8	8	8	8	8	8	8	8	8	8
Croatia	3	8	4	4	4	4	4	7	7	7
Macedonia	8	8	3	3	3	3	3	3	3	3
Commonwealth of Independent States										
Armenia	(3)	(8)	8	8	8	8	8	8	8	8
Azerbaijan	(3)	(3)	8	8	8	8	7	7	7	7
Belarus	(3)	(3)	(7)	7	4	7	7	7	6	6
Georgia	(3)	(8)	7	7	7	3	8	8	8	8
Kazakhstan	(3)	(8)	8	8	8	7	7	8	7	7
Kyrgyz Rep.	(3)	(8)	8	7	7	7	7	7	7	7
Moldova	(3)	(8)	8	8	8	8	8	8	8	8
Russia	(3)	(8)	8	4	6	6	7	8	7	7
Ukraine	(3)	(8)	8	7	7	4	4	7	7	7

Note: End-year observations. Codes in parentheses refer to the periods when the newly-introduced national currencies have not yet assumed the status as the sole legal tender. The meanings of the codes are: na=not available, 1=currency union (no separate legal tender), 2=currency board arrangements, 3=conventionally fixed pegs (adjustable pegs, de facto pegs), 4=horizontal bands, 5=crawling pegs, 6=crawling bands, 7=managed floating without preannounced path for the exchange rate, 8=independent floating.

Source: IMF's Exchange Arrangements and Exchange Restrictions, Annual Report (2003), Von Hagen, Jürgen, and Jizhong Zhou (2002).

Table 2. *De Facto* Exchange Rate Regimes in Selected Transition Countries

	1993	1994	1995	1996	1997	1998	1999	2000	2001
EU Accession Candidates: Central and Eastern European Countries									
Bulgaria	14	14	14	14	2	2	2	2	2
Czech Rep.	8	8	8	10	12	12	12	12	12
Estonia	2	2	2	2	2	2	2	2	2
Hungary	10	8	8	8	8	8	9	9	9
Latvia	14	2	2	2	2	2	2	2	2
Lithuania	14	14	2	2	2	2	2	2	2
Poland	15	15	10	10	10	10	10	12	12
Romania	14	14	14	14	14	14	14	14	10
Slovak Rep.	8	8	8	8	8	10	12	12	12
Slovenia	8	8	8	8	8	8	8	8	8
Other Central and Eastern European Countries									
Albania	14	13	13	13	14	13	13	13	13
Croatia	14	14	8	8	8	8	8	8	8
Macedonia	14	14	7	7	7	7	7	8	8
Commonwealth of Independent States									
Armenia	14	14	14	8	8	8	8	8	8
Azerbaijan	14	14	14	7	7	7	7	7	7
Belarus	14	14	14	14	14	14	14	14	14
Georgia	14	14	14	14	15	15	12	12	12
Kazakhstan	14	14	14	8	8	8	8	8	8
Kyrgyz Rep.	14	14	14	14	14	14	14	8	8
Moldova	15	15	4	4	4	14	14	4	4
Russia	14	14	14	14	15	15	14	8	8
Ukraine	14	14	14	14	15	15	10	4	4

Note: End-year observations. The meanings of the codes are: na=not available, 1=currency union (no separate legal tender), 2=currency board arrangements, 3= Pre announced horizontal band that is narrower than or equal to +/–2 percent, 4= De facto peg, 5= Pre announced crawling peg, 6= Pre announced crawling band that is narrower than or equal to +/–2 percent, 7= De facto crawling peg, 8= De facto crawling band that is narrower than or equal to +/–2 percent, 9= Pre announced crawling band that is wider than or equal to +/–2 percent, 10= De facto crawling band that is narrower than or equal to +/–5 percent, 11= Moving band that is narrower than or equal to +/–2 percent (i.e., allows for both appreciation and depreciation over time), 12= Managed floating, 13= Freely floating, 14= Freely falling, 15= Dual market in which parallel market data is missing.

Source: Reinhart and Rogoff (2002).

Table 3. Transition Probabilities (RR classification)

Regime_RR	Regime_RR 1	2	3	Total
1	96.15	0.00	3.85	100.00
2	0.00	93.24	6.76	100.00
3	5.26	14.47	80.26	100.00
Total	16.48	45.45	38.07	100.00

Table 4. Transition Probabilities (IMF classification)

Regime_IMF	Regime_IMF 1	2	3	Total
1	86.36	6.82	6.82	100.00
2	0.00	75.00	25.00	100.00
3	4.81	5.77	89.42	100.00
Total	24.43	17.05	58.52	100.00

APPENDIX III: DESCRIPTIVE STATISTICS

Table 1. Descriptive statistics for fixed exchange rate arrangements (RR classification)

Fixed:

Variable		Mean	Std. Dev.	Min	Max	Observations	
gdpgc	overall	4.831133	4.163087	-5.961522	11.04466	N =	30
	between		3.020005	3.15325	10.89105	n =	5
	within		3.88642	-5.090869	11.91531	T-bar =	6
sd_gdpgc	overall	3.859701	2.452581	.6948718	10.15849	N =	30
	between		.5917755	3.355516	4.678143	n =	5
	within		2.404972	.5019019	9.570236	T-bar =	6
industry	overall	30.10818	2.730205	23.0587	34.93346	N =	30
	between		3.662608	23.0587	33.21755	n =	5
	within		1.749032	25.72478	33.69879	T-bar =	6
services	overall	59.2677	6.221396	44.5626	70.34291	N =	30
	between		7.279973	46.14273	63.79848	n =	5
	within		3.802859	51.36037	65.81214	T-bar =	6
gdpc_89	overall	5201.033	1216.603	2203	6475	N =	30
	between		1725.51	2203	6475	n =	5
	within		0	5201.033	5201.033	T-bar =	6
popula~n	overall	-.8911633	.5261965	-2.0968	.2023	N =	30
	between		.5304237	-1.091213	.2023	n =	5
	within		.4457139	-1.927463	-.2330633	T-bar =	6
openness	overall	60.67044	16.04753	28.35496	95.8511	N =	30
	between		19.05668	28.35496	82.05912	n =	5
	within		5.863132	50.36397	74.46242	T-bar =	6
TOT_ad~t	overall	5.32e+07	1.68e+09	-3.23e+09	3.95e+09	N =	30
	between		1.27e+09	-1.42e+09	2.10e+09	n =	5
	within		1.07e+09	-2.05e+09	3.48e+09	T-bar =	6
inflat~n	overall	50.19555	191.3376	.7537493	1058.374	N =	30
	between		92.15108	7.087615	219.4593	n =	5
	within		175.0679	-166.6907	889.1103	T-bar =	6
dc_bank	overall	20.31379	8.647696	11.8645	43.4855	N =	30
	between		5.591763	12.78283	27.14377	n =	5
	within		7.038575	5.830943	36.65552	T-bar =	6

Table 2. Descriptive statistics for intermediate exchange rate arrangements (RR classification)

Variable		Mean	Std. Dev.	Min	Max	Observations
gdpgc	overall	3.605454	5.304681	-30.9	14.72279	N = 86
	between		2.724769	-4.032569	7.205656	n = 15
	within		4.488037	-23.26198	13.91026	T-bar = 5.73333
sd_gdpgc	overall	2.906519	3.135307	.1626693	17.16832	N = 86
	between		1.960318	1.03089	9.376211	n = 15
	within		2.307633	-3.746323	10.69862	T-bar = 5.73333
industry	overall	35.33182	4.561508	21.72272	46.35957	N = 83
	between		3.864706	28.74739	43.28782	n = 15
	within		2.915823	25.60932	47.86509	T-bar = 5.53333
services	overall	51.44036	9.509009	23.48532	65.02916	N = 83
	between		9.389477	34.20888	62.62798	n = 15
	within		3.270356	36.57324	62.93645	T-bar = 5.53333
gdpc_89	overall	5598.802	2608.803	2453	11525	N = 86
	between		2483.154	2453	11525	n = 15
	within		0	5598.802	5598.802	T-bar = 5.73333
in~t_GDP	overall	23.79616	6.106857	15.5529	55.79901	N = 86
	between		4.369247	18.20513	31.41449	n = 15
	within		4.562895	15.03968	50.80176	T-bar = 5.73333
popula~n	overall	-.0758616	.6615947	-2.389	1.1174	N = 86
	between		.6073524	-1.222683	.89615	n = 15
	within		.3363232	-1.646219	.9002829	T-bar = 5.73333
school~c	overall	87.59597	8.697566	60.91197	105.1681	N = 56
	between		8.207726	75.73887	105.1681	n = 14
	within		4.327021	72.76906	96.00738	T = 4
openness	overall	45.97345	11.83983	22.45066	65.1714	N = 86
	between		10.51856	26.02125	60.94599	n = 15
	within		5.602618	30.24421	62.88269	T-bar = 5.73333
TOT_ad~t	overall	-9.22e+10	1.39e+12	-7.53e+12	8.60e+12	N = 86
	between		2.39e+12	-2.90e+12	8.60e+12	n = 15
	within		6.94e+11	-4.73e+12	2.80e+12	T-bar = 5.73333
inflat~n	overall	12.20108	9.983876	-8.592579	39.3003	N = 80
	between		8.409538	2.764451	34.46779	n = 15
	within		7.286117	-4.372783	35.77179	T-bar = 5.33333
dc_bank	overall	34.87244	22.21399	5.263568	97.01299	N = 86
	between		22.19622	9.523403	74.52668	n = 15
	within		6.663032	14.80785	61.77105	T-bar = 5.73333

Table 3. Descriptive statistics for flexible exchange rate arrangements (RR classification)

Variable		Mean	Std. Dev.	Min	Max	Observations
gdpgc	overall	-1.939431	9.152196	-28.92088	11.87348	N = 82
	between		6.993858	-19.2825	7.095465	n = 19
	within		6.641614	-29.62771	10.86842	T-bar = 4.31579
sd_gdpgc	overall	5.162889	4.512168	.1614936	24.82577	N = 82
	between		4.004921	1.141318	18.19625	n = 19
	within		3.651911	-5.561723	18.48761	T-bar = 4.31579
industry	overall	32.66158	7.876762	15.86949	47.51687	N = 82
	between		6.446253	21.3481	41.52154	n = 19
	within		2.760787	27.00961	40.72431	T-bar = 4.31579
services	overall	43.81404	11.70671	18.15061	66.88567	N = 82
	between		10.66669	21.86456	65.92546	n = 19
	within		6.000823	21.45245	58.01432	T-bar = 4.31579
gdpc_89	overall	4170.354	2175.652	629	8207	N = 82
	between		1972.491	629	8207	n = 19
	within		0	4170.354	4170.354	T-bar = 4.31579
in~t_GDP	overall	20.76662	7.396796	2.64657	41.03033	N = 82
	between		6.22897	9.176488	30.24449	n = 19
	within		4.232273	11.94915	34.38115	T-bar = 4.31579
popula~n	overall	-.1223405	.7726855	-3.0177	1.5123	N = 79
	between		.7496136	-1.5193	1.171067	n = 19
	within		.4453666	-1.62074	1.376059	T-bar = 4.15789
school~c	overall	79.59443	12.9511	37.51534	101.3518	N = 70
	between		11.19794	55.0253	101.3518	n = 18
	within		6.665526	62.08447	102.917	T = 3.88889
openness	overall	45.64068	17.02392	20.57413	86.4508	N = 82
	between		14.71766	27.29478	72.4185	n = 19
	within		8.716863	28.19613	89.42698	T-bar = 4.31579
TOT_ad~t	overall	3.15e+10	1.72e+12	-7.29e+12	7.49e+12	N = 75
	between		1.81e+12	-7.29e+12	1.19e+12	n = 17
	within		1.44e+12	-5.44e+12	6.33e+12	T-bar = 4.41176
inflat~n	overall	363.7976	880.0677	.05	4962.217	N = 74
	between		680.1249	5.985228	2569.092	n = 19
	within		679.8277	-2029.327	3577.919	T-bar = 3.89474
dc_bank	overall	37.63755	28.23405	7.873518	148.5688	N = 76
	between		29.39814	15.52609	113.6618	n = 19
	within		11.36615	2.730515	72.54459	T-bar = 4

Figure 1. Real GDP per capita growth by country (whole sample)

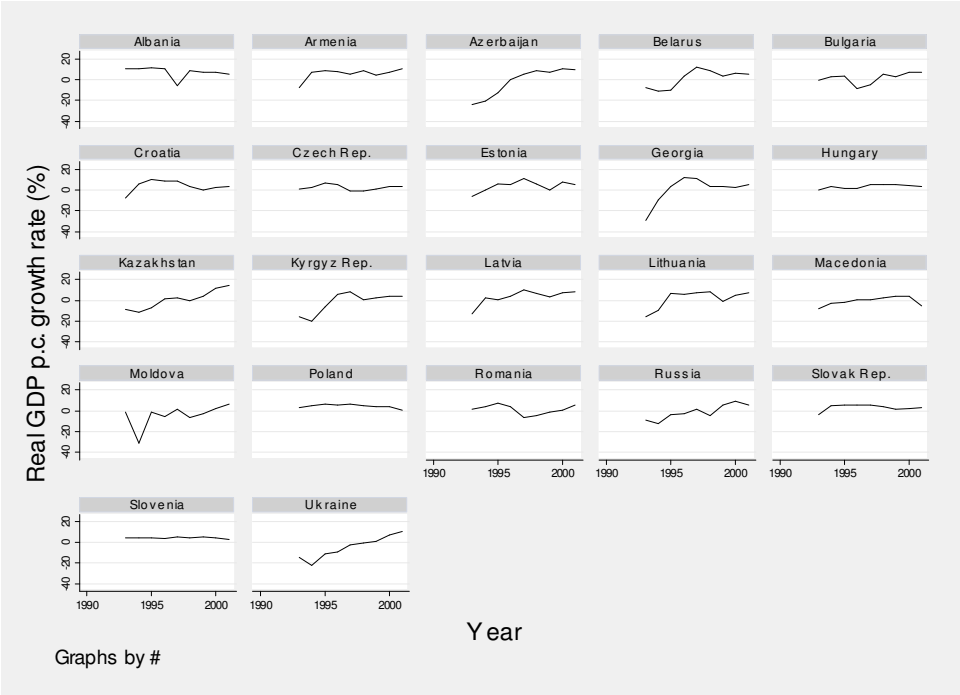
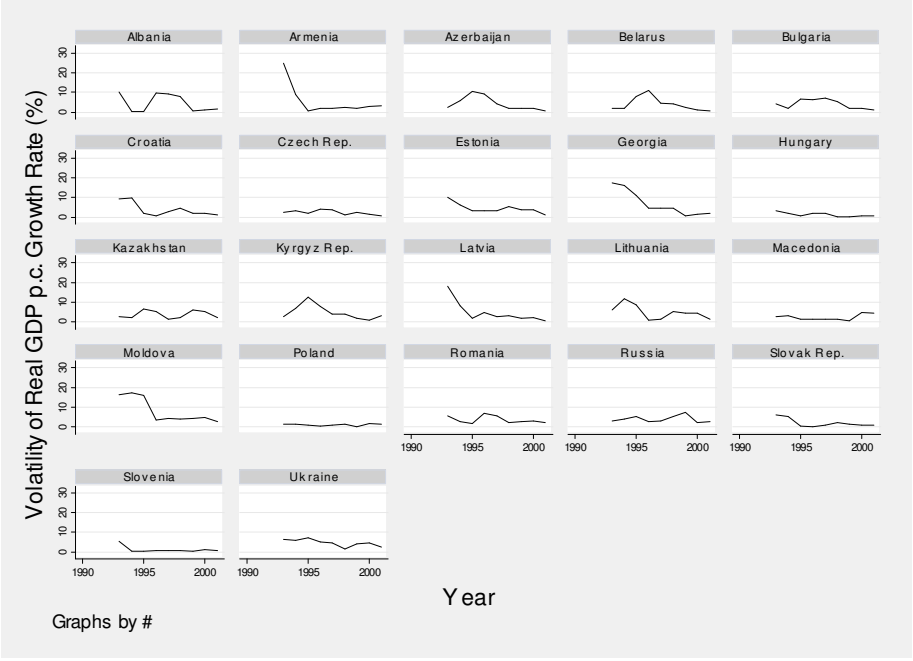


Figure 2. Volatility of real GDP per capita growth by country (whole sample)



APPENDIX IV: ESTIMATION RESULTS

Table 1. Growth Regressions

	RR CLASSIFICATION SCHEME			IMF CLASSIFICATION SCHEME		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Investment/GDP	.2068637 (1.82)*	.1567729 (1.76)*	.1713674 (1.94)*	.1251982 (1.40)	.1516853 (1.66)	.1772401 (2.00)**
School enrolment	.0675606 (0.73)	.0677226 (0.54)	.2573416 (1.81)*	.056842 (0.43)	.0872556 (0.66)	.1950838 (1.42)
Population growth	-1.12164 (1.47)	-1.71007 (1.62)	-1.80223 (1.69)*	-1.46526 (1.31)	-1.50062 (1.34)	-1.22829 (1.08)
Openness	-.085816 (2.22)**	-.076329 (1.38)	-.054633 (0.99)	-.097547 (1.40)*	-.102482 (1.78)*	-.085728 (1.51)
TOT adjustment	.0001842 (0.57)	.0000107 (0.73)	.0001804 (0.53)	.0000101 (0.03)	.0000437 (0.12)	.0002121 (0.59)
Fiscal balance/GDP	.3079768 (2.54)***	.4127177 (3.31)***	.3727983 (2.98)***	.5287658 (4.13)***	.55225 (4.30)***	.4177476 (3.28)***
Fixed ERR	.4666819 (1.82)*	.4510229 (2.01)**	.4698879 (1.76)*	.1690235 (1.03)	.3560969 (1.77)*	.9632401 (0.57)
Intermediate ERR	.5458963 (4.39)***	.2618397 (1.81)*	.3170222 (2.18)**	.1992189 (1.22)	.1796294 (1.04)	.8739645 (0.50)
Fixed ERR (-1)	–	.3529155 (1.75)*	–	–	-.252879 (1.54)	–
Intermediate ERR (-1)	–	-1.11810 (0.79)	–	–	.5691064 (0.32)	–
EU* Fixed ERR	–	–	.0273252 (0.01)	–	–	.3259352 (1.14)
EU* Intermediate ERR	–	–	-.117497 (0.40)	–	–	.2549985 (0.81)
EU	–	–	-.555530 (2.06)**	–	–	-.809072 (3.61)***
D94	.3412859 (0.844)	.5500514 (0.29)	-.115874 (0.07)	-.172295 (0.10)	-.217151 (0.12)	-.034818 (0.02)
D95	.479561 (2.66)**	.5334849 (2.76)**	.4015861 (2.33)**	.4017531 (2.23)**	.3852154 (2.12)**	.459573 (2.54)**
D96	.5827596 (3.16)***	.66509776 (3.39)***	.463017 (2.53)**	.5325948 (2.78)***	.5004056 (2.59)**	.557796 (2.99)***
D97	.6260683 (3.27)***	.7069262 (3.58)***	.4319238 (2.09)**	.6031281 (3.01)***	.516661 (2.69)***	.598637 (3.02)***
D98	.5430681 (2.70)**	.6405261 (3.11)**	.5873345 (2.58)**	.5137096 (2.33)**	.5240843 (2.36)**	.7539367 (3.39)***
D99	.5108946 (2.42)**	.5812823 (2.75)**	.5564666 (2.24)**	.5155497 (2.13)**	.5213482 (2.13)**	.7280924 (3.01)***
D00	.7605451 (3.18)***	.8246467 (3.70)***	.7556543 (2.54)**	.826032 (2.94)***	.8045266 (2.86)***	1.021394 (3.68)***
D01	.7107568 (2.79)**	.7933998 (3.39)***	.6681363 (2.09)**	.7856445 (2.57)**	.7562616 (2.46)**	.9385272 (3.12)***

Const	-1.457063 (0.13)	-2.233385 (0.80)	-2.78076 (0.83)	-1.95711 (0.46)	-.869714 (0.19)	-3.81468 (0.84)
Observations	188	188	188	188	188	188
R-squared	0.3774	0.3221	0.3173	0.3336	0.3263	0.3187
Hausman test statistics (*P-value* in parentheses)	48.03 (0.000)	397.13 (0.000)	25.46 (0.0441)	243.61 (0.000)	220.20 (0.000)	271.32 (0.000)
Wald test statistics (*P-value* in parentheses)*	3.12 (0.06)	6.08 (0.0478)	3.41 (0.0357)	1.04 (0.3553)	1.83 (0.1645)	0.22 (0.8015)
Absolute value of z statistics in parentheses: * significant at 10%; ** significant at 5%; *** significant at 1%						

Notes:

* - Wald test statistics of the joint significance of the ERR dummies:

$$H_0 : D_{fix} = D_{\text{int}} = 0$$

Table 2.Volatility of Output Regression						
	RR CLASSIFICATION SCHEME			IMF CLASSIFICATION SCHEME		
	(1)	(2)	(3)	(1)	(2)	(3)
Investment/GDP	-.086099 (1.77)*	-.1166033 (2.39)**	-.093867 (1.81)*	-.081138 (1.63)	-.060367 (1.19)	-.094380 (1.84)*
School enrolment	-.100625 (2.21)**	-.0292357 (0.42)	-.142187 (1.71)*	-.087458 (1.20)	-.069229 (0.94)	-.115305 (1.45)
Population growth	.1554089 (0.25)	.2554006 (0.44)	.1586503 (0.25)	.2289959 (0.37)	.2262067 (0.37)	.2300787 (0.35)
Openness	.0386702 (1.21)	.0480471 (1.59)	.0330542 (1.02)	.0346998 (1.09)	.03888 (1.22)	.0293456 (0.89)
TOT adjustment	-.000397 (2.04)**	-.0003903 (2.11)**	-.000447 (2.24)**	-.000393 (0.052)*	-.000367 (1.83)*	-.000427 (2.07)**
Fiscal balance/GDP	-.296131 (4.12)***	-.2727611 (3.99)***	-.280493 (3.82)***	-.280296 (3.95)***	-.275851 (3.89)**	-.267867 (3.63)***
Fixed ERR	-.788859 (0.56)	.1954234 (1.29)	-1.34304 (0.86)	-.454586 (0.50)	.405971 (0.37)	-.492686 (0.50)
Intermediate ERR	.4309902 (0.61)	-.2276374 (0.28)	.4924716 (0.58)	.1820064 (0.20)	.6838609 (0.72)	.0626127 (0.06)
Fixed ERR (-1)	–	-.4051373 (3.67)***	–	–	-1.38588 (1.82)*	–
Intermediate ERR (-1)	–	.462183 (1.96)**	–	–	-1.59470 (1.71)*	–
EU* Fixed ERR	–	–	.8525899 (0.44)	–	–	.2153523 (0.13)
EU* Intermediate ERR	–	–	1.288157 (0.74)	–	–	.8323427 (0.46)
EU	–	–	.9313637 (0.59)	–	–	.8634315 (0.67)
Observations	188	188	188	188	188	188
R-squared	0.2891	0.3885	0.2447	0.3157	0.3501	0.2988
Hausman test statistics (*P-value* in parentheses)	28.49 (0.0741)	25.51 (0.0839)	36.04 (0.0601)			
Wald test statistics (*P-value* in parentheses)*	0.40 (0.6695)	0.95 (0.3904)	0.63 (0.5393)	1.17 (0.5558)	0.28 (0.7534)	4.28 (0.1175)

Wald test statistics (*P-value* in parentheses)**	–	6.65 (0.0360)	–	–	4.75 (0.0932)	–
Absolute value of z statistics in parentheses: * significant at 10%; ** significant at 5%; *** significant at 1%						

Notes:

* - Wald test statistics of the joint significance of ERR dummies:

$$H_0 : D_{fix} = D_{\text{int}} = 0$$

** - Wald test statistics of the joint significance of lagged ERR dummies:

$$H_0 : D_{fix\_lag} = D_{\text{int}\_lag} = 0$$

Time dummies are omitted for brevity

Table 3. Sector Level Decomposition of GDP Growth (Tradables)						
	RR CLASSIFICATION SCHEME			IMF CLASSIFICATION SCHEME		
	(1)	(2)	(3)	(1)	(2)	(3)
Investment/GDP	.1009854 (1.77)*	.0952171 (1.56)	.0622455 (0.85)	.1394173 (2.16)**	.1660321 (2.35)**	.1293056 (1.97)**
School enrolment	.055241 (1.36)	.0619451 (1.57)	.0340589 (0.69)	.1090112 (1.19)	.1086032 (1.39)	.1383906 (1.57)
Population growth	.3713184 (0.58)	.2698908 (0.44)	.3095769 (0.47)	.703092 (1.16)	.6238266 (1.08)	.660893 (0.97)
Openness	.1572473 (3.45)***	.0239164 (0.93)	.1580259 (3.03)***	.1095512 (2.34)**	.1105004 (1.96)*	.0982903 (1.70)*
TOT adjustment	.000144 (0.73)	.000182 (0.96)	.0001051 (0.51)	.000131 (1.00)	.0001263 (0.94)	.0001347 (0.67)
Fiscal balance/GDP	.2667804 (2.55)**	.2864516 (2.81)***	.2925979 (2.64)***	.0866711 (1.24)	.0866452 (1.22)	.1814467 (1.80)*
Fixed ERR	-.695467 (4.01)***	-.9837427 (4.80)***	-.8037137 (2.31)	-.2408844 (2.44)**	-.2745213 (2.22)**	-.4228424 (3.92)***
Intermediate ERR	-.368972 (5.00)***	-.3783417 (4.28)***	-.3952906 (4.85)	-.0984012 (0.16)	-.3439572 (0.50)	-.3680313 (3.89)***
Fixed ERR (-1)	–	.4010073 (2.44)**	–	–	.5221201 (0.46)	–
Intermediate ERR (-1)	–	-.4314528 (0.51)	–	–	.5897494 (0.84)	–
EU* Fixed ERR	–	–	1.160176 (0.33)	–	–	.1114422 (0.05)
EU* Intermediate ERR	–	–	1.091129 (0.78)	–	–	1.511573 (0.96)
EU	–	–	-.3203939 (2.33)**	–	–	.4933321 (0.42)
Observations	90	90	90	90	90	90

R-squared	0.5615	0.6032	0.5654	0.5674	0.5821	0.5763
Hausman test statistics (*P-value* in parentheses)	59.82 (0.000)	125.20 (0.000)	47.34 (0.001)	47.80 (0.000)	28.39 (0.0970)	65.07 (0.000)
Wald test statistics (*P-value* in parentheses)*	28.92 (0.000)	28.30 (0.000)	27.26 (0.000)	30.31 (0.000)	2.54 (0.0870)	3.42 (0.0391)
Absolute value of z statistics in parentheses: * significant at 10%; ** significant at 5%; *** significant at 1%						

Notes:

* - Wald test statistics of the joint significance of ERR dummies:

$$H_0 : D_{fix} = D_{\text{int}} = 0$$

Time dummies are omitted for brevity

Table 4. Sector Level Decomposition of GDP Growth (Nontradables)						
	RR CLASSIFICATION SCHEME			IMF CLASSIFICATION SCHEME		
	(1)	(2)	(3)	(1)	(2)	(3)
Investment/GDP	.1232032 (7.04)***	.1280162 (7.36)***	.0968685 (4.95)***	.1236425 (7.84)***	.1229096 (7.67)***	.1038352 (5.27)***
School enrolment	.0460568 (1.83)*	.0470556 (1.87)*	.0133431 (0.46)	.0416406 (1.69)*	.0418675 (1.69)*	.0395659 (1.43)
Population growth	-.2045206 (1.09)	-.1739597 (0.93)	-.1269904 (0.70)	-.216794 (1.19)	-.2096818 (1.14)	-.0875138 (0.46)
Openness	-.0284274 (2.03)**	-.0326841 (2.35)**	-.0405398 (2.74)	-.0220839 (1.47)	-.0237802 (1.50)	-.0301807 (1.69)*
TOT adjustment	-.0000323 (0.80)	-.000037 (0.92)	-.0000594 (1.44)	-.0000425 (.01)	-.0000431 (1.02)	-.0000564 (1.29)
Fiscal balance/GDP	-.0173502 (0.65)	-.0086387 (0.32)	-.0135058 (0.49)	-.040367791.83)*	-.0396335 (1.77)*	-.02111 (0.86)
Fixed ERR	-.4809932 (0.56)	-.4808961 (0.56)	-0.756101 (2.15)*	.1933797 (0.61)	.1917436 (0.60)	.0556606 (0.16)
Intermediate ERR	-.176225 (0.95)	.0115717 (0.06)	-.3248877 (1.21)	.1261657 (0.64)	.1035605 (0.50)	.0198568 (0.09)
Fixed ERR (-1)	–	-.1921168 (0.54)	–	–	-.0347867 (0.09)	–
Intermediate ERR (-1)	–	-.3782763 (2.04)**	–	–	.0701705 (0.31)	–
EU* Fixed ERR	–	–	1.10226 (1.56)	–	–	.2659666 (0.38)
EU* Intermediate ERR	–	–	.7025441 (1.68)*	–	–	.1698734 (0.44)

EU	–	–	.4317915 (1.07)	–	–	.6757214 (2.20)**
Observations	90	90	90	90	90	90
R-squared	0.4211	0.4408	0.4429	0.3559	0.3646	0.3306
Hausman test statistics (*P-value* in parentheses)	23.88 (0.0672)	25.35 (0.0872)	30.44 (0.0334)	24.73 (0.0815)	25.26 (0.0911)	26.57 (0.0817)
Wald test statistics (*P-value* in parentheses)*	0.55 (0.5809)	0.17 (0.8474)	2.34 (0.1046)	0.33 (0.7197)	0.21 (0.8144)	1.58 (0.4534)
Absolute value of z statistics in parentheses: * significant at 10%; ** significant at 5%; *** significant at 1%						

Notes:

* - Wald test statistics of the joint significance of ERR dummies:

$$H_0 : D_{fix} = D_{\text{int}} = 0$$

Time dummies are omitted for brevity