PUBLIC DEBT IMPROVES THE STABILITY OF EXCHANGE RATES IN DEVELOPING COUNTRIES? THE SPECIFIC CASE OF NEWS EUROPEAN MEMBERS (2004 AND 2007)

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Abstract

The aim of this paper is to speak about the current situation in Central and Eastern European countries (CEEC). The majority of them have been entering in European Union in 2004 and 2007. This step has been increasing their international attractiveness and improves their economic growth. However, they must stabilize exchange rate to sustain their foreign direct investment attraction. Two strategies are adopting about the regulation of exchange rate. Bulgarian, Estonia, Latvia, Lithuania Slovenia and Slovakia are entering in Exchange Rate Mechanism 2 (ERM2) to adopt quickly euro currency (it is now the case for Slovenia in 2007, Slovakia in 2009 and Estonia in 2011). Hungary, Poland, Czech Republic and Romania prefer only to stabilize their currency for the moment. Despite the strong economic dynamic of these countries before the Subprime crisis, the impact reveals the incapacity for several of them to improve currencies stabilities. The theoretical approach about Mundell-Fleming trilemma informs the necessity to scarify monetary policy in a context of free financial market and fixed exchange rate. In a reality, the capacity to use fiscal policy appears supplementary indeed more efficient.

Keywords: Central and Eastern European countries, foreign direct investment, regulation of exchange rate, Mundell-Fleming trilemma, monetary and fiscal policy.

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Introduction

Central and Eastern European countries (CEEC) underwent a mostly positive process of economic recovery following the collapse of the Soviet empire in 1991. Their strategy consisted of turning towards Western Europe in order to benefit from the most favourable circumstances. Today, these countries have experienced an impressive economic and financial metamorphosis. They are an integral part of the European area, with considerable commercial and financial as well as regulatory dependence. European Union accession in 2004 for some countries (Hungary, Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovenia and Slovakia) and in 2007 for others (Bulgaria and Romania) merely reinforced this growing trend. However, the process of European integration is not yet complete. The fact that 16 of the main European countries use the euro is driving the CEEC to adopt the single currency in the short term (such as Slovenia in 2007, Slovakia in 2009 and Estonia in 2011) or in the medium term for others.

This is a double issue for the Central and Eastern European countries. Their economic recovery process is based on high attractiveness to foreign capital. This trend can be strengthened by pegging to an international currency, thus neutralising the risk of change. The major role that the eurozone countries play in this region will only drive them to adopt it. However, even with diverging pegging strategies (fixed for short-term integration and controlled floatation for medium-term integration), the intermediate period is still synonymous with macroeconomic difficulties. The theory, by means of the Mundell-Fleming trilemma (Fleming, 1962) (Mundell, 1961), has highlighted the need to give up control of one of three objectives: i.e. pegging the exchange rate, free capital movement and independent monetary policy.

In this case, Central and Eastern European countries do not seem to reflect one of the sacrifices which should have been made. An analysis of the latest financial crisis shows the greater importance of fiscal policy as a tool for regulating short-term pegging as opposed to monetary policy. However, efficient use of this macroeconomic tool has not been confirmed by all the parties.

1. Return to the theoretical approach of a currency area:

1.1 Currency areas as a solution to currency instability?

Currency areas are based on the principle of different economies adopting a single currency in order to facilitate their exchanges, whether economic or financial. These areas can be characterised by currencies that are peripheral to the currency of the central country being pegged to the latter country's currency (such as the CFA franc to the euro, for example). They can also be defined by the creation of a single currency for all the member states of the area (as when the euro was created). Certain processes may include both these pegging modes. An intermediate period can be defined, consisting of pegging the currency to the reference currency before integrating the single currency as the national currency. The Central and Eastern European countries are currently in this situation. They need to implement Exchange Rate Mechanism 2 (ERM2) for at least two years with a fluctuation band relative to the euro of no more than 15%. Following this intermediate period, they will be able to join the eurozone.

The past and present international context broadly explains the current trend towards unifying many currencies, with the tension produced by instability of this type as well as with the increasing volumes of all kinds of international exchanges. As proof of this, the last decades have been characterised by recurring monetary crises following free floating of currencies. The principle of the gold standard was not feasible due to the explosion of worldwide economic growth, which required increasing amounts of liquidity, while gold circulation depends on the discovery and exploitation of reserves (Moure, 1999) (Contamin, et al., 1999). The two World Wars only speeded up the existing imbalances in this currency indexing system. However, following the Bretton Woods agreement of July 1944, the dollar was left as the only currency that was convertible into gold. The USA's increasing trade deficit during the 1970s posed the problem of maintaining convertibility with American gold reserves. The Triffin dilemma (Triffin, 1960) highlights the contradictions of this system. After several devaluations, the Jamaica Agreements of 8 January 1976 officially ended the gold convertibility of the dollar, allowing free floating of currencies in accordance with market forces.

This free currency floating is open to a variety of interpretations. Many authors stress the legitimacy of this instability as a source of regulation, via the exchange rate, of macroeconomic imbalances between countries (Couharde, et al., 2000). A trade deficit therefore leads to currency depreciation, which pushes up the cost of imports (which should drop) and drives down the selling price of exports (which should rise), thus restoring equilibrium in the balance of payments. However, currency variations do not depend exclusively on the balance of trade exchanges. America's recurring deficit merely confirms this hypothesis (Beynet, et al., 2006). The value of a currency is obtained according to its capacity for being exchanged worldwide as well as its usefulness as a transaction currency, as a security, etc. It is therefore difficult to defend the hypothesis that macroeconomic imbalances can be regulated exclusively by free floating of currencies. Exchange rate fluctuations lead to major upheavals in the value of assets, profitability ratios, price of assets sold abroad, cost of production in a given territory, etc.

In this unstable context, many countries have taken the initiative and agreed to peg their currencies, officially and otherwise. The possibility of neutralising the risk of change provides an opportunity to expand economic and financial ties among the members of this area. However, other constraints appear regarding the relevance of this choice, in particular the feasibility of pegging the currencies of countries with diverse conditions.

1.2 The Mundell-Fleming trilemma

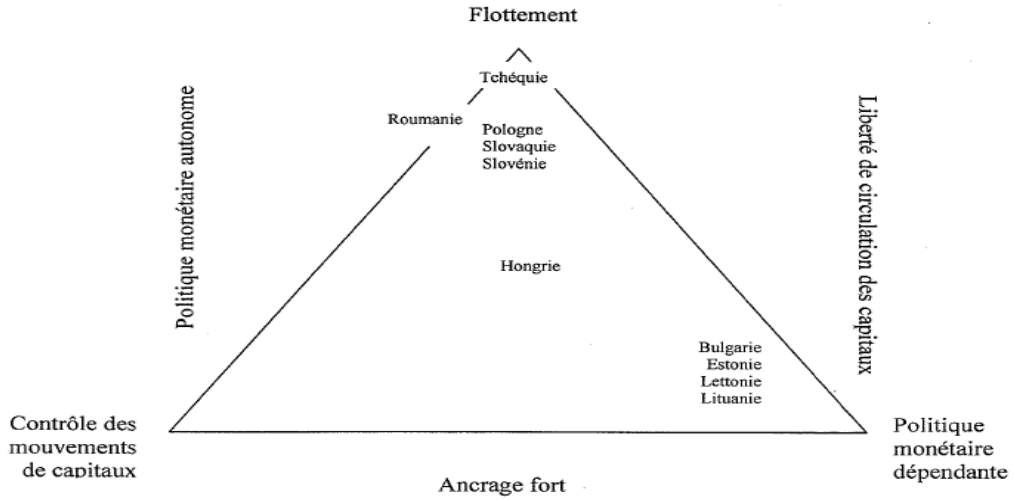
Mundell (Mundell, 1961) and Fleming (Fleming, 1962) put forward the theory of the trilemma of an economy in an international context in which the economy has to sacrifice one of the three objectives: a fixed exchange rate, free capital movement and independent monetary policy. Pegging an exchange rate in order to increase the economic and financial attractiveness of the Central and Eastern Europe countries requires sacrificing the independence of their monetary policy in favour of deregulating capital movement, which is a mandatory condition for joining the European Union (Directive, 1988). Renouncing monetary policy is justified by the need to peg the exchange rate by performing effects of attractiveness on international capital movements by varying the official market rates applied (Artus, et al., 2008). The monetary policy focuses on maintaining external balance which may, however, stand in contradiction to the internal balance (excessively high interest rates can reduce investment, mainly through indebtedness).

Membership of a monetary union implies that the countries in question have strong ties of economic and financial interdependence. The sacrifice of their monetary policy is less harsh if the members of the area will have similar reactions to external impacts. This is the concept of an optimum currency area, as put forth by Mundell (Mundell, 1961). Other channels for adjustment have been suggested, which aim to make up for the lack of uniformity between economies without however showing the non-feasibility of a currency area. Many papers have mentioned flexibility of production factors (Mundell, 1963), the degree of economic openness (McKinnon, 1963), the degree of production diversification

(Kennen, 1969), financial integration (Ingram, 1969), uniformity of preferences (Coopper, 1977) (Kindleberger, 1986), etc. The feasibility of a currency area therefore depends on the ability of its members to adapt to the international and regional context brought about by the ties of interdependence with their partners using factors other than exchange rate variations.

The Central and Eastern European countries, prior to their integration in the European Union in 2004 and 2007, had the chance to implement different strategies (Aubin, et al., 2003) for allocating the objectives of the Mundell-Fleming trilemma (Graphic 1).

I : Le triangle d'incompatibilité et la situation actuelle



Source: Aubin, Berdot, Goyeau and Leonard 2003.

Bulgaria, Estonia, Latvia and Lithuania chose hard pegging to the euro, while allowing free capital movement. Their monetary policy focussed on regulating the external balance. The ambition to control inflation via hard pegging explains why these countries adopted this strategy. The Czech Republic allowed its exchange rate to float, in addition to allowing free capital movement, leaving its monetary policy relatively independent. Romania, Poland, Slovakia and Slovenia preferred a flexible exchange system, with barriers to capital movements, ensuring maximum independence for their monetary policy. Hungary did not really choose objectives as concerns pegging (which has still not been truly defined), free capital movement or monetary policy.

The objectives chosen by the Central and Eastern European countries were broadly questioned after 2004 and 2007, in view of the balance imposed by the Mundell-Fleming trilemma. Free movement of capital was a condition for accession to the European Union (Directive, 1988). Bulgaria, Estonia, Latvia, Lithuania, Slovakia and Slovenia preferred to sacrifice the independence of their monetary policy and peg their currencies to the euro. On the other hand, the Czech Republic, Poland, Romania and Hungary chose to allow their currencies to float, keeping independent monetary policies. However, even for these countries with officially free exchange rates, relative control of the fluctuations of their currencies was put in place in order to avoid major disruptions, which would reduce their attractiveness to foreign capital (table 4).

Exchange rate variation allowing an economy to adjust itself in relation to the rest of the world no longer seems a decisive factor given the similarities between countries as well as the variety of potential channels for adjustment. The increasing number of currency areas around the world seems to bear witness to this fact. However, monetary crises involving the breakage of exchange rate pegs continue to have major repercussions today.

2. The special case of Central and Eastern European countries:

2.1 Legitimacy of joining the euro

The recovery process in Central and Eastern European countries was conditioned by the prospect of joining the European Union and eventually the eurozone. For this purpose, a series of resources were put in place to allow these economies to play an active role in the context of the European Union (Hapiot, et al., 2003). Today, the figures speak for themselves. The influence of Western Europe on Central and Eastern Europe can be seen in all spheres, whether economic, financial, monetary and even regulatory (tables 1, 2 and 3). The undeniable interdependence between the eurozone and these emerging countries (Defever, et al., 2005) (Multon, 2003) merely validates the optimum nature of eventual integration of the latter (possibly after evening out the difference in levels of development).

Table 1. Exports to the EU as a share of total exports (%).

geo\time	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
EU27	***68***	***67.9***	***68***	***68.8***	***68.5***	***67.8***	***68.3***	***68.1***	***67.4***
Bulgaria	56.2	60.7	62.1	63.2	62.2	60	60.7	60.8	60
Czech Republic	85.9	86.5	85.7	87.3	87.1	85.5	85.7	85.3	84.9
Estonia	88.1	81.3	81.7	82.4	80.4	78.1	65.6	70.2	70
Latvia	80.7	78.6	77.8	79.4	77.4	76.5	72.5	72.5	68.6
Lithuania	74.7	73.3	69.3	62.8	67.2	65.7	63.6	64.8	60.3
Hungary	83.6	83.8	84.5	84.2	83.1	80.9	79.2	79	78.2
Poland	81.2	81.2	81.2	81.9	80.3	78.6	79	78.9	77.8
Romania	72.2	75.2	73.8	75.3	74.7	70.1	70.3	72	70.5
Slovenia	72.1	70.6	68.6	68.2	67.5	68.2	68.4	69.3	68.1
Slovakia	89.8	90.6	89.5	85.9	86.7	87.2	86.8	86.8	85.3

Source: Eurostat and own calculations.

Table 2. Imports from the EU as a share of total imports (%).

geo\time	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
EU27	**63.5**	**64.6**	**65.8**	**66.1**	**66**	**64.5**	**64.1**	**64.3**	**62.6**
Bulgaria	52.9	57.1	57.7	57.7	57	62.6	61.1	58.5	56.7
Czech Republic	75.2	74.6	72.5	71.4	80.3	81.4	80.5	80.1	76.9
Estonia	70.6	66.4	68.9	65	73.7	76.3	74.4	78.6	79.8
Latvia	74.3	76	77.5	75.5	75.7	75.3	76.5	77.4	75.5
Lithuania	54.8	54.7	56.8	56.1	63.5	59.5	62.8	68.3	57.6
Hungary	66.1	65.9	65	64.5	68.5	69.9	70.2	69.5	68.2
Poland	69	69.7	69.7	69.6	75.3	75.3	73	73.3	71.9
Romania	65.3	67.1	68.2	68.2	65.9	63	63.4	71.3	69.2
Slovenia	76.9	77.3	77.5	76.5	82.1	79.4	77.7	73.7	71.3
Slovakia	70.2	72	73	74.4	78.8	77.8	75.2	74.6	72.9

Source: Eurostat and own calculations.

These two tables (1 and 2) describe the strong trade dependence about Central and Eastern Europe within European Union. Shares of exports (68% in 2000 and 67.4% in 2008) and imports (63.5% in 2000 and 62.6% in 2008) are high in level but also during the time. These results show reliance well before European Union integration in 2004 and 2007.

Table 3. FDI from Europe as a percentage of total FDI (%).

geo/time	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
Bulgaria		85.24	86.79	88.22	90.01	90.02	90.61	91.25	91.91
Czech Republic	91.96	91.68	93.07	91.64	91.78	92.22	92.89	92.85	94.23
Estonia	92.93	87.71	89.84	90.24	91.31	92.02	94.77	95.94	96.10
Hungary				84.09	73.68	75.14	72.55	71.80	74.98
Lithuania	86.72	88.06	88.11	89.62	91.49	95.72	95.85	95.89	94.22
Latvia	69.93	67.55	80.05	80.20	81.85	86.02	86.50	89.16	90.04
Poland	87.84	88.82	89.51	89.75	89.29	89.16	88.66	88.17	89.60
Romania				81.94	80.90	91.59	95.24	93.40	94.43
Slovenia		94.01	96.05	97.27	97.47	97.37	96.60	98.43	98.37
Slovakia	90.51		93.30	94.93	94.85	94.93	93.87	92.58	93.54

Source: Eurostat and own calculations.

The table 3 informs about integration level between European Union with Central and Eastern European countries. Foreign Direct Investments come from principally to Europe (until 98.37% in Slovenia in 2008). Strategy adopting by European firms about these countries explains this situation. Central and Eastern European countries take part totally of industrial and financial repartition.

There are two distinct steps in the process of integration in the euro for these countries (Aubin, et

al., 2003) (Henriot, et al., 1997). The first consists of pegging (with more or less rigour, as specified above) the currencies of these countries to the euro. In a context of free movement of capital, imposed when joining the European Union (Directive, 1988), monetary policy is then required to maintain an external balance which may contradict the internal balance, which can be relatively delicate in the context of an economic recovery process (Berdot, et al., 2007). The second stage consists of joining the euro. The risk of losing synchronism among currencies is no longer an issue as the currency of the emerging country is merged into the euro (the applicable European laws do not include an exit clause). Emerging countries can find it difficult to permanently lose a large part of their room for macroeconomic manoeuvres.

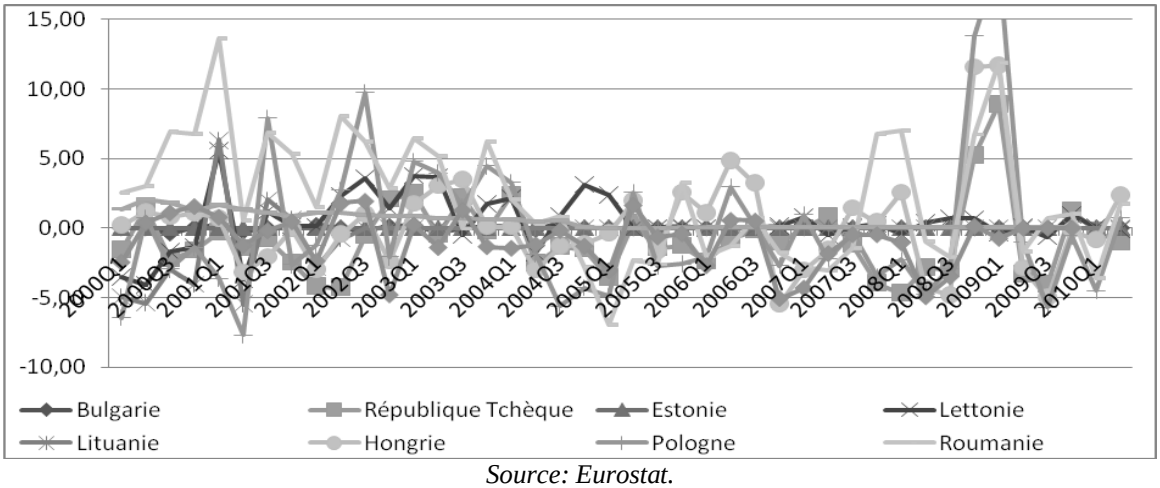
Table 4. Volatility of the exchange rate peg (2000 - 2010).

Standard deviation of exchange rates with the euro:	Nominal exchange rate:	Actual exchange rate:
Bulgaria	0.13	1.60
Czech Republic	2.62	2.69
Estonia	0.00	0.84
Hungary	3.56	3.64
Lithuania	1.95	2.12
Latvia	1.92	2.33
Poland	5.35	5.35
Romania	4.46	3.65
Slovenia (joined the euro in 2007)	0.61	0.51
Slovakia (joined the euro in 2009)	1.87	2.43

Source: Eurostat and own calculations.

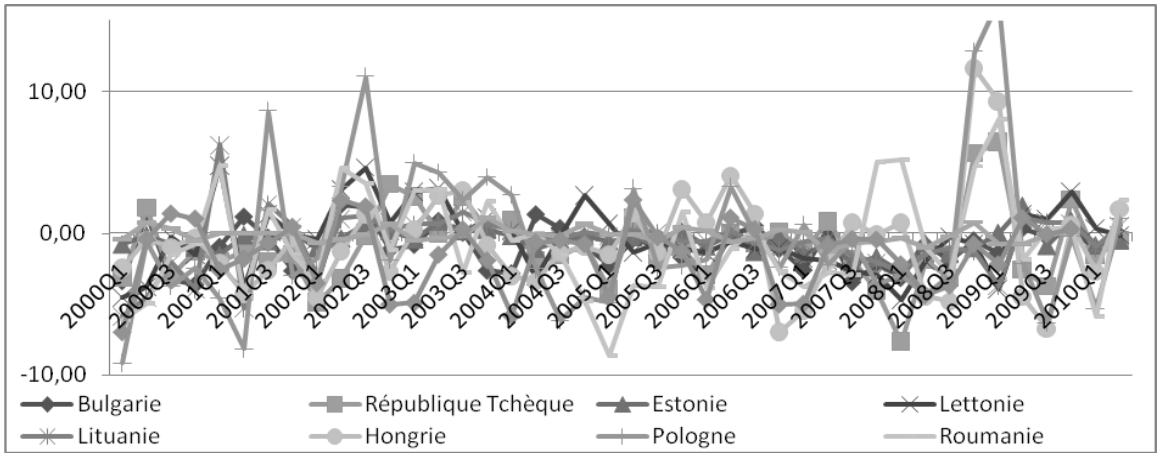
The analysis of the facts shows that 6 out of 10 countries have pegged their nominal exchange rates to the euro, with standard deviations not exceeding 2 (table 4) for the period from 2000 to 2010 (Bulgaria, Estonia, Lithuania, Latvia, Slovenia and Slovakia). At the same time, in other countries without official pegging (Czech Republic, Hungary, Poland and Romania), the variations remain under control with standard deviations from 2.62 to 5.35 (table 4). The analysis of actual exchange rates, in particular for countries with fixed pegging, confirms no escalation of the nominal exchange rate. It is justifiable to peg the currency of an emerging country to its main partner as a method to neutralise the exchange rate risk. However, sacrificing monetary policy can be a major issue for countries under permanent tension, during periods of over-attractiveness as well as during generalised capital flight (Ennajar, et al., 2005). The aim here is not to question the criteria used for deciding whether or not to join the eurozone, but rather how Central and Eastern European countries are managing this situation (mainly via their monetary policy) in a context of free movement of capital and exchange rate pegging (fixed for some and relatively supervised for others).

Graph 2. Rate of variation of the nominal exchange rate with the euro.



Source: Eurostat.

Graph 3. Rate of variation of the actual exchange rate with the euro.



Source: Eurostat.

The level of variation about Central and Eastern European countries is relatively stable from 2000 to 2010 (graphs 2 and 3). You are a break of this tendency at the end of 2008 until 2009, during Subprime crisis. It was a difficult period for these countries where a strong part of Foreign Direct Investments leave. Now, the situation has restored but not totally. This crisis has impacted strongly their economic dynamic which rested on exportation toward Western European Union.

2.2 Ineffectiveness of monetary policy as a method to guarantee external balance

The Mundell-Fleming trilemma has highlighted the need to sacrifice independent monetary policy in order to regulate the flows of free capital movement required to maintain the pegging of an exchange rate. The goal is to vary the official market rates of the Central Bank such as to influence the attractiveness of the country and maintain the external balance of the economy. The goal here is to check whether this macroeconomic tool is effective in order to validate this hypothesis for Central and Eastern European countries. Thus, you analyse the impact of the official market rate of each one of these countries on its internal structure (with the three-month financial market interest rates). Then, the analyse studies the responsiveness of the external structure by comparing the official market rates of the Central Banks with the flows of foreign capital.

Table 5. Effectiveness of monetary policy as a method to ensure internal balance (1995-2010).

Correlation coefficient:	*Central Bank three-month official market rate for the financial market:*
Bulgaria	
Czech Republic	0.94
Estonia	
Hungary	0.93
Lithuania	0.51
Latvia	0.68
Poland	0.99
Romania	0.84
Slovenia	0.89
Slovakia	0.98

Source: Eurostat and own calculations.

Table 6. Effectiveness of monetary policy as a method to ensure external balance (1995-2010).

Correlation coefficient with the Central Bank official market rate and foreign capital movements:	*I(t) total*	*I(t) Ct*	*I(t) Pf*	*I(t) FDI*
Bulgaria				
Czech Republic	-0.04	-0.18	0.08	0.05
Estonia				
Hungary				
Lithuania	-0.28	-0.37	0.10	0.05
Latvia	-0.17	-0.17	0.02	-0.10
Poland	-0.16	-0.25	0.10	0.00
Romania	-0.81	-0.78	0.12	-0.75
Slovenia	-0.47	-0.81	0.58	0.26
Slovakia	-0.26	-0.31	-0.02	0.05

Source: Eurostat and own calculations.

The Central and Eastern European countries show considerable influence between the official market rates of their Central Bank and the three-month interest rates in their financial markets (table 5). Monetary policy has a noticeable effect on the internal balance of the country (0.51 for Lithuania until 0.99 in Poland). On the other hand, monetary policy has no effect on the attractiveness of capital movements in order to consolidate an external balance, not including portfolio capital movements (table 6). The majority of results are negative or almost zero. Quite on the contrary, any rise in the official market rates in these emerging countries mainly leads to flight of short-term, foreign direct investment and overall capital. An interesting point can be made in this regard. Capital movements react in the opposite direction to the desired effect (increasing the official market rates should attract capital movements, while empirical evidence shows the opposite).

Table 7. Influence of eurozone monetary policy on the external balance (1995-2010).

Correlation coefficient with the ECB official market rate and foreign capital movements:	*I(t) total*	*I(t) Ct*	*I(t) Pf*	*I(t) FDI*
Bulgaria				
Czech Republic	*0.21*	*0.11*	*0.13*	*0.14*
Estonia				
Hungary	*-0.17*	*-0.06*	*-0.12*	*-0.03*
Lithuania	*0.16*	*0.11*	*-0.05*	*0.27*
Latvia	*0.13*	*0.11*	*-0.13*	*0.31*
Poland	*0.36*	*0.44*	*-0.23*	*0.29*
Romania	*0.15*	*0.18*	*0.22*	*0.02*
Slovenia	*0.16*	*0.15*	*-0.07*	*-0.03*
Slovakia	*0.03*	*-0.09*	*0.10*	*0.13*

Source: Eurostat and own calculations.

The analysis of the correlation between European Central Bank official market rates and capital movements from Central and Eastern European countries, not including portfolio capital movements, becomes much more relevant. It is a strong relation between European Central Bank official market rate and foreign capital movements, more especially for total, short term and FDI capital movements (table 7). It seems that attractiveness of capital movements to these countries also depends on more international variables. The specific nature of these economies justifies this result, with a considerable presence of European investors, both in terms of capital movements and through the control of strategic sectors such as commercial banking, for example (Moody's, 2009)**.**

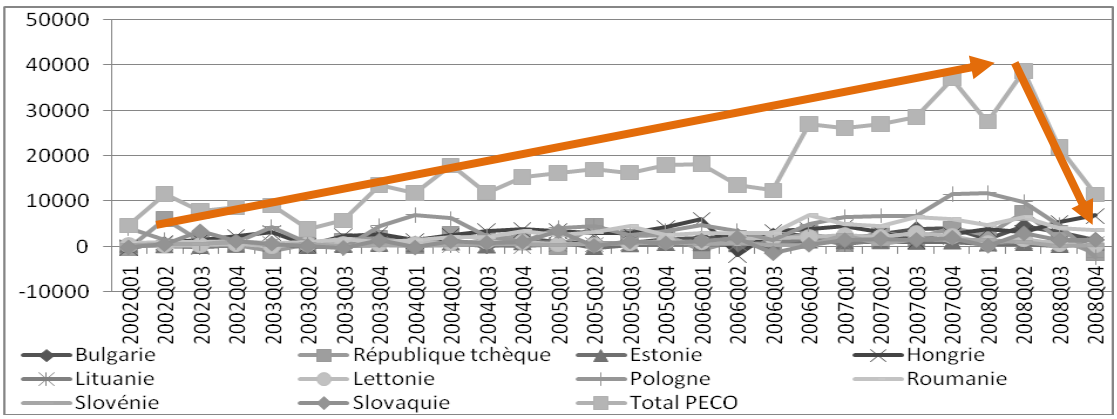
Monetary policy does not seem to be effective in its ability to regulate the exchange rate peg in a context of capital deregulation. This situation is of much concern, since it leaves the Central and Eastern European countries highly vulnerable.

3. Fiscal policy as a tool for short-term regulation of the exchange rate peg:

3.1 Known vulnerability of Central and Eastern European countries during the crisis

The economic recovery strategies implemented by each of the Central and Eastern European countries, based on the harder or softer pegging of their currency to the euro, provide an opportunity to increase the attractiveness of foreign capitals (Aubin, et al., 2006) (De Sousa, et al., 2004) (De Sousa, et al., 2006). However, in a tense situation, capital flight caused by capital deregulation puts extra pressure on the exchange rates. The issue here is not to wonder about the potential vulnerabilities of each economy, but rather to highlight the weakness brought about by this choice. The countries in question do not all have the same characteristics, either economic, financial or structural. They have greatly diverse levels of development (BCE, 2007). But above all, their economic recovery strategies are different: short-term for some and medium-term for others. However, the impact of the latest crisis affected them all without any clear distinctions (graph 4).

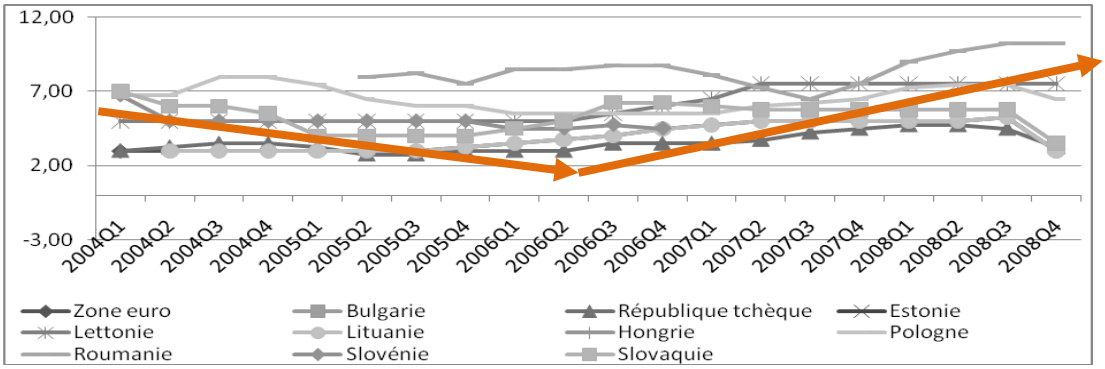
Graph 4. Capital flight induced by increasing risk (in million of euro).



Source: Eurostat.

The Subprime crisis highlighted this situation of vulnerability (Baduel, et al., 2009), in which even attempts at regulation via monetary policy were not effective in containing capital flight (graph 5).

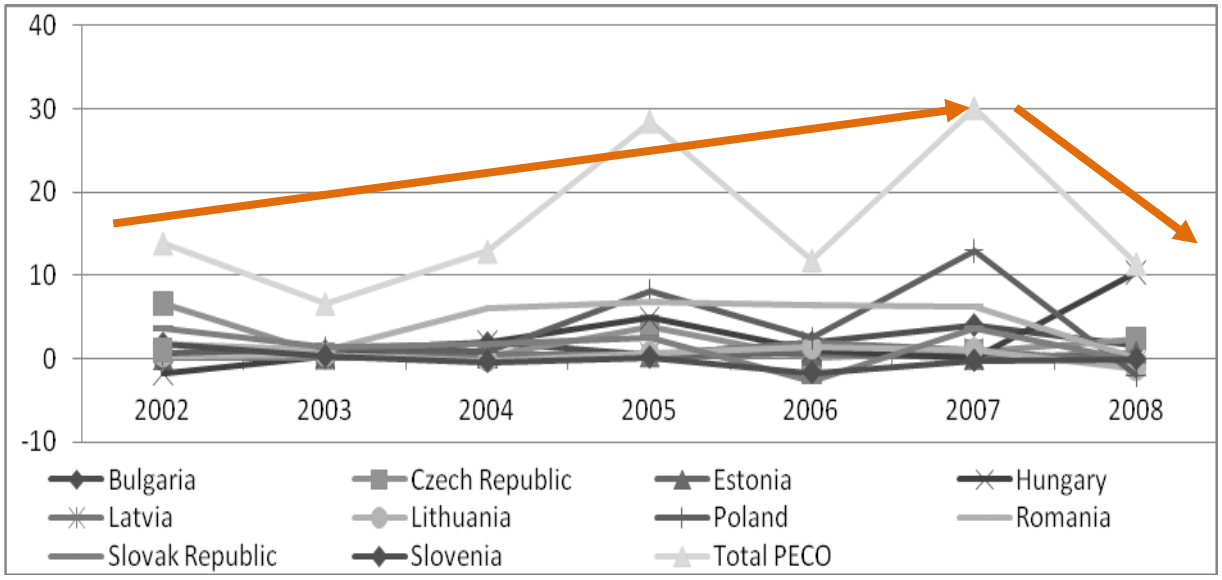
Graph 5. Increase of official market rates (%).



Source: Eurostat.

Estonia, Hungary and Romania even requested international aid to obtain the loans (Rodado, 2008) they needed in order to restore their currency stocks so as to maintain their exchange rate pegs (graph 6). The ability of these countries to retain capital brings up the question of regulating monetary policy in tense situations. Indeed, even if Central Banks sharply raise their rates, thus stifling the dynamism of the domestic economy, since these countries now have alarming risk profiles, international investors nevertheless no longer want to keep their investments there (Rodado, et al., 2009).

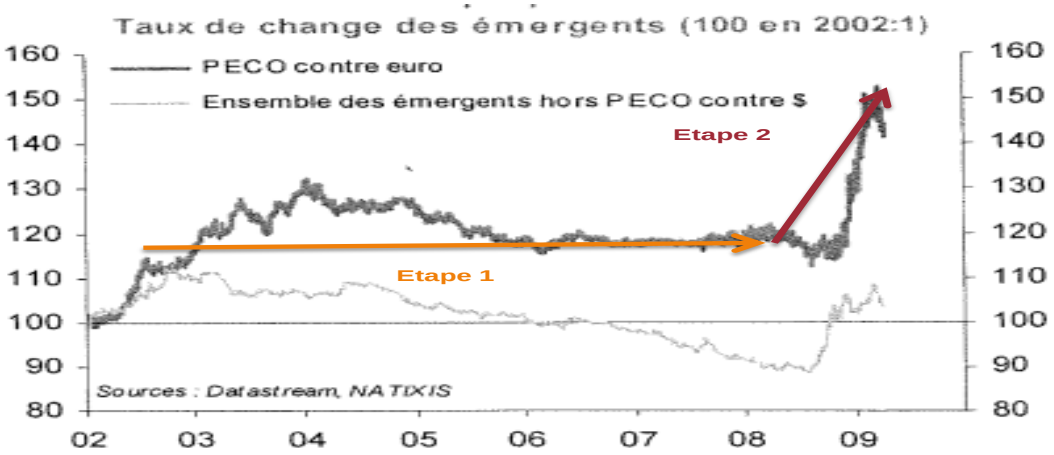
Graph 6. Exchange rate regulation by currency reserves (billion of US dollars).



Source: IMF.

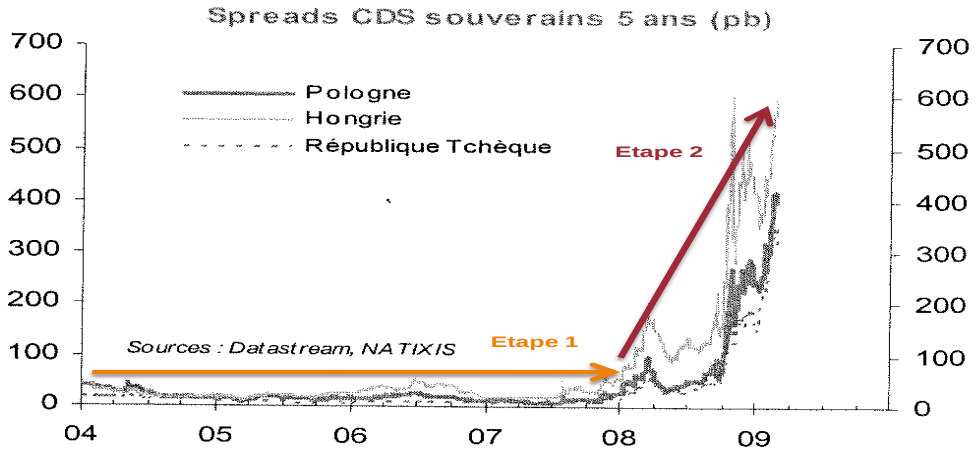
In these conditions, fiscal policy appears as the best short-term substitution tool for peg regulation (OCDE, 2003). Thus, the ability of a government to indebt itself in foreign currency in order to increase its reserves and guarantee its currency peg is therefore decisive (Faure, 2009). It is not a case here of determining whether the country is capable of guaranteeing its own medium or long-term economic growth. But rather its ability to respond to pressure brought on by the flight of international capital (graph 7).

Graph 7. Exchange rates are still under tension despite the use of monetary policy.

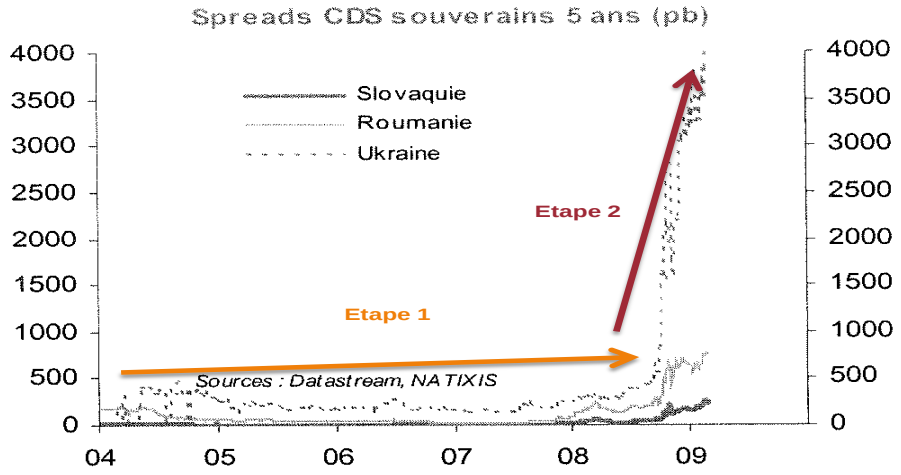


The latter may return rapidly once the tension induced by the uncertainties affecting the region has ended. The Subprime crisis offered a clear illustration of this state of affairs, mainly for Central and Eastern European countries, with these countries showing their defiance in the fourth quarter of 2008 (graphs 8 and 9).

Graph 8. Monetary policy is ineffective when country risk is too high.



Graph 9. Monetary policy is ineffective when country risk is too high.



The responsiveness of fiscal policy for regulating pressure on the exchange rate depends on its short-term room for manoeuvres, which is directly conditioned by the medium-term policies thus implemented (CAS, 2010). A country running recurring deficits will automatically have a considerable indebtedness rate, reducing its future financial capacity. All the Central and Eastern European countries that may have had difficulties in the context of the latest crisis had vulnerabilities in their fiscal policies that did not allow them to play an effective role (high total indebtedness for Hungary, mainly short-term indebtedness for Estonia, Latvia and Hungary, pro-cyclical public expenditure for Bulgaria, Latvia, Estonia and Romania). Regardless of the medium- or long-term feasibility of the economic recovery process in these countries, the financial crisis has highlighted the importance of short-term regulation via public deficits to the detriment of monetary policy, which has become ineffective (Calès, et al., 2001).

3.2 Determination of fiscal policy responsiveness in times of crisis:

In order to judge the responsiveness of the fiscal policies of Central and Eastern European countries in times of crisis, a model is built and tested econometrically. With the help of a crisis indicator on the exchange rate (which name CRISE), based on the work of Cartapanis (Cartapanis, et al., 1998) (Cartapanis, et al., 1999), variables are used which indicate the responsiveness of the fiscal policy. However, the test used here is only suitable for judging the responsiveness of fiscal policy in times of crisis, nothing else. The ability for regulation by running public deficits, allowing governments to become indebted in international currencies, in order to recover the currency reserves required to maintain their peg, depends as much on discretionary fiscal policies as on stabilising automatic fiscal policies. The two types of policy are closely related. Automatic stabilising policies can minimise the impact of a recession and allow quicker recovery, but they automatically increase the public deficit. On the other hand, discretionary intervention of the government is only possible in relation to its indebtedness rate, which may have been reduced by the automatic stabilising policies.

To realize the test about fiscal policy ability on Central and Eastern European countries, it is important to explain CRISE indicator. Cartapanis (Cartapanis, et al., 1998) (Cartapanis, et al., 1999) used different approach to realize it (Sachs, et al., 1996) (Goldfajn, et al., 1997). CRISE is an average of real exchange rate variation (in your case, with euro currency and not dollar US) and negative international currency reserves variation (with an inverse weighted of standard deviation measured on five previous years with monthly date). In the case of this study, the dates are in quarterly and not in monthly (more specially to realize tests after with quarterly fiscal policy dates). The interest here is to inform about the level of pressure (when the standardized rate of real depreciation of the currency is important and the standardized rate of decline of foreign reserves is itself). Speculative attacks are identified by extremes of crisis index which is more than twice the standard deviation above its mean. The majority of currency crises identified by the literature (Kaminsky, et al., 1996) are empirical characterization of currency crises.

Also, the same indicator of crisis pressure is used on the exchange rate, known as CRISE, with the following equation:

$$CRISE = \left[\frac{\log\left(\frac{TCRt}{TCRt-1}\right)}{\sigma DTCR}\right] - \left[\frac{\log\left(\frac{RESt}{RESt-1}\right)}{\sigma DRES}\right]$$

TCR = (TCN*Peuro)/P;
TCR Actual exchange rate (an increase corresponds to a real depreciation);
TCN Nominal exchange rate (local currency unit / euro);
Peuro Retail price in euro;
P Domestic retail price of the country;
RES International currency reserves (in euro or left out);
σDTCR Standard deviation of log (TCRt/TCRt-1) ;
σDRES Standard deviation of log (RESt/RESt-1) ;

The process of responsiveness of a fiscal policy in this type of situation implies counter-cyclic behaviour, through automatic stabilisation and discretionary policies. In periods of exchange rate tension, State expenditure increases, while its income drops, resulting in an increase of the deficits and the weight of total indebtedness. On the other hand, during favourable periods, income should rise and expenditure should drop to allow the governments to recover the room for manoeuvre they need for the next crisis. For this reason, these variables are used to represent this process (table 8).

Table 8. Variables about econometric test:

Variables:	*Desired sign of the coefficient:*	*Measurement unit:*
(Da): Budget deficits of the public powers.	*Positive*	*Percentage of GDP*
(Et): Total indebtedness of the public powers.	*Positive*	*Percentage of GDP*
(Td): Total expenditure of the public powers.	*Positive*	*Percentage of GDP*
(Tr): Total income of the public powers.	*Negative*	*Percentage of GDP*
(Ti): Total public taxes.	*Negative*	*Percentage of GDP*
(Cc): Counter-cyclic fiscal policy.	*Positive*	*Percentage of GDP*
(Ect): Short-term maturity of the debts of the public powers.	*Negative*	*Percentage of total indebtedness.*
(Ip): Interest payable by the public powers.	*Positive*	*Percentage of GDP*

The variables of budget deficits (Da) and total indebtedness (Et) show the financial capabilities put into place when there is tension on the exchange rate. However, they are not enough to indicate a counter-cyclic public policy. The variables of total expenditure (Td), total income (Tr) and total tax inform us of the real process in place in the country (a public deficit can be softened by reducing expenditure and increasing income by changing taxes). The pro-cyclic nature of the fiscal policy (based on deficits and economic growth rates) stresses the use of financial capabilities of the State during optimum or non-optimum periods. The variables in the short-term maturity dates of public debt and interest payable are additional indicators that complete the analysis. An increase of the risk in Central and Eastern European countries might force them to take on short-term debt at higher rates.

The indicator of crisis pressure on the exchange rate known as CRISE allows obtaining the following equation:

$$CRISE = \alpha 1 + \alpha 2.(Da) + \alpha 3.(Et) + \alpha 4.(Td) + \alpha 5.(Tr) + \alpha 6.(Ti) + \alpha 7.(Cc) + \alpha 8.(Ect) + \alpha 9.(Ip)$$

Table 9. Results about econometric test:

Variable coefficient:	***Optimum fiscal policy***	*Bulgaria*	*Estonia*	*Lithuania*	*Latvia*	*Slovenia*	*Slovakia*
(Da)	+	-	-	-	-	+	-
(Et)	+	-	+	-	-	+	+
(Td)	+	-	-	-	-	+	-
(Tr)	-	+	+	+	+	-	+
(Ti)	-	-	-	-	-	-	+
(Cc)	+	-	+	-	-	+	+
(Ect)	-	+	+		+	+	-
(Ip)	+	+	+	-	+	-	-

The analysis shows divergence among Central and Eastern European countries (table 9). First of all, modelling Romania had trouble. The history of this country can justify this situation. It is therefore excluded it from the sample. There are three countries for which the tests highlight the lack of significance of the variables. These are the Czech Republic, Hungary and Poland. Apparently, they have no true fiscal policy (neither pro-cyclic nor counter-cyclic) during periods of tension on the exchange rate. However, that these are the only three countries whose currency is not hard pegged to the euro (since Romania is excluded from the list). The default of Hungary during the Subprime crisis with its request for international aid in order to reconstitute its currency reserves, should have led it to question the relevance of using fiscal policy. Another group is notable for its pro-cyclic fiscal policies, which is therefore non-optimum during these tension phases (Bulgaria, Estonia, Lithuania and Latvia). These countries are even more vulnerable to pressure on their exchange rates, since their pro-cyclic fiscal policy will strengthen the increased vulnerabilities of the time (no intervention margin, inverse effect of the automatic stabilisation policies, etc.). As for Slovenia and Slovakia, the analysis was only conducted up until their integration in the euro so to avoid any bias (their exchange rate exposure became zero when they joined the eurozone). Slovenia seems to be a good student, with optimum fiscal policy, while Slovakia is still in an intermediate situation.

Conclusion

The approach aimed to describe a reality in the context of pegging the exchange rates (in a harder or softer fashion) of the Central and Eastern European countries that joined the European Union in 2004 and 2007. The theoretical approach using the Mundell-Fleming trilemma highlights the obligation of sacrificing one of three objectives: pegging the exchange rate, free capital movement and independent monetary policy. The desire of these emerging countries to speed up their economic recovery process has led them to peg their currencies to the euro, officially or otherwise. However, free movement of capital was a condition for accession to the European Union in 2004 and 2007. In this context, it was legitimate to sacrifice monetary policy independence in order to guarantee external balance to the detriment of internal balance.

However, the analysis of the monetary policy of these countries does not justify true effectiveness in order to guarantee pegging to the euro. The variations of the official market rates of the Central Bank have a clear influence on domestic interest rates. However, these variations do not seem relevant as regards the ability to attract foreign capital. Quite on the contrary, the tests actually show a negative correlation. This characteristic, which contradicts the dominant Mundell-Fleming trilemma theory, can be explained by increased risk alongside rising official market rates. Even if productivity increases, this is not enough in terms of the risk of default of the country. The integration of these countries in the European area highlights other variables in the behaviour of international investors. The importance European Central Bank official market rates have on the flows of capital towards these countries only confirms this state of affairs.

The recent Subprime crisis cast light on the ineffectiveness of monetary policy, with fiscal policy turning out to be a much more suitable short-term regulation tool. All the countries that have had difficulties pegging their exchange rates had, at the same time, known vulnerabilities in their ability to use this pegging (high total indebtedness for Hungary, mainly short-term indebtedness for Estonia, Latvia and Hungary, pro-cyclical public expenditure for Bulgaria, Latvia, Estonia and Romania). The model that was proposed, using an index of exchange rate pressure (Cartapanis, et al., 1998) (Cartapanis, et al., 1999), aimed to judge the responsiveness of the fiscal policies of these countries when subjected to short-term pressure. The countries were split into two main groups. The first included Hungary, Poland and the Czech Republic, whose currencies are not officially pegged to the euro (but which still want to stabilise their currencies). Fiscal policy does not seem to be used in this context. The second group includes Bulgaria, Latvia, Estonia and Lithuania, with pro-cyclic fiscal policies. The vulnerabilities are even greater in this case since, in addition to not playing a stabilising role, their fiscal policy further increases tensions through the inability of the governments to take relevant action. Slovenia is an example of optimum use with true counter-cyclic effects, while Slovenia is in a more intermediate situation.

In order to preserve the benefits of an economic recovery process, which is more than satisfactory for these countries, the question of permanent pegging to the euro during periods of short-term tension must be answered. Ineffectiveness of monetary policy as a method to guarantee external balance should also lead to complementary use of fiscal policy. Some countries have already joined the eurozone (Slovenia in 2007 and Slovakia in 2009) while others will be joining soon (in particular Estonia in 2011). It would seem that membership of the single currency would neutralise the risk of change (since only one currency would exist). However, all this does is shift the problem, given the difficulties of controlling a currency area which appears to be increasingly sub-optimum.

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Annexes: results of econometrics tests.

Bulgaria. Dependent Variable: CRISE
Method: Least Squares
Date: 08/17/10 Time: 16:34
Sample (adjusted): 2000Q1 2009Q4
Included observations: 40 after adjustments
CRISE=C(1)+C(2)*DA+C(3)*ET+C(4)*TD+C(5)*TR+C(6)*CC+C(7)*TI+C(8)*ECT+C(9)*IP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-3.511200	1.953797	-1.797116	0.0821
C(2)	-17.25176	32.19663	-0.535825	0.5959
C(3)	-0.014474	0.019129	-0.756626	0.4550
C(4)	-17.32156	32.20603	-0.537836	0.5945
C(5)	17.39450	32.18111	0.540519	0.5927
C(6)	-0.141032	0.083123	-1.696656	0.0998
C(7)	-0.005974	0.088242	-0.067699	0.9465
C(8)	0.074007	0.068830	1.075212	0.2906
C(9)	0.340571	0.119428	2.851678	0.0077

R-squared	0.443128	Mean dependent var	-0.648685
Adjusted R-squared	0.299419	S.D. dependent var	0.966685
S.E. of regression	0.809123	Akaike info criterion	2.609375
Sum squared resid	20.29506	Schwarz criterion	2.989373
Log likelihood	-43.18750	Hannan-Quinn criter.	2.746770
F-statistic	3.083510	Durbin-Watson stat	2.120319
Prob(F-statistic)	0.011218		

Estonia: Dependent Variable: CRISE
Method: Least Squares
Date: 08/17/10 Time: 16:35
Sample (adjusted): 2000Q1 2009Q4
Included observations: 40 after adjustments
CRISE=C(1)+C(2)*DA+C(3)*ET+C(4)*TD+C(5)*TR+C(6)*CC+C(7)*TI+C(8)*ECT+C(9)*IP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-5.393014	2.577824	-2.092080	0.0447
C(2)	-69.19741	41.79896	-1.655482	0.1079
C(3)	0.836356	0.309543	2.701907	0.0111
C(4)	-69.27752	41.81173	-1.656892	0.1076
C(5)	69.08866	41.86107	1.650427	0.1090
C(6)	-0.101348	0.079014	-1.282659	0.2091
C(7)	0.231154	0.162854	1.419396	0.1658
C(8)	0.044200	0.052828	0.836675	0.4092
C(9)	2.202441	2.584212	0.852268	0.4006

R-squared	0.453775	Mean dependent var	-0.900000
Adjusted R-squared	0.312813	S.D. dependent var	1.331666
S.E. of regression	1.103907	Akaike info criterion	3.230697
Sum squared resid	37.77695	Schwarz criterion	3.610695
Log likelihood	-55.61394	Hannan-Quinn criter.	3.368092
F-statistic	3.219140	Durbin-Watson stat	2.254693
Prob(F-statistic)	0.008842		

Hungary. Dependent Variable: CRISE
Method: Least Squares
Date: 08/17/10 Time: 16:38
Sample (adjusted): 2000Q1 2009Q4
Included observations: 40 after adjustments
CRISE=C(1)+C(2)*DA+C(3)*ET+C(4)*TD+C(5)*TR+C(6)*CC+C(7)*TI+C(8)*ECT+C(9)*IP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	7.032198	5.593309	1.257252	0.2181
C(2)	41.44939	37.45699	1.106586	0.2770
C(3)	-0.001559	0.029974	-0.051996	0.9589
C(4)	41.43999	37.41812	1.107484	0.2766
C(5)	-41.44817	37.38577	-1.108662	0.2761
C(6)	0.028442	0.083760	0.339567	0.7365
C(7)	-0.059105	0.203352	-0.290655	0.7733
C(8)	-0.025445	0.017873	-1.423671	0.1645
C(9)	-1.075057	0.531601	-2.022302	0.0518

R-squared	0.216994	Mean dependent var	-0.505000
Adjusted R-squared	0.014928	S.D. dependent var	1.163979
S.E. of regression	1.155258	Akaike info criterion	3.321632
Sum squared resid	41.37326	Schwarz criterion	3.701630
Log likelihood	-57.43265	Hannan-Quinn criter.	3.459028
F-statistic	1.073876	Durbin-Watson stat	2.068052
Prob(F-statistic)	0.406238		

Latvia. Dependent Variable: CRISE
Method: Least Squares
Date: 08/17/10 Time: 16:44
Sample (adjusted): 2000Q1 2009Q4
Included observations: 40 after adjustments
CRISE=C(1)+C(2)*DA+C(3)*ET+C(4)*TD+C(5)*TR+C(6)*CC+C(7)*TI+C(8)*ECT+C(9)*IP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	12.55100	5.321103	2.358721	0.0248
C(2)	-82.35690	44.25441	-1.860987	0.0723
C(3)	-0.182065	0.073771	-2.467977	0.0193
C(4)	-82.28178	44.24419	-1.859719	0.0724
C(5)	82.43257	44.24717	1.863002	0.0720
C(6)	-0.051803	0.053954	-0.960134	0.3444
C(7)	-0.610530	0.239551	-2.548646	0.0160
C(8)	0.676900	0.300869	2.249816	0.0317
C(9)	0.090025	0.942759	0.095491	0.9245

R-squared	0.365110	Mean dependent var	-0.552500
Adjusted R-squared	0.201268	S.D. dependent var	1.452317
S.E. of regression	1.297962	Akaike info criterion	3.554575
Sum squared resid	52.22585	Schwarz criterion	3.934573
Log likelihood	-62.09150	Hannan-Quinn criter.	3.691970
F-statistic	2.228424	Durbin-Watson stat	2.183327
Prob(F-statistic)	0.052487		

Lithuania. Dependent Variable: CRISE
Method: Least Squares
Date: 08/17/10 Time: 16:45
Sample (adjusted): 2000Q1 2009Q4
Included observations: 40 after adjustments
CRISE=C(1)+C(2)*DA+C(3)*ET+C(4)*TD+C(5)*TR+C(6)*CC+C(7)*TI+C(9)*IP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	12.71701	4.555986	2.791274	0.0088
C(2)	-53.73407	53.44505	-1.005408	0.3222
C(3)	-0.067960	0.083017	-0.818632	0.4191
C(4)	-53.66900	53.45786	-1.003950	0.3229
C(5)	53.38899	53.45681	0.998731	0.3254
C(6)	-0.041333	0.041953	-0.985219	0.3319
C(7)	-0.100455	0.200677	-0.500580	0.6201
C(9)	-0.137761	0.559530	-0.246208	0.8071

R-squared	0.287601	Mean dependent var	-0.625000
Adjusted R-squared	0.131764	S.D. dependent var	1.265063
S.E. of regression	1.178776	Akaike info criterion	3.343686
Sum squared resid	44.46438	Schwarz criterion	3.681462
Log likelihood	-58.87372	Hannan-Quinn criter.	3.465815
F-statistic	1.845522	Durbin-Watson stat	2.649294
Prob(F-statistic)	0.112412		

Poland. Dependent Variable: CRISE
Method: Least Squares
Date: 08/17/10 Time: 16:46
Sample (adjusted): 2000Q2 2009Q4
Included observations: 39 after adjustments
CRISE=C(1)+C(2)*DA+C(3)*ET+C(4)*TD+C(5)*TR+C(6)*CC+C(7)*TI+C(8)*ECT +C(9)*IP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-11.02080	7.490124	-1.471377	0.1516
C(2)	-81.62969	52.81698	-1.545520	0.1327
C(3)	-0.051731	0.114893	-0.450252	0.6558
C(4)	-81.09682	52.79740	-1.536000	0.1350
C(5)	81.48604	52.78857	1.543630	0.1332
C(6)	0.010633	0.281562	0.037764	0.9701
C(7)	-0.007113	0.196892	-0.036129	0.9714
C(8)	-0.026645	0.049148	-0.542134	0.5917
C(9)	-0.900587	0.734657	-1.225861	0.2298

R-squared	0.239263	Mean dependent var	-0.328205
Adjusted R-squared	0.036400	S.D. dependent var	1.645400
S.E. of regression	1.615176	Akaike info criterion	3.995940
Sum squared resid	78.26385	Schwarz criterion	4.379839
Log likelihood	-68.92082	Hannan-Quinn criter.	4.133679
F-statistic	1.179430	Durbin-Watson stat	1.784419
Prob(F-statistic)	0.343564		

Czech Rep. Dependent Variable: CRISE
Method: Least Squares
Date: 08/17/10 Time: 16:47
Sample (adjusted): 2000Q1 2009Q4
Included observations: 40 after adjustments
CRISE=C(1)+C(2)*DA+C(3)*ET+C(4)*TD+C(5)*TR+C(6)*CC+C(7)*TI+C(8)*ECT+C(9)*IP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-4.657389	5.316755	-0.875983	0.3878
C(2)	-58.61727	46.53988	-1.259506	0.2172
C(3)	0.042518	0.090442	0.470108	0.6416
C(4)	-58.41481	46.49031	-1.256494	0.2183
C(5)	58.50501	46.40751	1.260680	0.2168
C(6)	0.262196	0.230296	1.138517	0.2636
C(7)	0.279692	1.076475	0.259822	0.7967
C(8)	0.019116	0.053153	0.359645	0.7216
C(9)	-0.047828	0.314936	-0.151865	0.8803

R-squared	0.170237	Mean dependent var	-0.715000
Adjusted R-squared	-0.043896	S.D. dependent var	1.394963
S.E. of regression	1.425251	Akaike info criterion	3.741681
Sum squared resid	62.97155	Schwarz criterion	4.121679
Log likelihood	-65.83361	Hannan-Quinn criter.	3.879076
F-statistic	0.795008	Durbin-Watson stat	1.420604
Prob(F-statistic)	0.611161		

Slovakia. Dependent Variable: CRISE
Method: Least Squares
Date: 08/17/10 Time: 17:27
Sample (adjusted): 2000Q1 2008Q4
Included observations: 36 after adjustments
CRISE=C(1)+C(2)*DA+C(3)*ET+C(4)*TD+C(5)*TR+C(6)*CC+C(7)*TI+C(8)*ECT+C(9)*IP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	4.402165	2.326411	1.892256	0.0692
C(2)	-30.19069	31.07143	-0.971654	0.3398
C(3)	0.080012	0.033632	2.379060	0.0247
C(4)	-30.11052	31.05826	-0.969485	0.3409
C(5)	29.84116	31.04247	0.961301	0.3449
C(6)	0.031452	0.074601	0.421607	0.6766
C(7)	0.076815	0.145374	0.528395	0.6015
C(8)	-0.014735	0.018645	-0.790272	0.4363
C(9)	-0.209322	0.132665	-1.577821	0.1263

R-squared	0.342983	Mean dependent var	-0.633333
Adjusted R-squared	0.148311	S.D. dependent var	0.942641
S.E. of regression	0.869935	Akaike info criterion	2.771521

Sum squared resid	20.43323	Schwarz criterion	3.167400
Log likelihood	-40.88737	Hannan-Quinn criter.	2.909693
F-statistic	1.761854	Durbin-Watson stat	2.185847
Prob(F-statistic)	0.129379		

Slovenia. Dependent Variable: CRISE
Method: Least Squares
Date: 08/17/10 Time: 17:31
Sample (adjusted): 2004Q1 2006Q4
Included observations: 12 after adjustments
CRISE=C(1)+C(2)*DA+C(3)*ET+C(4)*TD+C(5)*TR+C(6)*CC+C(7)*T+C(8)*ECT+C(9)*IP I

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-12.14142	7.786981	-1.559194	0.2168
C(2)	88.50992	41.19617	2.148498	0.1209
C(3)	0.307744	0.335091	0.918388	0.4261
C(4)	88.55361	41.16905	2.150976	0.1206
C(5)	-88.44286	41.13395	-2.150118	0.1207
C(6)	-0.065486	0.119798	-0.546640	0.6227
C(7)	0.134667	0.456732	0.294849	0.7873
C(8)	0.879997	1.508049	0.583533	0.6005
C(9)	-3.860541	2.597934	-1.486004	0.2340

R-squared	0.840977	Mean dependent var	0.033333
Adjusted R-squared	0.416917	S.D. dependent var	0.449916
S.E. of regression	0.343555	Akaike info criterion	0.814768
Sum squared resid	0.354090	Schwarz criterion	1.178448
Log likelihood	4.111395	Hannan-Quinn criter.	0.680120
F-statistic	1.983154	Durbin-Watson stat	1.817961
Prob(F-statistic)	0.310009		