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Empirical Analysis of the Impact of Inflation Targeting on the Risk Premium

Abstract: The basis for the conduct of monetary policy is monetary policy strategy. Monetary strategy is necessary for monetary policy makers to analyse all relevant information in order to undertake effective policy actions. Inflation targeting has enabled countries to achieve low inflation in the very short term. Due to this, the financial markets have adjusted their long-term inflation expectations and incorporated them into the interest rate. Risk premiums that compensate for the uncertainty of inflation have fallen. The aim of this paper is to examine how the adoption of inflation targeting affects the movement of the risk premium. The hypothesis we want to test is that the adoption of inflation targeting affects the reduction of the country risk premium by affecting the formation of a more stable macroeconomic environment through a more stable and predictable inflation rate in the medium and long term. The method used for evaluating the regression coefficients is the dynamic panel generalized method of moments (GMM). This method involves the use of conditional moments in endogenous and exogenous variables with a lag as instruments for the assessment of differential equations, while the difference lagged endogenous variables are used as instruments in the levels equation.

Keywords: inflation targeting, inflation risk premiums, asset prices, monetary strategy

JEL Classification: E31, E52 and E58

Introduction

The basis for the conduct of monetary policy is monetary policy strategy. All monetary strategies include the appropriate exchange rate regime and instruments for achieving the ultimate goal of monetary policy. Monetary strategy is needed for monetary policy makers to analyse all relevant information in order to undertake effective policy action. Mishkin and Schmidt-Hebbel (2006) point out that inflation targeting has helped developed countries to reduce their long-term inflation, the inflation response to oil price shocks and the exchange rate, increase the independence and effectiveness of monetary policy, as well as to reduce the deviation of inflation from the outcome of the inflation target. Inflation targeting has enabled countries to achieve low inflation in the very short term. Due to this, the financial markets have adjusted their long-term inflation expectations and incorporated them into the interest rate. Risk premiums that compensate for the uncertainty of inflation have fallen. Cohen et al. (2003) discuss the response of the nominal and real exchange rates in real and nominal shocks to assess the benefits and harms of inflation targeting. When evaluating the influence of inflation targeting, they compared the effects real shocks have on the nominal exchange rate before and after the adoption of this monetary strategy and assumed a smaller impact that confers credibility. Ammer & Freeman (1995) examined three countries inflation targeters (New Zealand, Canada and the UK). This study provides a variety of evidence on the effects of inflation targeting. On one hand, inflation has not exceeded targets and this was accomplished without a sharp increase in short-term interest rates. However, long-term interest rates show that none of the central banks has quickly achieved a complete long-term credibility by publishing long-term inflation targets. Johnson (2002) showed that the level of inflation expectations declines after the announcement of explicit inflation targets, and the variability of expected inflation is not falling. Target inflation allows achieving higher disinflation with minor errors in forecasting inflation in the inflation targeters. Ball & Sheridan (2003) show that the effect of inflation targeting on macroeconomic outcome is not important. Inflation targeting has no effect on the level of long-term interest rates, contrary to what would be expected if the targeting reduced inflation expectations. Also, inflation targeting has no effect on the variability of short-term interest rate controlled by monetary policymakers. Moutot & Vitale (2008) point out that inflation targeting in the context of price rising balloon can rise to a position of monetary policy, in fact, encourages the growth of asset price bubble. The logic of this argument rests on the rigidity of nominal wages that are not enough to increase in response to the expected productivity shock, such as that to happen that wages are flexible. Therefore, the required increase in real wages can only happen by

reducing interest rates. Saxton (2005) shows that when the prices stabilize, inflation and inflation expectations reduce the variability of relative and nominal prices, as well as the volatility of interest rates and the market (short-term money market, long-term bond market, foreign exchange market, commodity markets, market shares, etc..)

1. Benefits of Inflation Targeting

The basis for the conduct of monetary policy is monetary policy strategy. A monetary strategy includes the appropriate exchange rate regime and instruments for achieving the ultimate goal of monetary policy. Monetary policy strategy is particularly important in frequent structural changes. Monetary strategy is needed for monetary policy makers to analyse all relevant information in order to undertake effective policy action. Any general guidelines for creating a monetary strategy should be determined by the characteristics of an economy. Monetary policy strategy that aims at price stability must be controlled by long-term monetary developments.

Many central banks implement monetary policy according to certain rules in order to enhance credibility. Monetary policy rule implies that monetary policy instrument should be determined as a function of the limited number of variables. For example, you can use simple rules, such as unconditional rules (rules of constant money growth) and conditional rules (McCallum basic rule of money and the Taylor rule of interest rates). In a complex and uncertain environment, the rules are too restrictive to fit the optimal monetary policy. This does not mean that monetary policy should be completely discretionary. Given that the time delays of monetary transmission long and uncertain effects of discretionary monetary policy can exacerbate economic fluctuations and postpone the achievement of the objective of the central bank. Monetary policy should act in a predictable and systematic manner in order to stabilize expectations and increased efficiency of macroeconomic policy.

The main requisite for a successful monetary strategy is to define a clear goal that a central bank should achieve. Today there is a consensus that price stability is the primary objective of monetary policy. However, one should not neglect the exchange rate stability and the growth of output and employment as objectives of monetary policy. By achieving price stability, monetary policy can best contribute to economic growth because it provides a reduction in the social cost of having money, more efficient alignment of relative prices, and maintenance of a low risk premium. Therefore, it is important that institutional arrangements provide

clear authority to the central bank to achieve its primary objective of monetary policy.

The following requisite for successful monetary strategy is consistent with the on-going process of nominal and real convergence. Monetary policy and exchange rate policy should aim to create a stable macroeconomic environment, which will reinforce expectations, and ensuring sufficient flexibility for adapting to unforeseen shocks. To ensure a stable macroeconomic environment, it is important to create a strong institutional basis for the regulation and supervision of the financial sector. It is important to ensure that the monetary policy strategy maintain a credible disinflation process and achieve price stability, which is consistent sustainable process of nominal and real convergence (Issing, s.a.).

When the goal of monetary policy price stability, optimal rules in open economy differ significantly from optimal policies in a closed economy. In a large open economy, price stability is achieved by targeting inflation. In the regime of flexible exchange rates, monetary policy actions have effects through the interest rate and the exchange rate. Since most economic agents are net debtors, higher interest rates increase the cost of financial operations, which in the end lead to a decrease in aggregate demand. Changes in the real exchange rate affect economic activity through external competitiveness. Taking into account the transmission mechanism of monetary (interest rate and exchange rate), the central bank must choose the operating target to achieve the ultimate objective of monetary policy. If the central bank uses the interest rate as the operating target, there is a potential danger of ignoring a very important transmission mechanism of foreign exchange through which monetary policy operates (Wet, 2001).

In the case of neomonetarist transmission mechanism, monetary policy affects the economy through unanticipated inflation. In the case of supply shocks, these provide information about the central bank additional leverage for cutting the volume of inflationary surprises in relation to the magnitude of realized shocks in the sense that, except in extreme cases, to reduce the absolute value of the deviation of inflation and employment in relation to the reference value. In the case of New Keynesian transmission mechanism, monetary policy affects the economy through a change of the nominal interest rate which, if given inflationary expectations and sticky prices, converts into changes in real interest rates. Changes in the real interest rate then affect the output and the deviation of output from the target, as well as the policy output, which in turn affects inflation. Since the transmission mechanism is not working through unanticipated inflation, disclosure of information, in this case, does not affect the relationship between the variation in inflation and output. However, disclosure in advance increases the

fluctuations in inflationary expectations. As a result, achieving real interest rates requires wider fluctuations in the nominal interest rate (Krušković, 2009).

Inflation targeting has enabled countries to achieve low inflation in the very short term. Due to this, the financial markets have adjusted their long-term inflation expectations and incorporated them into the interest rate. Risk premiums that compensate for the uncertainty of inflation have fallen. In addition, the goods and labour markets adjusting their expectations are a low base rate when the target rate is achieved. At the same time, inflationary expectations have become linked to the targeting and less sensitive to the removal of inflation targets. However, there has been deterioration in the ratio of sacrifice. When inflation targeting, the central bank is transparent because it publishes inflation report. Forecasts of inflation have become effective intermediate target of monetary policy. Inflation target provides a nominal anchor and can contribute to reducing and maintaining inflation at a low level (Freedman, s.a.). Inflation targeting has helped developed countries to reduce their long-term inflation, the inflation response to oil price shocks and the exchange rate, increase the independence and effectiveness of monetary policy, as well as to reduce the deviation of inflation from the inflation outcome targets (Mishkin & Schmidt-Hebbel, 2006).

Inflation targeting allows the central bank to focus on domestic objectives and respond to domestic and foreign shocks, and to use all available information, not just the information contained in one or two variables, in order to determine the best adjustment of monetary policy instruments. Also, inflation targeting does not depend on the stability of the connection between money and inflation (Mishkin & Savastano, 2001).

When prices stabilize, inflation and inflation expectations have less negative impact on price movements. Price reaction to the announcement of macroeconomic policy will be muted. Reduction of inflation and inflation expectations reduce the variability of relative and nominal prices, as well as the volatility of interest rates and the market (short-term money market, long-term bond market, foreign exchange market, commodity markets, market shares, etc) (Saxton, 2005).

2. Inflation targeting, risk premium and asset prices

Monetary environment in many countries moved towards greater openness over recent years, as characterized by relatively low levels of inflation and the volatility of the price of financial assets (stocks, bonds and foreign exchange). This partly reflects the volatility of the asset prices dependence on expectations, but major

changes in these prices also raise the question of an appropriate monetary policy response. In this context, the reaction of central banks to unexpected changes in asset prices depends on how price volatility affects forecasts of inflation. Changes in the prices of assets can have a direct impact on aggregate demand through changes in wealth and consumption. In addition, sudden changes in exchange rates affect aggregate demand through increased imports and exports. If the exchange rate changes imply a growth forecast of inflation, monetary policy has to tighten and vice versa.

In making monetary policy decisions, it is important to take into account the movement of asset prices. Changes in asset prices reflect changes in the financial and real sectors, which affect inflation. Inflation of asset prices usually happens with rapid credit growth and excessive debt accumulation, leading to the acceleration of inflation. Pricing balloons have serious repercussions on the real economy. Therefore, when establishing monetary policy, it is necessary to take into account changes in the prices of real estates, stocks and bonds, and to determine how they might affect aggregate demand and inflation. Changes in asset prices are important as an integral element of the monetary transmission mechanism.

Reaction to changes in asset prices can be destabilizing and lead to wrong decisions of monetary policy changes because asset prices are not always associated with the fundamentals that can generate inflation. In addition, changes in the prices of different assets may administer opposite signals. For example, the real estate prices can increase, while the share prices decline. Also, it will be difficult for the central bank to target variables over which it has no control. Therefore, it is desirable for the central bank to take action against an increase in asset prices when inflation forecasts show that it will be filled with the inflation target. It is difficult to raise interest rates in order to stop the expansion of credit if inflation forecasts do not show that the inflation target will be exceeded.

Changes in asset prices affect inflation in two basic ways (Smets, s.a.): 1) changes in asset prices directly affect aggregate demand. For example, the growth of asset prices increases wealth. As a result, aggregate demand will increase, which could generate inflationary pressures; 2) changes in asset prices contain useful information about current and future economic conditions. For example, higher stock prices can cause a positive supply shock and reduce inflationary pressures.

Reaction to asset prices and the mismatch of asset prices will achieve better performance by reducing the probability of price bubble. Since the central bank's inflation-targeting is to focus on the basic inflation, not necessarily targeting asset prices directly, but before they can be used to improve the prediction of the basic

trajectory of inflation. In this way, the possibility of price bubble in asset markets is less likely, which promotes financial stability. Low inflation is not usually associated with the stability of asset prices. Inflation targeting is usually associated with the movement of asset prices, pricing balloons and volatility of asset prices.

Inflation targeting, so far, has focused on achieving price stability over a period of two to three years, generally paying little attention to the movement of asset prices. It was considered that the equilibrium asset prices were impossible to identify at an early stage and that any action of the central bank was unsuccessful and eventually led to moral hazard. However, in a closed economy, inflation targeting in the context of a price rising balloon can rise to a position of monetary policy which, in fact, encourages the growth of asset price bubble. The logic of this argument is based on the rigidity of nominal wages, which are not sufficiently increased, corresponding to the expected productivity shock, such as that to happen when wages are flexible. Therefore, the required increase in real wages can only be achieved by reducing interest rates. However, it would affect the central bank that targets inflation to reduce the interest rate and then amplify ripple effect that occurs with the expected increase in productivity. Reducing interest rates would raise the credit boom. This may explain the increase of price bubble in the context of low inflation where central banks that target inflation do not sufficiently control money and credit (Moutot & Vitale, 2008).

3. The impact of inflation targeting on the risk premium - econometric analysis

The aim of this paper is to examine how the adoption of inflation targeting affects the movement of the risk premium. The hypothesis we want to test is that the adoption of inflation targeting affects the reduction of a country`s risk premium by affecting the formation of a more stable macroeconomic environment through a more stable and predictable inflation rate in the medium and long term.

Data

The EMBI index is used as a measure of country risk premium. In the econometric analysis we used monthly data for Bulgaria, Serbia, Croatia, Hungary, Poland, Turkey and Romania. Data on the risk premium (EMBI Index), inflation, exchange rates and foreign exchange reserves were obtained from statistical offices of respective national banks and Eurostat. Bearing in mind that the availability of data on the risk premium is not the same for all countries in the panel, the unbalanced panel for the period from May 2003 to September 2013 is evaluated.

As the dependent variable in the regression of the CFA EMBI index, i.e. the first set differential logarithm of the EMBI index. As explanatory variables emerge: a dummy for inflation targeting (IT) which takes the value 1 for the period in which the country applies inflation targeting and the value 0 otherwise, then the dependent variable lag, monthly changes in exchange rates, and changes in foreign exchange reserves.

Table 1 shows the data on the year of adoption of inflation targeting and the annual rate of inflation at the time. Inflation targeting implies formally adopted inflation targeting, which is currently implemented in 27 countries worldwide (Bank of England, 2012).

Table 1: Date of adoption of inflation targeting and the inflation rate at inception of inflation targeting in the Czech Republic, Poland, Hungary, Romania, Turkey and Serbia

Country	Date of adoption inflation targeting	The inflation rate in moment of the beginning of inflation targeting
Czech Republic	1997	6,8
Poland	1998	10,6
Hungary	2001	10,8
Romania	2005	9,3
Turkey	2006	7,7
Serbia	2006	10,8

Source: IMF Finance and Development 2010

To avoid the error specifications due to omission of relevant regressors, in addition to the artificial variables for inflation targeting, the model included additional variables that have a statistically significant impact on the movement of the risk premium. The model also includes a monthly rate of inflation which is expected to have a negative impact on the risk premium, then depreciation of the nominal exchange rate which is also expected to negatively impact the level of foreign exchange reserves, which is expected to have positive connection to the movement of the risk premium. Table 2 shows the variables used in the model and a description thereof.

Table 2: Definition and description of variables used in the models

Variable	Description of variables
EMBI	index that indicates the risk premium
IT	artificial variable that takes the value 1 in the case of inflation targeting and the value 0 in the opposite case
inf	Monthly inflation
FX_rate	rate monthly exchange rate changes
FX_res	level of foreign exchange reserves

Methodology

When evaluating the regression coefficients, the method used is the dynamic panel generalized method of moments (GMM). This method involves the use of conditional moments in endogenous and exogenous variables with a lag as instruments for the assessment of differential equations, while the difference lagged endogenous variables are used as instruments in the levels equation.

To test the effect of the adoption of inflation targeting in the risk premium, we estimated the following equation:

$$\Delta \log(EMBI)_{it} = \beta_1 \Delta \log(EMBI)_{it-1} + \beta_2 IT_{it} + \beta_3 \Delta(FX\_res)_{it} + \beta_4 \Delta(FX\_rate)_{it} + \gamma_t + \varepsilon_{it}$$

where γ_t is a fixed time effect. Coefficient β_2 represents the relationship between the adoption of inflation targeting and the risk premium. The coefficient β_1 indicates the degree persistency in moving risk premium, while the coefficients β_3 and β_4 indicate the effect of changes in the level of foreign exchange reserves and exchange rate changes in the risk premium, respectively.

The two models with different sets of explanatory variables are evaluated and the regression results are shown in Table 3.

Table 3: **Results of panel regression for the risk premium and inflation targeting in Bulgaria, Serbia, Croatia, Hungary, Poland, Turkey and Romania; Rated generalized method of moments for the period May 2003 – September 2013**
Dependent variable: Rate of change of monthly EMBI

Independent variables	Equation (1)		Equation (2)	
Variable	Coefficient	P-value	Coefficient	P-value
C	0,14***	0,00	0,04***	0,00
$\Delta \log(EMBI)_{t-1}$	0,20**	0,05	0,41***	0,00
IT	- 0,07**	0,02	-0,04***	0,00
INF	0,10*	0,06	0,04***	0,00
$\Delta(fx\_res)$	-0,04**	0,03	-0,03***	0,00
$\Delta \log(fx\_rate)$	0,79	0,15		
	R^2=0,58 Adjusted R^2=0,55		R^2=0,77 R^2=0,72	

Note: *, ** and *** denote statistical significance at the level of 10%, 5%, and 1%, respectively. Time effects were included in the regression.

Equation 1 of Table 3 presents the regression-rated bond between the monthly changes in the country`s risk premium and changes in the country`s risk premium from the previous month, inflation, changes in the level of foreign exchange reserves and exchange rate changes. Regression includes fixed temporal effects that are not statistically significant at the level of 1% of significance (p-value which is higher than the preliminary constant is 0.00). Based on the estimated coefficients to the explanatory variables, it can be concluded that the risk premium exhibits some persistency (β_1 = 0.20), the growth rate affects the growth of risk premiums, while foreign exchange reserves lead to a decrease in the growth rate of the country`s risk premium. The coefficient β_2 is negative and statistically significant with a significance level of 5% and indicates that the adoption of inflation targeting leads to a decrease in the risk premium of 0.07 percentage points. The coefficient of the change in the exchange rate, although of the expected sign, is not statistically significant, so the equation 2 sites by exclusion of the exchange rate from the model.

After shutting down the exchange rate of the model, this resulted in improved models in the form of an increase in the statistical significance of estimated coefficients of the remaining variables, where their character has not changed. There was also an increase in the value of the coefficient of variation (R2), which is from 0.58 in the first regression, increased to 0.77 in the second regression. The value

of the coefficient of determination indicates that 77% of the variation in growth rate risk premium explained the proposed variables.

In the final model (Equation 2), the growth rate risk premium exhibits a slightly higher persistency ($\beta_1 = 0.41$). Coefficient, which indicates the relationship between the adoption of inflation targeting and movement of the risk premium remains statistically significant at the 1% level and negative. Its value ($\beta_2 = -0.04$) indicates that the adoption of inflation targeting impacts the reducing of the rate of growth of the country risk premium of 0.04 percentage points. After shutting down the exchange rate of the model, the statistical significance of this ratio has increased. Rising inflation increases in risk premiums, while the increasing of levels of foreign exchange reserves acts in the opposite direction.

Immutable character variables and their statistical significance indicate that estimated coefficients are robust to changes in model specification.

Conclusion

Many central banks implement monetary policy according to certain rules in order to enhance credibility. Monetary policy rule implies that monetary policy instrument should be determined as a function of a limited number of variables. Monetary policy should act in a predictable and systematic manner in order to stabilize expectations and increase efficiency of macroeconomic policy.

The main requisite for a successful monetary strategy is to define a clear goal that the central bank should achieve. There is a consensus nowadays that price stability is the primary objective of monetary policy. However, one should not neglect the exchange rate stability and the growth of output and employment as objectives of monetary policy. Achieving price stability, monetary policy can best contribute to economic growth because it provides a reduction in the social cost of having money, more efficient alignment of relative prices and maintain a low risk premium. Therefore, it is important that institutional arrangements provide a clear authority to the central bank to achieve its primary objective of monetary policy.

Inflation targeting has enabled countries to achieve low inflation in the very short term. Due to this, the financial markets have adjusted their long-term inflation expectations and incorporated them into the interest rate. Risk premiums that compensate for the uncertainty of inflation have fallen. In addition, the goods and labour markets adjusted their expectations of a low base rate when the target

rate is achieved. At the same time, inflationary expectations have become linked to targeting and less sensitive to the removal of inflation targets. However, there has been deterioration in the ratio of sacrifice. Inflation targeting has helped developed countries to reduce their long-term inflation, the inflation response to oil price shocks and the exchange rate, increase the independence and effectiveness of monetary policy, as well as to reduce the deviation of inflation from the outcome of the inflation target. The econometric analysis in this paper showed that inflation targeting leads to a reduction in the risk premium.

In making monetary policy decisions, it is important to take into account the movement of asset prices. Changes in asset prices reflect changes in the financial and real sectors, which affect inflation. Inflation of asset prices usually happens with a rapid credit growth and excessive debt accumulation, leading to the acceleration of inflation. Pricing balloons have serious repercussions on the real economy. Therefore, when determining monetary policy, it is necessary to take into account changes in the prices of real estates, stocks and bonds, and to determine how they could affect aggregate demand and inflation. Changes in asset prices are important as an integral element of the monetary transmission mechanism.

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