Inflation targeting at the crossroads: Evidence from post-communist economies during the crisis

Petreski, Marjan

University American College Skopje

2013

Inflation targeting at the crossroads: Evidence from post-communist economies during the crisis

Abstract

The objective of this paper is to assess if inflation targeting post-communist economies performed better, in terms of output growth, during the crisis than their non-inflation targeting counterparts. The paper also puts the issue in the context of the preconditions of inflation targeters to adopt this regime. 26 post-communist economies of Central and Eastern Europe and the Commonwealth of Independent States are analyzed during the ongoing economic crisis. Results suggest that inflation targeters of those countries performed worse than non-inflation targeters. The growth decline in inflation targeters post-communist economies has been estimated to be deeper by about four percentage points than that in non-inflation targeters. The study finds very limited role of the preconditions for growth decline. Only the lower amount of monetary financing of the budget may have contributed in inflation-targeting countries to have gone through the crisis better.

1. Introduction

Since its "invention" in the early 1990s, inflation targeting (IT) sparked a tremendous body of research. The studies evaluating macroeconomic performance under this monetary regime (see, for instance, Siklos, 1999; Mishkin and Schmidt-Hebbel, 2001; Kuttner and Posen, 2001; Corbo et al. 2002; Neumann and von Hagen, 2002; see also Angeriz and Arestis, 2007, for a summary) generally conclude that after IT was introduced inflation and its persistence fell. The results on output volatility remained mixed, thus not giving support for the claim that IT is a superior strategy. However, these studies also found that IT countries did not perform better than non-ITers with a similar starting point (mostly taken as an equal initial level of inflation). Consequently, much of the extant evidence fails to address the argument put forth in Friedman (2003) and Ball and Sheridan (2005) that most central banks, not just inflation targeters, enjoyed better outcomes in recent years. One reason for this is that the widespread adoption of IT happened to coincide with a period with a stable economic environment, "a period friendly to price stability" (Neumann and von Hagen, 2002, p. 129) and mild macroeconomic shocks. Hence, while IT proponents (Bernanke et al. 1999; Alesina et al. 2001) strongly argued in IT's favor, IT opponents (Stiglitz, 2008; Frankel, 2012), including the FED and the ECB, continue to show skepticism towards its adoption.

The research on IT in developing, including post-communist economies is not an exception of the general conclusion that inflation targeters performed well, but not better than non-inflation targeters (Corbo et al. 2001; Mishkin and Schmidt-Hebbel, 2001; 2006; 2007 IMF, 2005; Edwards, 2007; Conçalves and Salles, 2008; Carvalho Filho, 2010; Petreski, 2011). However, over and above this discussion, the conduct of monetary policy in developing and post-communist economies faces several challenges. Calvo and Mendoza (2000) highlight the weak institutional environment in the post-communist economies: they did not have a strong record of low inflation and this could have been detrimental for successful IT. Mishkin (2004); Fraga et al. (2004) and Aizenman et al. (2011) further question the following characteristics of the post-communist process: i) the capacity of fiscal, financial and monetary institutions, including the increased probability that authorities will pursue short-run objectives without regard to the long-run damage; ii) financial and fiscal dominance; iii) the

1

exposure to shocks and cash-inflows vulnerability of those countries as small, open economies; and iv) the problem of high euroization. Hence, IT performance in post-communist economies has been likely shaped by those aspects as well.

Notwithstanding the ongoing debates about merits of inflation targeting, it is a stylized fact and even a warning of the pre-crisis literature (Kuttner, 2004) that it had not been tested by a situation involving large macroeconomic shock until the 2007 economic crisis came by. Until the present moment, no IT regime failed, but the question if it helped mitigating the perils of the crisis persists (e.g. Carvalho Filho, 2010). This paper opts to investigate if inflation targeting post-communist economies performed better in terms of their output growth, than their non-inflation targeting counterparts during the crisis, with special reference to their preparedness and capability to conduct this monetary framework.

The paper is organized as follows. Section 2 reviews the underlying literature on IT and presents some stylized facts about IT in post-communist economies. Section 3 puts the emphasis on the preconditions to adopt IT in post-communist economies. Section 4 presents the model, methodology and data used. Section 5 presents the results and offers a discussion. Section 6 concludes.

2. Inflation targeting at the crossroads

Inflation targeting (IT) was first introduced by New Zealand in 1990 and then followed by many developed and developing countries. Hence, many studies emerged on many aspects of IT. IT proponents, like Bernanke et al. (1999), Mishkin (2006) and Svensson (1996, 1999a,b) portrayed it as a flexible monetary framework enabling central banks to pursue countercyclical monetary policy while maintaining medium- and long-run price stability. Indeed, the years under IT have been quite favorable: inflation and its persistence fell, while results on output volatility have not been worse (Siklos, 1999).

However, IT had its skeptics even from the beginning. One longstanding question is if this policy strategy could actually matter for outcomes as much as, and in the way that, its advocates said it should. For instance, a strand of the literature (Neumann and von Hagen, 2002; Friedman, 2003 and Ball and Sheridan, 2005) expressed doubts that merely declaring a numerical inflation target, while reserving the right to respond to shocks, would offer any tangible advantage over conventional discretionary frameworks. The second question is whether IT's touted advantages would come at the cost of greater output instability, due to stricter adherence to a rigid policy rule (Kuttner and Posen, 2011). In other words, the concern was over the credibility-flexibility dilemma: how IT could be constraining enough to have an effect, and yet flexible enough to allow for meaningful output stabilization (Kohn, 2003; Meyer, 2004; Friedman and Kuttner, 1996). At the empirical front, literature failed to address the argument put forth in Friedman (2003) and Ball and Sheridan (2005) that most central banks, not just inflation targeters, enjoyed better outcomes in recent years. Throughout most of the period since IT was widely adopted, global macroeconomic conditions have been relatively benign compared with earlier periods. As a result, there is only limited evidence on the robustness of IT regimes to major shocks, as the ongoing global economic crisis.

The crisis sparked a fundamental rethinking of the basic economic tenets (Mishkin, 2011). In that, inflation targeting was punched by extreme considerations. On the one extreme, literature argues that IT coped with the crisis better than other monetary frameworks. For instance, Fouejieu (2012) provides some arguments and preliminary evidence that IT economies underwent the crisis better due to some inherent features of the framework itself: IT enables favorable fiscal stance, monetary-policy credibility and low volatility of the exchange rate, which are all credits for better economic management during crisis. Roger (2009) also tentatively assesses the performance of IT during the crisis and concludes that IT economies somehow better coped with the crisis, both in terms of the level and volatility of the macroeconomic outcomes. On the other extreme, though, prominent economists argue that the crisis marked the end of IT: "Inflation targeting is being put to the test – and it will almost certainly fail" (Stiglitz, 2008); "It is with regret that we announce the death of inflation targeting. The monetary-policy regime, known as IT to friends, evidently passed away in September

2008." (Frankel, 2012). The former argues that IT cannot cope with imported inflation in developing economies, as rising interest rates will suffocate aggregate demand, but will not curb inflation. The latter, in addition, blames IT for not having considered asset bubbles enough in the policymaking, which in turn ignited the crisis. Fairly, though, neither an inflation targeter left the framework so far, nor critical empirical evidence has yet been provided that (why) IT performed so good or so bad; let alone evidence on developing and post-communist economies.

Figure 1 presents some measures for central tendency and variability of growth and growth decline during crisis in IT[1] and non-IT post-communist economies of Central and South East Europe (CESEE) and the Commonwealth of Independent States (CIS). The figure makes a distinction between the observed growth over the crisis period and growth decline over the same period when compared to a period of roughly one economic cycle (2006-2012). Therefore, for the 'growth decline' parts of the graph, negative figures would mean that the growth during the crisis has been lower than the average over the business cycle (2006-2012) and vice versa. The median is given by the thick bar so as to make it distinctive from the quartiles.

---

[1] These are nine countries from the two regions of post-communist economies which have so far adopted inflation targeting: Albania, Armenia, Czech Republic, Georgia, Hungary, Poland, Romania, Russia and Serbia. The remaining countries of our sample are labeled as non-IT countries.

Figure 1 – Growth performance during crisis (2009-2012) under inflation targeting versus non-inflation targeting in post-communist economies

Minimum, 1st quartile; Median; 3rd quartile; Maximum
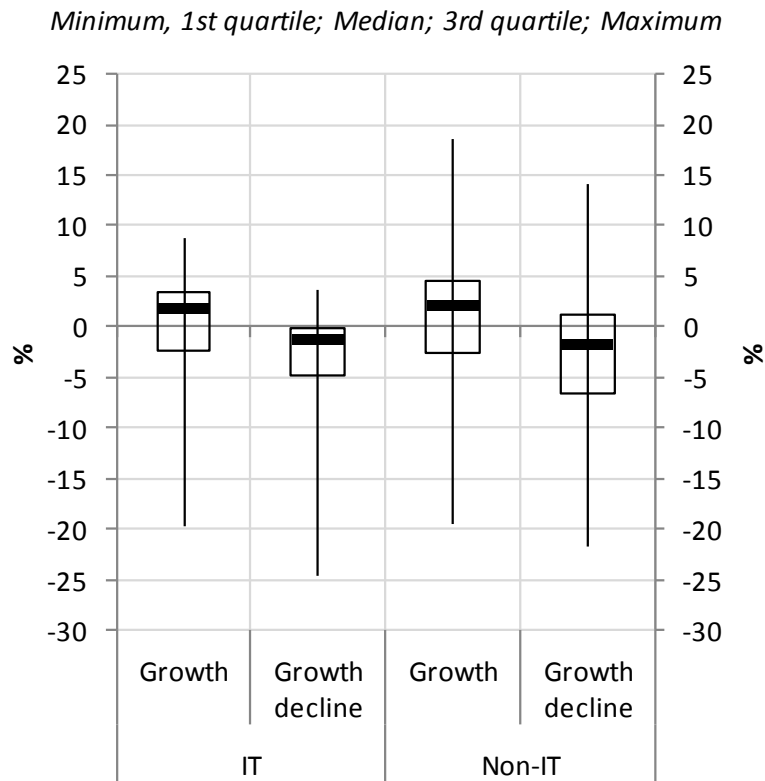
Source: Drafted by the author, based on IMF data

Judging according to the median, inflation targeters did not perform worse than non-inflation targeters, neither in terms of crisis growth nor in terms of crisis growth decline. However, observing the median only may lead to a wrong conclusion. Looking at the range and the inter-quartile range, important conclusions emerges: i) the range of the growth decline under IT is narrower and lower than under non-IT; ii) the inter-quartile range for the IT series is narrower than that of non-IT series; and iii) the fourth quartile of the IT series is very narrow and the maximum growth decline is about 4%, while of the non-IT series is very large and the maximum growth decline is nearly 15% (i.e. 3 to 4 times higher than that of IT). All these observations suggest that while the median growth and growth decline during the crisis have been almost the same for both IT and non-IT post-communist economies; the distribution of the IT series is heavily skewed on the downside. Together with the qualms in the literature, we pursue this stylized fact for further investigation in this paper.

3. Preconditions for IT in post-communist economies

There is consensus in the literature that five pre-conditions are important to be sufficiently fulfilled when a country, particularly developing country, considers adopting inflation targeting. A summary of these is given, for instance in Mishra and Mishra (2009), as follows:

- Central bank independence from the government;

- Absence of fiscal dominance, i.e. a monetary financing of budget deficit;

- Sufficiently developed financial system and monetary transmission effectiveness;

- Low currency substitution and liability dollarization;

- Absence of or low external dominance, i.e. external shocks.

The central bank must be given a clear mandate for price stability (Hennan et al. 2006). The credibility of IT is likely to be enhanced by a high degree of central-bank independence from the government in its policy formulation. In that regard, the central bank has to have at its disposal a variety of instruments necessary for achieving the inflation target. However, the central bank must not be left alone in explaining to the public the chosen strategy for monetary policy: there must be a joint responsibility for setting of the inflation target (Siklos and Abel, 2002).

Masson et al. (1997) argue that monetary policy must not be subordinated to any other economic policy, primarily fiscal policy. Whereas there is no qualm that the fiscal stance should be strong (Jonas and Mishkin, 2003), implying fiscal deficits and debt levels supportive to the inflation target, the conduct of the monetary policy must not be dictated to or severely constrained by developments of a fiscal nature. The case against fiscal dominance requires that the government has a sufficiently broad tax base and that, therefore, there is no incentive to systematically rely on seigniorage. Under IT, public sector borrowing from the central bank should be minimized or non-existent (Jonas and Mishkin, 2003). Moreover, this implies that a financial market for government securities should be developed in order to absorb the issuance of government debt. Recall that Sargent and Wallace (1982) argue that the accumulation of debt should be at a pace that guarantees its

sustainability. Even if the government does not borrow from the central bank, the fiscal theory of the price level suggests that such irresponsible behaviour of the government will lead to inflation with a fiscal origin. Then, the fiscally-driven inflation process will gradually undermine the effectiveness of the monetary policy to attain any nominal target, including the inflation target. In such a scenario, fiscal policy dominates and monetary policy accommodates - a situation which is inconsistent with an IT framework.

Not only the government-securities market should be developed, but all segments of the financial and banking sector should be developed to a level sufficient to provide an efficient transmission mechanism for monetary policy. Moreover, as IT is not accompanied by any target for the exchange rate, economic agents will be better off if there are hedging instruments against exchange-rate risk. Hedging gains in importance when the level of euroization of the economy is considerable. The exchange-rate risk arises because of the currency mismatch in economic agents' balance sheets in euroized economies. The flexible exchange rate under IT would create greater exchange-rate exposure to economic agents in a euroized economy. A developed foreign exchange market would mitigate this exposure. In a world of increased capital mobility, therefore, an optimal combination of the level of euroization and the development of the financial market is desirable for successful IT (Masson et al. 1997). Finally, Mishra and Mishra (2009) explain that external shocks hitting the economy may play a role for successful IT in developing economies. External shocks may result in large volatility of the exchange rate, inflation and interest rate. Large external shocks that generate instability in the economy may in turn jeopardize the fulfillment of the inflation target.

Despite the consensus in the IT literature around the pre-conditions that need to be met for successful IT in developing economies, the argumentation of Mishkin (2004) cannot be overlooked. He argues: "…although fiscal and financial stability are necessary conditions for inflation control, I think the view that these reforms are prerequisites for attempting an inflation targeting regime in emerging market countries is too strong … If an inflation targeting regime is to be sustainable, a commitment to and work on these reforms is required when inflation targeting is implemented." (p.120). One should also not forget that some developing countries embarked on IT after turbulence

on the foreign exchange market, i.e. after the peg became unsustainable (for instance, the Czech Republic; for more details see Petreski, 2011). Hence, they were not at that point in time quite concerned in satisfying these preconditions, but likely invested in their fulfillment later so as to enable smoother conduct of monetary policy under IT.

Figures 2 to 5 offer some insight into preconditions for the nine IT post-communist economies of CESEE and CIS who adopted this monetary strategy so far. Figure 2 shows that countries already had very low levels of monetary financing of the budget (frequently at one-digit level), but even if they did not, they were able to reduce it by the time and after IT adoption (the solid line above the dashed line). For instance, Albania and Georgia, both with the highest amounts of monetary financing of the budget in the sample of IT post-communist economies, were able to reduce it by 28% and 44%, respectively, between 2009 (the year of adoption) and 2011, hence likely showing commitment to mitigate this risk for the IT operation as fast as possible. Also, Figure 3 suggests that monetary transmission effectiveness continued to improve between 2003 and 2011 for those countries who adopted IT before 2003, while improvement is also observable, although at a lower scale, for those who made the adoption after 2003 (the solid line below the dashed line).

Figure 2 – Monetary financing of the budget   **Figure 3 – Monetary transmission**
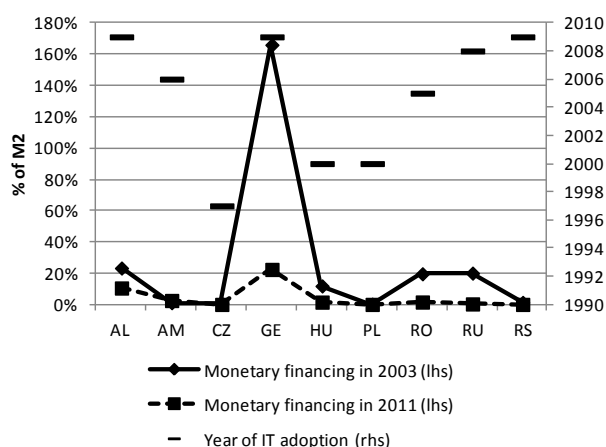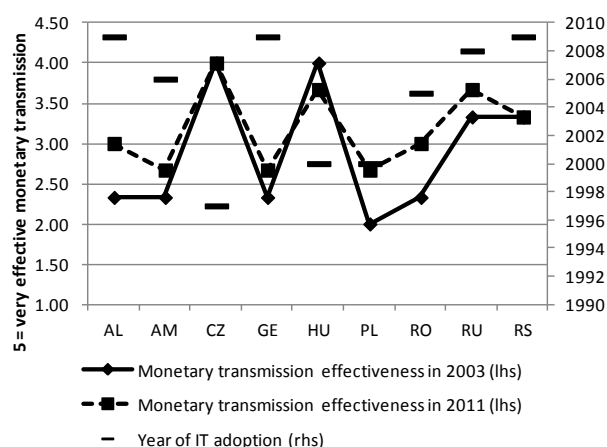

Source: Drafted by the author, based on IMF data
Note: AL – Albania, AM – Armenia, CZ – Czech, HU – Hungary, PL – Poland, RO – Romania, RU – Russia, RS - Serbia

However, Figures 4 and 5 do not give such a clear-cur conclusion. Figure 4 looks at the level of euroization. It suggests that over the observed period, there is worsening in some countries which

early adopted IT (like Poland and Hungary); while in some later adopters (like Armenia and Georgia), the improvement is apparent, but the level of foreign currency deposits remains very high. Similarly, Figure 5 points out to the present 'external dominance': while the solid line (2004) is calmer, the dashed one (2010) suggests that in many IT adopters, this criterion quite worsened. It is expected, though, this to be the case, amid the global crisis, but this still suggests that IT adopters did not work on the plan to reduce their external-shock exposure (like, diversification – geographical and industrial – of their export and capital flows).

Figure 4 – Euroization	**Figure 5 – External exposure**
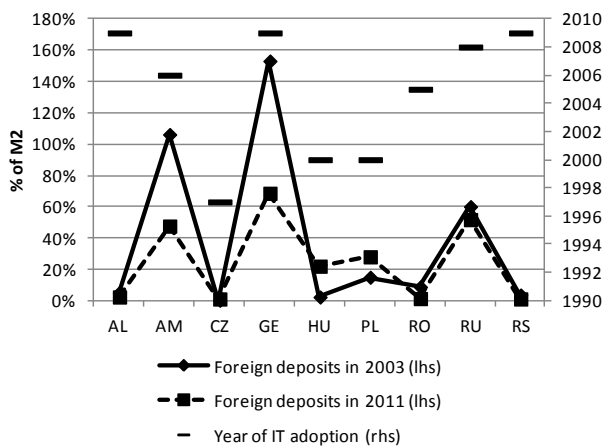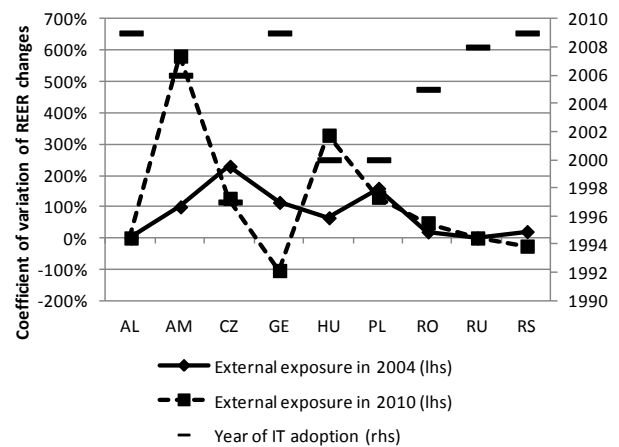
Source: Drafted by the author, based on IMF data
Note: AL – Albania, AM – Armenia, CZ – Czech, HU – Hungary, PL – Poland, RO – Romania, RU – Russia, RS - Serbia

Overall, while there is weak evidence of fulfillment of IT preconditions before IT adoption in post-communist economies, there is some satisfactory evidence that countries worked to improve some of the criteria – hence, supporting Mishkin's (2004) stance – but, the results on euroization and external-shock exposure are feeble and in some way repealed. To find out if these stylized facts somehow affected IT performance during the crisis in post-communist economies is one of the objectives of this study, which we pursue in the next section.

4. Model, methodology and data

4.1. Economic model and methodology

In order to examine if inflation targeting post-communist economies performed better, in terms of growth, than their non-inflation targeting counterparts over the crisis, we first need a measure of their growth performance during the crisis. In order to measure *how much* they were affected by the crisis, we propose a measure of the short-run output growth being a difference between the growth in the respective quarter of the crisis period, minus the average growth rate over 2006-2012. In particular for the latter, growth is averaged over both expansion and contraction over fairly short period of time and should be a satisfactory representation of the long-run growth. Defined in this way, the variable wipes out the unobserved country heterogeneity, i.e. factors such as schooling or investment which are contained in a standard growth regression and affect the long-run path of the growth (see, e.g. Barro and Sala-i-Martin, 2004). So, what remains in the above-specified variable is indeed the "short run". However, inflation targeting itself cannot explain growth performance, i.e. once growth is 'demeaned', the remaining variability can be attributed to certain developments in the economy.

As suggested by the literature, the first group of developments is policy moves which would reflect the `capacity` of the economy to handle disturbances. "Employment and output fluctuations inevitably relate to shocks and to the manner in which the economy copes with … shocks" (Easterly et al. 2001, p.8). Changes in money, interest rate, fiscal stance or changes in the terms of trade as a result of external factors would impinge on the short-run output movements.

The second group of variables represents buffers against the shocks. Kose et al. (2005) and Easterly et al. (2001), for instance, suggest including GDP per capita, trade openness, an indicator of financial deepness, price volatility and an indicator of political instability. Mobarack (2001) suggests taking an even broader list of variables, among which the Gini coefficient, tax revenues, real-exchange-rate volatility, credit to the private sector and war participation. Easterly and Kraay (2000) argue in favor of the trade and financial openness to reflect the extent of integration of the economy into global trade and capital markets. However, they point out that the level of financial development may matter little if firms in the country have easy access to credit abroad. Hence, a high degree of

international trade and financial integration could also play a buffer role and smooth large output drop. However, while high degrees of openness of the capital account could serve to smooth the adjustment of a country to a shock, it may also expose it to another adverse source of dynamic reaction and, in essence, may measure the economy's vulnerability to an external shock. Investors, observing the weakening condition of firms and financial institutions within the country in response to a shock, may decide to pull their (short-term) money out of the country and put it elsewhere, thus further weakening both firms and financial institutions (e.g. by further weakening the currency) and possibly inducing a crisis. A negative shock to the capital account will have adverse effects on the terms at which firms can get access to funds and may be exacerbated by the presence of credit rationing. The increased uncertainty about different firms' balance sheets, caused by the economic disturbance, may lead to a greater prevalence of credit rationing and to further contractions in demand, as firms attempt to increase their liquidity.

A third group suggests inflation and wage growth as determinants of short-run growth to account for the traditional explanation of output fluctuations by downward nominal rigidities (Newbery and Stiglitz, 1982). Namely, rigid real wages provided an easy explanation of unemployment — a decrease in the demand for labour immediately turns into unemployment (lower output), because real wages are rigid and fail to equilibrate the market. The reduction in the demand for labour could be explained by the falling demand for goods, in itself explained by rigidities in intertemporal prices.

To this set of variables explaining the short-run growth, we will add an indicator of if a country is an inflation targeter or not. Hence, the regression to be estimated is as follows:

$$stgrowth_{i,t} = \alpha + \beta_1 money_{i,t} + \beta_2 ir_{i,t} + \beta_3 gov_{i,t} + \beta_4 reer_{i,t} + \beta_5 to_{i,t-4} + \beta_6 capfl_{i,t} +$$
$$\beta_7 credit_{i,t} + \beta_8 inf_{i,t} + \beta_9 IT_{i,t} + u_i + \varepsilon_{i,t} \hspace{3cm} (1)$$

Where: $stgrowth_{i,t}$ is GDP growth in country i in period t minus the average GDP growth over 2006:Q1-2012:Q1; $money_{i,t}$ is the annual growth of M2; $ir_{i,t}$ is the reference interest rate of the central bank, both variables capturing the actions of the monetary policy; $gov_{i,t}$ is the growth of the

government consumption, reflecting the stance of the fiscal policy; $reer_{i,t}$ is the growth of the real effective exchange rate, reflecting external factors; $to_{i,t}$ and $capfl_{i,t}$ are the trade and capital flows as a percentage of GDP, respectively, to capture the trade and financial openness as reflections of external vulnerability or integration; $credit_{i,t}$ is the total domestic credit as a percent of GDP, to reflect the financial deepness as a shield; $inf_{i,t}$ is price growth to reflect nominal rigidities; and $IT_{i,t}$ is a dummy variable taking a value of one if the country has been an inflation targeter during the crisis and zero otherwise. u_i is a country-specific error term; $\varepsilon_{i,t}$ is the idiosyncratic error which is assumed to be well behaved. Our main interest is the parameter β_9; if inflation targeters performed better during the crisis due to having this framework in operation, this coefficient would be significant and positive.

To check if more prepared inflation targeting central banks performed better than those which were less prepared, (1) will be supplemented by the interactions of $IT_{i,t}$ with variables reflecting the preconditions to embark on an inflation targeting in post-communist economies, discussed in Section 3:

$$stgrowth_{i,t} = \alpha + \beta_1 money_{i,t} + \beta_2 ir_{i,t} + \beta_3 gov_{i,t} + \beta_4 reer_{i,t} + \beta_5 to_{i,t-4} + \beta_6 capfl_{i,t} +$$
$$\beta_7 credit_{i,t} + \beta_8 inf_{i,t} + \beta_9 IT_{i,t} + \gamma_1 IT_{i,t} \times cbcg_{i,t-4} + \gamma_2 IT_{i,t} \times mte_{i,t-4} + \gamma_3 IT_{i,t} \times$$
$$reervol_{i,t-4} + \gamma_4 IT_{i,t} \times fl_{i,t-4} + u_i + \varepsilon_{i,t} \qquad (2)$$

Where the added variables are as follows: $cbcg_{i,t-4}$ is the amount of central bank claims to the government in M2, as a measure of the monetary financing of the budget; $mte_{i,t-4}$ is an indicator of the effectiveness of the monetary transmission, ranging from 1 to 5 where 5 is very effective transmission and interest rates fully liberalized; $reervol_{i,t-4}$ is the volatility of the real effective exchange rate growth, as a measure of frequency and magnitude of external shocks; and $fl_{i,t-4}$ is the foreign liabilities of the banking sector in M2, as a measure of the degree of currency substitution. A variable measuring the central bank independence is not included, due to: lack of unified index for the countries investigated; due to not having quarterly data; and due to the very low variability even of the

annual series. The coefficients from γ_1 to γ_4 would reveal if inflation targeters which entered inflation targeting more prepared, went through the crisis less harmed.

An econometric challenge in estimating (1) and (2) is that of reverse causality – growth can affect some of the explanatory variables, as well. For instance, if policy reaction and growth are measured contemporaneously, positive coefficient on the policy variable can be obtained because policy really affects growth positively, but also because higher growth allows for more supportive policy. Reverse causality can lead to wrong inference. If reverse causality is not problematic, then equations (1) and (2) can be consistently estimated with an OLS. However, reverse causality cannot be rejected on theoretical grounds, i.e. we can be on the safe side if we take it into consideration in the model. Therefore, besides the OLS estimation, we would consider FE and RE specifications wherein the unobserved individual heterogeneity is included and IV specifications where past values of the suspected variables for endogeneity are used as instruments to correct for it. With regard to the added variables in equation (2), these are dated back for four quarters. This has an intuitive explanation: since these variables stand for the pre-conditions for pursuing inflation targeting, they need to capture the setup earlier than the investigated period. Hence, these will not be instrumented, as the dating-back resolves the potential endogeneity problem.

4.2. Data

The models set in the previous section will be estimated for 26 post-communist economies of CESEE[2] and CIS[3]. The referent period is 2009:Q1-2012:Q1. The first quarter of 2009 is taken as the quarter when crisis hit those economies, since all of them firstly recorded negligent or negative growth in this quarter, as well because some econometric investigations (Jovanovic and Petreski, 2012) empirically document this quarter as the onset of the crisis. Therefore, the dependent variable is defined as the growth rate in quarter *i* minus the average growth rate between 2006:Q1 and 2012:Q1.

---

[2] Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Montenegro, Poland, Romania, Serbia, Slovak Republic, Slovenia.

[3] Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russian Federation, Tajikistan, Ukraine.

This has an intuitive explanation as well, since the years 2006-2008 were the best years for many post-communist economies before the crisis hit, while 2009-2012 as crisis years, so as a full business cycle is covered.

Since we will operate with relatively large number of explanatory variables, an important problem that may arise is that of multicolinearity. Therefore, Table 1 checks for the correlation between variables; it points out to low to moderate correlation between all pairs of variables, except between the trade and capital flows, which is considered to be high. However, in general, estimations should not suffer multicolinearity.

Table 1 – Correlation matrix

	Real money growth	Real growth of gov't con.	Interest rates	Change in REER	Credit to GDP	Inflation	Trade to GDP	Capital flows to GDP
Real money growth	1							
Real growth of gov't con.	0.2637	1						
Interest rates	-0.2488	0.0376	1					
Change in REER	0.4397	0.0979	0.0331	1				
Credit to GDP	-0.1851	-0.2397	0.0978	-0.1021	1			
Inflation	0.0272	-0.0132	0.1665	0.1254	-0.0687	1		
Trade to GDP	-0.0357	-0.0959	0.3629	-0.0300	-0.0073	-0.0492	1	
Capital flows to GDP	-0.0020	-0.1345	0.2185	-0.0564	-0.0399	-0.1229	0.8153	1
Source: Drafted by the author, based on the data from IMF.								

The main source of the data is the databases of the International Monetary Fund. The index on the effectiveness on the monetary transmission is approximated by the bank reform and interest-rate liberalization index from the Transition Indicators of the European Bank for Reconstruction and Development. The list of central banks inflation targeters in CESEE and CIS is based on Hammond (2009) and the update on www.centralbanknews.info, and is as follows: Albania, Armenia, Czech Republic, Georgia, Hungary, Poland, Romania, Russia and Serbia.

5. Results and discussion

5.1. Growth during crisis under inflation targeting

Results of the baseline specification (1) are given in Table 2. The table has five columns. It starts with a simple OLS which does not consider the individual heterogeneity into account. The next two columns (2 and 3) present the results of a fixed and random effects estimators, respectively, both accounting for the individual heterogeneity. As we argued earlier, the OLS approach may be justified in our case, since the dependent variable is 'demeaned', i.e. individual countries characteristics are wiped out by subtracting the average growth rate between 2006 and 2012 from each growth observation. We also argued that OLS and FE/RE estimators may give credible estimates should the problem of reverse causality is not assumed to exist or has been resolved by taking past values as explanatory variables.

However, in our case, we can argue that growth affect policy as much as policy affects growth. From that viewpoint, hence the results in the first three columns of Table 2 may be wrongly estimated due to the potential presence of the problem of endogeneity. Therefore, columns (4) and (5) make use of an instrumental variables approach, which uses past values of the potentially endogenous variables as instruments to correct for the potential endogeneity. Note that column (4) gives the IV fixed effects, while (5) IV random effects estimator. In the bottom of the table, the Hansen test suggests that the instruments used are valid. Also, the Hausman test is given to make a statistical suggestion of which, FE or RE, is preferred. In the case of the non-IV estimators, the test suggests that FE is preferred, but when it comes to IV, RE is preferred. Though, an FE estimator does not fit our purpose since our main variable of interest – the dummy that takes value of one if a country is an inflation targeter over the crisis – is a kind of a fixed effect and would be hence wiped out. On the other hand, having the IV-FE estimates affords us to calculate the p-value of the endogeneity test (in the bottom of the table), which suggests that the suspected variables for endogeneity could be actually treated as exogenous.

Fortunately, a factor that goes against the dissonant discussion above is the considerable robustness of the obtained coefficients across the specifications presented in Table 2. Therefore, in

analyzing the obtained coefficients, we propose to focus on column (5), despite the suggestions of the endogeneity test. We do so, since this is only a statistical test, while the critics from the literature that there is a reverse causality between growth and policy are well articulated (see, e.g. Barro and Sala-i-Martin, 2004; Mankiw et al. 1992; Fischer, 1993; Levine and Renelt, 1992; and others).

Table 2 – Baseline results

Dependent variable: Current growth minus average 2006:Q1-2012:Q1	OLS	FE	RE	IV-FE	IV-RE
	(1)	(2)	(3)	(4)	(5)
Real money growth	0.293***	0.303***	0.293***	0.285***	0.273***
Interest rate	-0.004**	-0.004*	-0.004**	-0.009***	-0.009***
Change in the real effective exchange rate	0.086	0.079	0.088	0.089	0.096
Real growth of government consumption	0.143	0.121	0.143	0.215	0.192
Trade openness	0.252**	0.496*	0.252**	0.465***	0.234***
Capital flows to GDP	-6.324	-1.095	-6.324	3.159	-0.709
Credit to GDP	0.060**	0.052*	0.060	0.102**	0.103***
Inflation	0.391*	0.359	0.391*	0.343	0.424
Constant	-0.041	-0.088	-0.041*	-	-0.007
Inflation targeting	**-0.033***	**-**	**-0.033***	**-**	**-0.044***
R squared	0.8163	0.6276	0.8163	0.7760	0.7737
F-statistics	0.0000	0.0000	0.0000	0.0000	0.0000
No of observations	48	48	48	48	48
Hausman Test (p-val) H_0: FE is preferred	-	0.9678		0.0017	
Hansen test (p-val) H_0: Instruments are valid	-	-	-	0.3029	0.2507
Endogeneity test (p-val) H_0: Variables can be treated as exogenous	-	-	-	0.7509	-
Source: Author's estimates. Note: *, ** and *** denote statistical significance at the 10, 5 and 1%-age level, respectively.					

Results for the real money growth suggest that if it increases by 10 percentage points (going from the first to the third quartile), it reduces growth decline during crisis by 2.7 percentage points (p.p.), on average, ceteris paribus. If the interest rate declines by about 7 p.p. (going from the first to the third quartile), crisis growth would be saved by 6.3 p.p., on average. These two variables confirm the power of the monetary policy to affect short-run growth and prevent the economy being dragged into deeper recession. The real effective exchange rate is found insignificant, which may be due to the

presence of domestic inflation already in the equation, but more probably due to the relative invariability of the nominal exchange rate in a significant part the investigated countries. Surprisingly, though, fiscal policy is found ineffective in stimulating recovery or preventing recession. Trade openness is found significant and positively affecting crisis growth, which suggests that it acts as a buffer rather than as exposure factor for those countries. Indeed, the post-communist economies investigated here are all small and open[4], whereby international trade is the main driving force of the domestic GDP. Therefore, even slight changes in external demand significantly affect domestic growth. Similarly, credit in GDP, as an indicator of the financial deepness, suggests that the higher the financial intermediation in crisis, the more output decline is saved: additional 18 p.p. increase of credit in GDP (going from the first to the third quartile), would prevent output decline by 2 percentage points. Capital flows to GDP, reflecting the external exposure, and inflation, reflecting nominal rigidities, are not significant.

Out main variable of interest – if the country has been an inflation targeter or not over the crisis – is statistically significant and economically meaningful. It suggests that post-communist countries which had inflation targeting as their monetary strategy, during the crisis performed worse than non-inflation targeters, by about 4.4 percentage points, on average, ceteris paribus. This may be surprising result, as some tentative evidence (Section 2) argued in favor of inflation targeting during the crisis. On the other hand, despite the afforded flexibility under IT, it may be that the warning of Stiglitz (2008) and Frankel (2012) is just right: the narrow focus of IT on inflation in the 'good' years may have blinded central bankers from other worthwhile objectives such as reducing unemployment, hence resulting in larger decline of output than in a non-IT economy. Indeed, although IT did not literally fail during the crisis, results suggest that it coped with the crisis worse than the non-IT countries. "The weaker economy and higher unemployment that inflation targeting brings won't have much impact on inflation; it will only make the task of surviving in these conditions more difficult." (Stiglitz, 2008, p.1). Our findings give preliminary support to this statement and are in line with the observed stylized fact on Figure 1 that inflation targeters went shoddier through the crisis. If we

---

[4] Although this cannot be quite claimed for Russia and Poland, they still exert considerable openness and, from that viewpoint, do not differentiate from a typical small and open economy.

consider that almost all of the non-IT countries in the sample have a form of a hard peg (currency board or monetary union), then it appears that in non-normal times, IT performed worse than hard pegs, with regard to the growth performance of the economy.

Results are further confirmed for their robustness in Table 3, where variables are added group by group. A notable change is that the real exchange rate loses its significance once inflation enters the regression, which was our concern above. Therefore, we may conclude that the real exchange rate also exerts some influence on the crisis growth. Real depreciation of additional 8 p.p. (going from the first to the third quartile), results in growth decline saved by about 0.7 p.p.

Table 3 – Checking robustness to variables exclusion (IV-RE)

Dependent variable: Current growth minus average 2006:Q1-2012:Q1	'Monetary' variables only	'Fiscal' variable added	'Exposure' variables added	'Buffer' variable added	All variables
	(1)	(2)	(3)	(4)	(5)
Real money growth	0.316***	0.316***	0.309***	0.293***	0.273***
Interest rate	-0.004***	-0.004*	-0.003*	-0.009***	-0.009***
Change in the real effective exchange rate	0.154***	0.151***	0.074***	0.082***	0.096
Real growth of government consumption	-	0.025	0.004	0.093	0.192
Trade openness	-	-	0.181	0.189	0.234
Capital flows to GDP	-	-	-9.451	-3.387	-0.709
Credit to GDP	-	-	-	0.095**	0.103***
Inflation	-	-	-	-	0.424
Constant	0.002	-0.001	-0.010	0.018	-0.007
Inflation targeting	**-0.028***	**-0.028**	**-0.029**	**-0.037**	**-0.044***
R squared	0.7306	0.7310	0.7777	0.7595	0.7737
F-statistics	0.0000	0.0000	0.0000	0.0000	0.0000
No of observations	61	61	48	48	48
Hansen test (p-val) H_0: Instruments are valid	0.1277	0.1097	0.1114	0.2847	0.2507
Source: Author's estimates.					
*Note: *, ** and *** denote statistical significance at the 10, 5 and 1%-age level, respectively.*					

Having evidenced that inflation targeters on average performed worse than non-inflation targeters post-communist economies, leads to the next question – whether their 'condition' to pursue inflation targeting may have affected this result. Namely, some (e.g. Carvalho Filho, 2010) argue that inflation targeting may perform well in good times even if some of the pre-conditions for its

pursuance are not fulfilled. However, this may not be true under non-normal circumstances, especially for developing ecoomies. We check for this in turn.

5.2. Does pre-conditions fulfillment matter?

Table 4 gives the results of regression (2), i.e. when four variables approximating the four pre-conditions for successful inflation targeting in post-communist economies are included. Columns (1)-(4) give the results for each pre-condition separately, while column (5) treats them together. According to the diagnostics, all regressions are well specified; also, sufficiently large variation of the growth decline during crisis is explained by the regressors, as judged by the coefficient of determination. The coefficients of the basic specification remain robust to this treatment. Results suggest that only one of the conditions matters for how inflation targeters coped with the crisis – the amount of monetary financing of the budget. It shows limited statistical significance both in column (1) and in (5), suggesting that inflation targeters who had less monetary financing of the budget, experienced on average lower growth decline. This is expected since, as explained in Section 3, having a large portion of the budget deficit being financed by the central bank, would jeopardize the achievement of the inflation target and may result in higher interest rates suffocating the economy, but not easing inflation.

Table 4 – Testing the role of preconditions (IV-RE)

Dependent variable: Current growth minus average 2006:Q1-2012:Q1	Precondition 1	Precondition 2	Precondition 3	Precondition 4	All preconditions
	(1)	(2)	(3)	(4)	(5)
Real money growth	0.297***	0.280***	0.264***	0.275***	0.284***
Interest rate	-0.009**	-0.009***	-0.010**	-0.009***	-0.006*
Change in the real effective exchange rate	0.116*	0.097	0.125	0.099	0.139*
Real growth of government consumption	0.154	0.237	0.461	0.190	0.286
Trade openness	0.105	0.261*	0.354	0.223	0.100
Capital flows to GDP	-1.618	-0.867	2.620	-0.829	1.193
Credit to GDP	0.129***	0.105**	0.134*	0.098**	0.103*
Inflation	0.490	0.410	0.885	0.436	1.110
Constant	-0.009	-0.013	-0.045	-0.005	-0.062
Inflation targeting	**-0.025**	**-0.044****	**-0.041****	**0.002**	**-0.171**
Pre-conditions					
Central bank financing of the budget under IT – a year before	**-0.936***	**-**	**-**	**-**	**-0.878****
Degree of euroization under IT – a year before	**-**	**0.016**	**-**	**-**	**0.124**
Volatility of REER under IT – a year before	**-**	**-**	**-0.001**	**-**	**-0.001**
Monetary transmission effectiveness under IT – a year before	**-**	**-**	**-**	**-0.017**	**0.051**
Joint significance of the preconditions (p-val)	-	-	-	-	*0.0295*
R squared	0.7755	0.7792	0.7445	0.7756	0.8094
F-statistics	0.0000	0.0000	0.0000	0.0000	0.0000
No of observations	48	48	48	48	48
Hansen test (p-val) H_0: Instruments are valid	0.3824	0.1934	0.2272	0.2469	0.1475
Source: Author's estimates.					
*Note: *, ** and *** denote statistical significance at the 10, 5 and 1%-age level, respectively.*					

Results suggest that a percentage point larger amount of monetary financing of the budget (as a share of M2) leads to additionally (to that of IT itself) larger growth decline by about 0.9 percentage points for inflation targeters, on average, ceteris paribus. In addition to the limited statistical significance, this result may be large, though. However, it may have two explanations: i) some inflation targeting central banks – like that of Hungary and Romania – reduced the monetary financing of the budget to a very low level (1.5% of M2 in 2011), while others – Czech, Poland and Serbia – do not have an

option to extend fresh money for budget purposes. Hence, this finding may matter little for those economies; and ii) other inflation targeters, though – Albania and Armenia –still have a two-digit level of their monetary financing for the budget and the large coefficient for them may signify that they can mitigate the risk for operating under IT in terms of the output losses the economy may incur under economic crisis, should they reduce the amount of monetary financing.

The insignificance of the other three preconditions is in line with Mishkin (2004), who argues that albeit in many cases these were far from being fulfilled, countries pursued successful IT; it is also in line with the findings of Leiderman et al. (2006) and Armas and Grippa (2006) who find no role for euroization in the IT economies of South America. Nevertheless, against the hesitant finding that only one precondition matters for short-run growth under IT during crisis, we find that the four pre-conditions jointly have a statistically significant explanatory power on growth decline at the 5% level. One should not disregard this finding, given that the addition of extra variables in the regression may result in multicolinearity and hence render many important variables insignificant. So, from that viewpoint, euroization, external shocks and the effectiveness of monetary transmission may matter for successful IT in times of crisis for the growth in post-communist economies. However, this interpretation is tentative and should be approached with considerable caution. Though, coefficients signs are appropriate: more euroization supports crisis growth, probably because IT central banks in more euroized economies would intervene on the foreign exchange market more to prevent large swings in the exchange rate to adversely affect agents' portfolios; by doing so, the central bank would prevent larger output volatility also. Higher volatility of the real effective exchange rate (reflecting the incidence of external shocks) would deepen growth decline, while better monetary transmission would ease growth under IT.

Overall, we find little evidence that the fulfillment of the preconditions for IT matters for how the IT economy would perform during the crisis. Very tentative evidence suggests that more monetary financing of the budget would result in larger output decline, but the finding may have limited importance due to the already low levels of the budget monetary financing in a larger part of the investigated economies.

6. Conclusion

The objective of this paper is to investigate if inflation targeting post-communist economies performed better, in terms of the output growth, than their non-inflation targeting counterparts during the ongoing economic crisis. The paper also puts emphasis on the preconditions for pursuing inflation targeting and their potential role in those economies during the crisis. 26 post-communist economies from Central and South-East Europe and the Commonwealth of Independent States have been analyzed over the period 2009:Q1-2012:Q1, which coincides with the duration of the economic crisis. The growth decline, measured as a difference between actual growth and the average for the period 2006-2012, is regressed on a set of variables measuring monetary and fiscal policy, external vulnerability and buffer variables. Then, a dummy variable is added for inflation targeters so as to measure if and to what extent they differed in terms of growth decline during the crisis.

Results suggest that countries which had inflation targeting as their monetary strategy, during the crisis performed worse than non-inflation targeters, by about 4.4 percentage points, on average, ceteris paribus. Hence, results suggest that inflation targeting indeed does not suit a large macroeconomic shock as the ongoing crisis; the narrow focus of the framework on inflation may have blinded central bankers from other worthwhile objectives such as smoothing output fluctuations. When the question is put in the context of the preconditions for successful inflation targeting, the study finds little evidence that their fulfillment matters for how the economy performs during the crisis. Very tentative evidence suggests that only the lower amount of monetary financing of the budget may have contributed inflation-targeting countries to have gone through the crisis better, but the finding may have limited importance due to the already low levels of the budget monetary financing in the investigated economies.

7. References

Aizenman, J., Hutchison, M. and Noy, I. (2011) Inflation Targeting and Real Exchange Rates in Emerging Markets. *World Development*, 39(5), p.712–724.

Angeriz, A. and Arestis, P. (2007) Inflation Targeting: Assessing the Evidence. Chapter in: McCombie, J.S.L. and Gonzalez, R.C. (eds.) *Issues in Finance and Monetary Policy.* Palgrave Macmillan.

Armas, A. and Grippa, F. (2006) Targeting Inflation in a Dollarized Economy: The Peruvian Experience. In: Armas, A., Ize, A. and Levy Yeyati, E. (eds.) *Financial Dollarization: The Policy Agenda*. Palgrave Macmillan.

Ball, L. and Sheridan, N. (2005) Does Inflation Targeting Matter? In: Bernanke, B.S. and Woodford, M. (eds.) *The Inflation Targeting Debate*. University of Chicago Press for the National Bureau of Economic Research, p.249-276.

Barro, R.J. and Sala-i-Martin, X. (2004) *Economic growth*. 2nd ed. Cambridge, MIT Press.

Carvalho Filho, I. (2010) Inflation Targeting and the Crisis: An Empirical Assessment. IMF Working Paper 10/45.

Conçalves, C.E.S. and Salles, J.M. (2008) Inflation Targeting in Emerging Economies: What do the Data Say? *Journal of Development Economics*, 85, p.312-318.

Corbo,V., Landerrretche, M.O. and Schmidt-Hebbel, K. (2002) Does Inflation Targeting Make A Difference? In: N. Loayza and R. Saito (eds.) *Inflation Targeting: Design, Performance, Challenges*. Central Bank of Chile: Santiago, Chile.

Duisenberg, W. (2003) Introductory Statement, and Questions and Answers. ECB Press Conference, 8 May, Frankfurt: Germany.

Easterly, W. and Kraay, A. (2000) Small States, Small Problems? Income, Growth, and Volatility in Small States. *World Development*, 28(11), p.2013-2027.

Easterly, W., Islam, R. and Stiglitz, J.E. (2001) Shaken and Stirred: Explaining Growth Volatility. *Proceedings of the Annual World Bank Conference on Development Economics*, p.191-222.

Edwards, S. (2007) The Relationship Between Exchange Rates and Inflation Targeting Revisited. in: Frederic S. Miskin & Klaus Schmidt-Hebbel & Norman Loayza (Series Editor) & Klaus Schmidt-Hebbel (Series Editor) (ed.) *Monetary Policy under Inflation Targeting*, chapter 10, pages 373-413.

Fischer, S. (1993) The Role of Macroeconomic Factors in Growth. *Journal of Monetary Economics,* p.485-512.

Fouejieu, A. (2012) Coping With The Recent Financial Crisis, Did Inflation Targeting Make Any Difference. Mimeo.

Fraga, A., Goldfajn, I. and Minella, A. (2004) Inflation Targeting in Emerging Market Economies. *Paper presented at the NBER Eighteenth Annual Conference on Macroeconomics, Washington, p.365-400.*

Frankel, J. (2012) The Death of Inflation Targeting. In: http://www.project-syndicate.org/commentary/the-death-of-inflation-targeting

Friedman, B. M. and Kuttner, K.N. (1996) A Price Target for U.S. Monetary Policy? Lessons from the Experience with Money Growth Targets. *Brookings Papers on Economic Activity,* 1996(1), p.77-146.

Friedman, B.M. (2003) The Use and Meaning of Words in Central Banking: Inflation Targeting, Credibility, and Transparency. In: Mizen, Paul (ed), *Essays in Honour of Charles Goodhart*, vol. 1. Cheltenham, U.K. and Northampton, MA: Elgar.

Gramlich, E.M. (2000) *Inflation Targeting*. Remarks before the Charlotte Economics Club, Charlotte: North Carolina.

Hammond, G. (2009) State of the Art of Inflation Targeting. CCBS Handbook, 29.

Hennan, G., Peter, M. and Roger, S. (2006) Implementing Inflation Targeting: Institutional Arrangements, Target Design and Communications. IMF Working paper, 06/278.

IMF (2005) *World Economic Outlook*. Washington: International Monetary Fund.

Jonas, J. and Mishkin, F.S. (2003) Inflation Targeting in Post-communist Countries: Experience and Prospects. In: Woodford, M. (eds.) *Inflation Targeting*. University of Chicago Press: Chicago.

Jovanovic, B. and Petreski, M. (2012) Hemlock for policy response: Monetary policy, exchange rates and labour unions in SEE and CIS during the crisis. FIW Working Paper 081.

Kohn, D.L. (2003) Comments on Marvin Goodfriend's "Inflation Targeting in the United States?" *Remarks delivered at the NBER Research conference on Inflation Targeting, Bal Harbor, Florida.*

Kose, M.A., Prasad, E.S. and Terrones, M.E. (2005) Growth and Volatility in an Era of Globalization. *IMF Staff Papers*, 52(Special issue), p.31-63.

Kuttner, K. (2004) A Snapshot of Inflation Targeting in its Adolescence. Pages 6–42 of: Kent, Christopher, & Guttmann, Simon (eds), *The Future of Inflation Targeting*. Sydney: Reserve Bank of Australia.

Kuttner, K. and Posen, A. (2001) Beyond Bipolar: A Three-Dimensional Assessment of Monetary Frameworks. *International Journal of Finance and Economics*, 6, 369–387.

Kuttner, K. and Posen, A. (2011) How flexible can inflation targeting be and still work? Discussion Papers 34, Monetary Policy Committee Unit, Bank of England.

Leiderman, L., Maino, R. and Parrado, E. (2006) Inflation Targeting in Dollarized Economies. IMF Working paper, 157.

Levine, R. and Renelt, D. (1992) A Sensitivity Analysis of Cross-Country Growth Regressions. *American Economic Review*, p.942-63.

Mankiw, G., Romer, D. and Weil, D. (1992) A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics*, 407–437.

Masson, P.R., Savastano, M.A. and Sharma, S. (1997) The Scope for Inflation Targeting in Developing Countries. IMF Working paper, 130.

McKinnon, R.I. (1991) Financial Control in the Post-communist from Classical Socialism to a Market Economy. *The Journal of Economic Perspectives*, 5(4), p.107-122.

Meyer, L.H. (2004) Practical Problems and Obstacles to Inflation targeting. *Federal Reserve Bank of St. Louis Reviews,* 86(1), p.151-160.

Mishkin, F.S. (2004) Why the Fed Should Adopt Inflation Targeting. *International Finance*, 7(1), p.117-27.

Mishkin, F.S. (2011) Monetary Policy Strategy: Lessons from the Crisis. NBER Working Paper 16755.

Mishkin, F.S. and Schmidt-Hebbel K.D. (2006) Monetary Policy Under Inflation Targeting: An Introduction. *Journal Economía Chilena (The Chilean Economy)*, 9(3), p.5-17.

Mishkin, F.S. and Schmidt-Hebbel K.D. (2007) Does Inflation Targeting Make a Difference? NBER Working Paper, 12876.

Mishkin, F.S. and Schmidt-Hebbel, K.D. (2001) One Decade of Inflation Targeting in the World: What Do We Know and What Do We Need to Know? NBER Working paper, 8397.

Mishra, A. and Mishra, V. (2009) Pre-Conditions For Inflation Targeting In An Emerging Economy: The Case Of India. Development Research Unit, Discussion Paper DEVDP 09/08.

Mobarack, A. (2001) The Causes of Volatility and Implications for Economic Development. Mimeo, University of Maryland.

Neumann, M.J.M. and von Hagen, J. (2002) Does Inflation Targeting Matter*? Federal Reserve Bank of St. Louis Review*, 84(4), p.127-148.

Newbery, D.M. and Stiglitz, J.E. (1982) Risk Aversion, Supply Response, and the Optimality of Random Prices: A Diagrammatic Analysis. *Quarterly Journal of Economics*, 97(1), p.1-26.

Petreski, M. (2011) A Markov Switch to Inflation Targeting in Emerging Market Peggers with a Focus on the Czech Republic, Poland and Hungary. *Focus on European Economic Integration*, 3, p.57-75.

Roger, S. (2009) Inflation Targeting at 20: Achievements and Challenges. IMF Working paper 09/236.

Sargent, T.J. and Wallace, N. (1982) The Real Bills Doctrine vs. The Quantity Theory: A Reconsideration. *Journal of Political Economy*, 90(6), p.1212-1236.

Siklos, P.L. (1999) Inflation Target Design: Changing Performance and Persistence in Industrial Countries. *Federal Reserve Bank of St. Louis Review*, 81(2), p.47-58.

Siklos, P.L. and Abel, I. (2002) Is Hungary Ready for Inflation Targeting? *Economic Systems*, 26, p.309-333.

Stiglitz, J. (2008) The Failure of Inflation Targeting. In: http://www.project-syndicate.org/commentary/the-failure-of-inflation-targeting

Svensson, L.O. (1996) Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets. *European Economic Review*, 41, p.1111-1146.

Svensson, L.O. (1999a) Inflation Targeting as a Monetary Policy Rule. *Journal of Monetary Economics,* 43, p.607-654.

Svensson, L.O. (1999b) Inflation Targeting: Some Extensions. *Scandinavian Journal of Economics*, 101(3), p.337-361.