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MASTER'S THESIS

The Performance of inflation targeting in emerging market economies

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Declaration of Authorship

The author hereby declares that he compiled this thesis independently; using only the listed resources and literature, and the thesis has not been used to obtain a different or the same degree.

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Prague, July 31, 2018

Signature

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Abstract

The aim of the thesis is to study the performance of emerging economies under the inflation targeting as a framework. This framework is characterized by the direct target that it has on inflation which should be achieved within a period. Inflation targeting was initially adopted by industrialized economies, and the outcomes throughout the years have been substantially good for other economies to join this framework. The dataset used is updated with data from after the financial crises allowing space for us to test another hypothesis about the importance of inflation targeting during the financial crises. We used difference to difference model to test our hypothesis and we concluded that inflation targeting does not have any significant statistical effect on the output growth, but it does have a statistical significant effect in the inflation rate. We also pointed out that the economies that were targeting inflation during the financial crises performed much better compared to the ones which did not.

JEL Classification	E31, E44, G01
Keywords	Inflation targeting, emerging and developed economies, financial crises

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Acronyms

IT Infaltion Targeting Economies

NIT Non- Inflation Targeting Economies

BoA Bank of Albania

CNB Czech national Bank

CIS Commenwealth Independent State

UK United Kingdom

EDE Emerging and Development Europe

Master's Thesis Proposal

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Proposed Topic:

The Performance of inflation targeting in emerging market economies.

Motivtion:

The primary goal of this thesis is to study the performance of inflation targeting in emerging economies such as Albania, Turkey, India, Brazil, Moldavia etc., and understanding better the macroeconomic impact that this framework has on these countries.

Inflation Targeting which today is one of the most commonly used monetary policies, was initially adapted by New Zealand in 1990. What differentiates mostly this monetary policy from others is the fact that it is straightforward and targets inflation without having to use an intermediate variable. Through this technique central banks settle a target of inflation that should be met within a specific period of time.

The history has shown that not all of the policies work for all the countries and that there are special preconditions that should be strictly met for a monetary policy to be effectively applied. Nevertheless, a lot of literature supports the claim that inflation targeting was mainly a very good story to tell from several emerging economies.

Hypotheses:

The main hypotheses of this thesis are related with the macroeconomic development of countries which implement inflation targeting. It is important to test as well how these inflations targeting emerging market economies performed during the post-crises period compared to the non-targeting economies.

1. Hypothesis #1: Macroeconomic performance is improved through Inflation Targeting
2. Hypothesis #2: Inflation rate is lower after implementing inflation targeting
3. Hypothesis #3: Inflation targeting is predominant in terms of issued stability in the post-crises period

Methodology:

Difference in difference method has been commonly used since 1985 to provide the necessary evidences on many policy questions. This thesis will test the hypothesis through the usage of this specific model. In other words this method will allow us to compare the changes in inflation for a specific set of countries before and after the implementation of inflation targeting to the changes in control group's variable. Also this method will be used to compare the performance of treatment and control group during and after the crises period. Ball and Sheridan (2004) argued through their results that countries with higher inflation will be more motivated to adapt inflation targeting, but on the other hand it might be possible that this high inflation comes because of a shock.

Because of implementing inflation targeting in the second period (the period post-inflation targeting) we might expect lower inflation due to regression to the mean, which might cause bias results. To avoid this problem apart from the dummy variable we might also use the initial value of the inflation (pre- inflation targeting) in the model so that the dummy coefficient would reflect the change in macroeconomic performance attributable specifically to the implementation of inflation targeting.

In order to test for the macroeconomic performance after implementation of inflation targeting it is important to identify the variables such as the level and the volatility of inflation and GDP growth which will be used in the above-mentioned method. Central bank reports and IMF reports will provide us with the dataset.

Expected Contribution:

This thesis will use a more updated dataset which will allow us to study the role of the inflation targeting in emerging market economies before, during and after the crises. The nature of this topic allows possibilities for very contradictual findings, which lead throughout the years to a still continuing debate on the effectiveness of inflation targeting. Some of the economists argue that inflation targeting is a framework which facilitates nominal convergence. Other studies conclude that inflation targeting apart from improving the macroeconomic environment is also the best proven framework throughout the years. This paper will investigate the performance of the emerging market economies and conclude whether they outperfome the control group.

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1 Introduction

The aim of the thesis is to study the performance of emerging economies under the inflation targeting as a framework. This framework is characterized by the direct target that it has on inflation which should be achieved within a period. Inflation targeting was initially adopted by industrialized economies, and the outcomes throughout the years have been substantially good for other economies to join this framework.

During the recent years, the studies that focus on the monetary policies frameworks have become the center of research for most of the economist. This strongly relate with the necessity to understand the relation between inflation, interest rates, macroeconomic aggregates and the business cycle itself. (Dokle, 2013)

The impact that monetary policies and frameworks might have on the aggregates is also strongly related to the everyday consumption and investments. Of course a lower and stable inflation rate would imply price stability, which, in a chain reaction affects the cost of borrowing and the consumption itself. Understanding these connections, but most importantly the crises experiences has led to the creation of several policies and regulations that would allow the central banks to avoid possible further disequilibrium. Generally Central banks are entitled to three main responsibilities:

a. Ensure that there is a stable monetary environment in long run. Low and stable inflation is one of the targets for central banks because through it the borrowing cost remains low. Targeting a low inflation has proven to be the best way to boost confidence in the value of the money and to provide ground for stable economic development. (Bank of Canada)
b. React to crises. In most of the cases no matter the type of the monetary policy that is chosen, crises cannot be prevented, but central banks have the responsibility to react accordingly to the circumstances.
c. Stabilize short term economic performance.

In order to achieve these goals Central Banks have to make sure that they are following the most suitable monetary policy. One of the most commonly used ones is inflation targeting.

1.1 Inflation Targeting

Inflation Targeting is a monetary policy framework that targets inflation directly without using an intermediary target. The main goal is to settle a target and achieve it within a specific period. New Zealand was the first country that in 1989 adopted inflation targeting. After that industrialized countries like Canada, United Kingdom, Australia and Finland joined shortly. During the last couple of years, the literature has been focusing more on the adoption of inflation targeting by the emerging markets rather than the industrialized ones. Inflation targeting application is different from country to county but commonly these countries all apply the same four elements:

1. Aim to achieve price stability
2. Set a numerical target
3. Defines the horizon of the time needed to reach this target
4. Constantly evaluates if the goal is achieved and adjusting accordingly the short-term interest rate, which is the main monetary policy instrument. (Mishkin, 2000)

During the last two and a half decades, inflation targeting has been the monetary policy framework choice of many countries. What mainly characterized this framework is the fact that it started to become popular not only because of the practice that it implies but also because it substituted other failing monetary policy frameworks. Rose, A.K. (2014) in his study emphasize that none of the countries which have adopted inflation targeting have abounded this frame work during the financial crises. Inflation targeting is flexible in terms of shock response but also is consistent with the regime. Inflation Targeting apart from focusing in the price stability has additional benefits such as:

1. Medium term target inflation announced to the public

2. Sets the price stability as the primary goal of the monetary policy
3. Monetary aggregates do not play an important role in the formation of the scope of this framework
4. Communications with the public increase highly the transparency of this framework
5. Central banks become more accountable for reaching the inflation target. (Mishkin, 2000)

These elements all imply the characteristics that an economy adopting inflation targeting as a monetary policy framework should have. But how are these countries classified and how would we define which of them is for real an inflation targeter?

Because for some of the economies that state that they have an inflation target, there are evidences that actually they are still under the exchange rate regime or even monetary policy. Aiming for the price stability is not the only criteria that makes a country an inflation targeter, (Dokle, 2013)

Carare & Stone (2003) bring a much-clarified classification of countries which target inflation. Fully fledged inflation targeter together with the implicit price stability anchor and inflation targeting lite are the three main categories that are briefly explained in Carare & Stone (2003) paper.

1.1.1 Fully fledged inflation target

Fully fledged inflation target is characterized by the credibility and very good communications about the inflation target. Central banks that are classified as Fully-fledged inflation targeters are those central banks which put emphasis a lot on the communications with the public and other agents. Apart from initial information, central banks of this nature frequently publish reports on the values and the forecasts done for the inflation rate, which later affects inflation expectations.

1.1.2 Implicit price stability anchor

Implicit price stability anchor is a characteristic of those central banks which have been facing for a long period of time a stable inflation. In this case what also

characterizes these central banks is the credibility that they have. The public trusts the central bank' s decision, because it has proven to be right. So, in this scenario, even though the transparency is not the strongest point of the central banks, still the position that it has earned through tough experiences show that if these central banks, target inflation and does not share all the details with the public, it can still manage well to achieve the goal.

1.1.3Inflation targeting lite

Inflation targeting lite is a characteristic of those central banks which have a very low level of credibility. As we have understood so far credibility is one of the most important characteristics of central banks, because through this tool the central banks can affect the inflation expectations and so reach their goal of price stability. Generally, these types of central banks inflation targeters are the ones who most commonly fail to meet their forecasts and goals.

1.2 Advantages and Disadvantages of Inflation Targeting

1.2.1 Advantages of Inflation Targeting

Advantages of inflation targeting are mainly related with the behavior of the central banks. In order to have a sound framework application, central banks should be independent and transparent.

Starting to discuss about the advantages of inflation targeting, we should keep in mind that such a framework has lower cost compared to other policies. The failure of this policy as argued by Batini, Kuttner and Laxton (2005) leads to very short term cost which do not strongly impacts the debt, reserves or even the crises. The losses might be seen in the increasing inflation and even a slow economic growth, but always for a short or medium term.

One of the best characteristics of inflation targeting is that it directly targets inflation, without the need and the usage of an intermediary variable. It is crucial for the central banks to define the target and the time horizon as clearly as possible.

This whole process will make the central banks more credible from the public point of view. Having the tools to make clear predictions and forecast about inflation directly affects the public. So another important characteristic of inflation targeting is that it promotes transparency of the central bank to the public. Since this framework is much easily understandable and it impacts the economy directly through the expectations, central banks find it essential to communicate and present the whole process of targeting. This framework places the focus on mainly what the central bank can achieve rather than what they fail to achieve. In other words, such a framework aims at price stability and does not focus on other variable such as output or unemployment rate. This fact makes the bank more credible.

Apart from increasing the credibility of the central bank the communication to the public is a very successful way of affecting the inflation expectations. When the target is understandable, and most importantly if it is clear and realistic, the expectations from the public for inflation will almost match the forecasted inflation. This leads to price stability and as a whole the aim of the central bank is easily reached. Apart from the transparency and credibility inflation targeting encourages central banks to be more accountable from the public point of view, since such targets encourage the public to support the independency of the central banks.

The other aspect of transparency is related with the government. It does not matter the type of the policy that a country has chosen, there should always be a balance between fiscal policies and the monetary ones. But it is essential for the central bank to be independent completely from other institutions especially for countries which have been having monetary policies management issues through the years. This independency allows space for the central banks to put as a key and primary goal the price stability and leave aside other goals.

Mishkin (2009) focuses also on the advantage that inflation targeting has on relation to the time- inconsistency trap. Inflation targeting decreases the changes of time-inconsistency trap, making the central bank more accountable. The reason why is related with the fact that inflation targeting targets a numerical value of inflation as a primary and priority goal, making so the central bank more accountable. This target is set once and remains the same over time, no matter what the conditions of

the economy are. As argued by King (2005) “Inflation targeting is a framework designed for a world of learning”.

1.2.2 Disadvantages of Inflation Targeting

Disadvantages of inflation targeting are commonly highlighted especially after the crises in 2008 – 2009.

One of the greatest concerns not only for inflation targeting but for any other framework is the relation with the fiscal policy. For a monetary policy to be fruitful and reach the target results the environment should be stable but also there should be no contradiction between it and the fiscal policy.

As argued by Debelle (1997) if an economy is facing huge public debt the failure of the inflation targeting as a framework is highly expected. The reason behind is that the public debt encourages an increasing inflation, which strongly contradicts the main goal of inflation targeting. Savantano & Mishkin (1999) state that for such a framework to work accordingly the economy should be financially stable and most importantly no dominancy of fiscal policy should be seen.

In their paper Lepeer and Leith (2016) try to understand inflation as a joint monetary and fiscal phenomenon. They conclude that monetary and fiscal policies interact with private- business behavior to produce the aggregate level of price. Choosing between the monetary and the fiscal point of view for defining the inflation dynamics depends strongly on the circumstances and there is no way of saying which one is the right and which one is the wrong policy.

Another disadvantage of inflation targeting is related with the fact that inflation itself is not easily controlled by the central banks. Countries that suffer the most from this problematic are the economies which are emerging and growing and have a tendency of high inflation rate. This issue which is pointed out by Mishkin (1999) emphasis the difficulties of forecasting inflation rate under these circumstances. Countries, which prior were characterized by high inflation, will have a greater change on having a huge variance between what they are forecasting and what the level will be, affecting so directly the credibility of the banks itself. This whole process makes it even more difficult for the central banks to explain the situation to

the public, causing so more problems. Sharma et al. (1997) states that the best scenario for the implementation of inflation targeting as a monetary policy framework is the case where the county itself has been having deflation periods prior to this policy.

1.3 Conditions of Implementation

In the following section, we will be reviewing all the prior conditions that are needed for the implementation of inflation targeting as a monetary policy framework.

The reason why we are focusing in such an area is the fact that the history itself has shown that countries should meet several conditions before fully implementing the monetary policy framework. Another reason why these pre-conditions are important is because the countries which adopt inflation targeting as a monetary policy framework different a lot from one another. Countries which are already developed have shown that these pre-conditions are already fully fulfilled, but for economies which are emerging ones, these pre-conditions help in understanding whether this policy is suitable for them. Duman (2004) emphasis that these pre-conditions help the emerging economies to make some reforms and changes and be forward-looking oriented so that they could decide on the instrument that they might use. It is important to understand that these pre-conditions are no longer questions whether they are or they are not, but instead it is questioned the level of the fulfillment (Dokle, 2013). The main pre-conditions that will be discussed in this thesis are: Central Bank independence, transparency, accountability, credibility, stability of the financial system,

1.3.1 The Independence of central banks

An institution is independent when it can freely use their instruments to achieve the priority goals.

Batini & Laxton (2007) argue that for adopting inflation targeting as a monetary policy framework, central banks should be fully independent from the fiscal policy and the politics of the country. By being independent and not even effected by the political environment and the fiscal policy, central bank can focus on their primary

goal, price stability. Being independent from the political environment decreases the risk of time inconsistency trap (Yilmaz et al. 2000). Time inconsistency trap related to the dilemma that follows the policy maker right at the time when the policy should be implemented. Mishkin & Schmidt- Hebbel (2001) show on their paper that the independency of the central banks helps a lot in the implementation of the inflation targeting as a monetary policy framework.

In this context, it should be clear that being independent does not mean to have no relationship between the central banks and their governments. It is essential for these two bodies to interact accordingly, share the necessary information and goal, because they both aim for the stability of the country. Though none of them should allow the interference of the other when it comes to prioritizing the goals. An institution is independent when it can freely use their instruments to achieve the priority goals.

1.3.2 Transparency, Credibility and Accountability

Central bank has the obligation to be transparent when it comes to the targets, the time horizon and the instruments used for achieving these targets. Why it is so important to be transparent?

When it comes to inflation targeting, one of the most important indicators is inflation expectations. So if a central bank wants to achieve its goal of price stability, it should make sure that actually the public would be expecting similar inflation in the future. Batini & Laxton (2007) argue that inflation targeting is easily understood by the public, the reasons behind it might be the fact that this framework targets inflation directly without the need of an intermediate variable.

Transparency plays a great role in the credibility of central banks. Since the past and the present rates of inflation cannot be changed and adjusted, what central banks do is focus on the predictions of future inflation rate. Being able to make the goals and the priorities easily accessible to the public mean that the public itself understand these measurements and adjusts their expectations accordingly. This makes central banks even more accountable. No matter what type of monetary policy framework is adopted by the central bank, the public plays an essential role in reaching this objective. Especially for countries which have adopted inflation targeting as their

monetary policy framework. These central banks should be transparent and credible so that they could easily manage the future expectations.

Khan (2003) emphasis the main steps of inflation targeting in terms of transparency. In the paper it is stated that the transparency of a central bank starts the announcement of the target, which follows with all other important information necessary to understand the process, the reason for this choice, the plan B solution in the case the rate does not meet the target, and lastly an analysis on the development and result of this monetary policy framework.

1.3.3 Economic structure and the financial system

Laxton et al. (2005) offers a possible recommendation regarding the prices. According to the paper the prices should not be regulated. Another aspect of the pre-conditions is the financial sector stability. If a country has liquid and stable banking system, the inflation rates can be more easily maintained within the targets.

1.3.4 Fiscal Discipline and dominance

One of the greatest problematics of inflation targeting in emerging economies is related with the fiscal dominance.

As broadly argued by Mishkin (2000) and Blanchard (2004), it is essential for the central banks to be fully independent from the government. The main argument is related with the possible increase in the real interest rate, that would encourage the increase in debt and a possible appreciation, or an increasing default possibility that would lead to depreciation. Maintaining inflation rate within the targets would become almost impossible.

Another point of view is presented by Fraga (2003), which explains that if both fiscal policy and monetary policy would interfere in one another, there would be a great chance that both systems would collapse, causing so a possible future increase in inflation rate, which lastly would impact the inflation expectations. As mentioned, Lepeer and Leith (2016) on the other hand argue that despite the different view that arises from this two angles (monetary and fiscal policy) there is no sense to determine which is wrong or which is right. AS a recommendation to the macroeconomist they suggest viewing both of them as right and take into consideration that most probably price- level determination is not as simple as described.

1.3.5 Instruments and the target

The main condition for inflation targeting implementation would be the presence of only one important goal, the price stability. It is essential to understand this target should be clearly stated and should become the priority of the central bank. One of the greatest advantages of inflation targeting according to Fraga (2003) is the fact that this monetary policy framework has a clear target and only focuses on it.

Kadioglu et al. (2000) brings another perception on the reason why inflation targeting has more advantages compared to other monetary policies. In this paper they state that having a second or even a third target would make people question on the priority of price stability, raising so a question mark on the credibility of central banks. Regarding the instruments that are commonly used in monetary policies, also for inflation targeting it is important that the operational framework should work in a perfect way so that the targets are reached accordingly (Baser, 2011)

1.4 Other predominant monetary policies

Choosing the most suitable monetary policy is a challenge on its own. After the 2008-2009 crises the role of monetary policy was questioned. Economist like Beckworth (2012); Horwitz and Luther (2011); White (2012) suggest that loose monetary policies are catalyst for deep recessions due to unmanageable booms that they encourage. And other studies like Hetzel 2012; Sumner 2011, 2012 suggest that the problem with the monetary policies is that they do not act on time in cases of distress. Even though these authors have different points of view, their main focus is the critics towards the monetary policies. What types of frameworks are there and which has proven to be the most successful one?

There are two main monetary policies frameworks beside Inflation Targeting; Exchange Rate Targeting and Money Targeting. Each of these two frameworks is characterized by different targets, different channels and different outcomes

1.4.1. Money Targeting

Money targeting is a monetary policy framework which targets one or more monetary aggregates growth as a middle process for the final control of inflation rate. The reason behind this process is supported strongly by Fridman (1968), where the strong relationship between money supply and the price level is emphasized.

What complicates this process more is the question raised on the correct monetary aggregate that should be chosen to achieve the final goal. This regime that started in 1970s and became very famous during 1980s has two main assumptions; money aggregates have stable or easily predictable relations and that central bank is able to control the monetary supply. (Dokle, 2013)

One of the main assumptions is stability or at least predictability of money aggregates; unfortunately, history has shown that such an assumption did not always hold, leading so to huge problems in the credibility towards the central banks since the predictions never met the reality (Laxtonet al. 2005). Agenor (2012) argues that the reason behind this failure is strongly related with the demand for money which is characterized by instabilities. Debelle & Lim (1998) point out another disadvantage of this regime which relates to the frequency of adjustments. This frequent adjustment affects the relationship between inflation and money growth level.

This framework generally is much more rigid compared to others, but still different countries apply it differently. As pointed out by Mishkin (2002) this monetary policy framework aims more in longer terms rather than short terms, it is less transparent and less flexible compared to other policies, it is much more difficult to explain to the public and needs a strong reliable relationship between inflation and money aggregates.

But on the other side this monetary policy framework is also characterized by its positive sides. As argued by Laxton et al. (2005) the data used in this regime are easily obtainable. The major advantage of this monetary policy framework is related with the availability that this regime allows to the policy maker country to target inflation differently from other economies and allows some responses towards the output fluctuations.

1.4.2. Exchange rate targeting

Exchange rate targeting is a monetary policy framework which aims stability in the exchange rate through two main roads: direct intervention in foreign exchange and interest rate changes.

This regime itself classifies the targeting into 2 main groups; the hard peg and the soft peg. Understanding how exactly the economies behave sometimes is complex. The history has shown that countries which have been claiming to use a fixed regime have been devalued during worst days, and countries which have claimed to be

floating, still continue and intervene in the exchange market. (Rainhard, 2000),Obstfeld & Rogoff (1995). As implied from the name soft peg, is much more flexible compared to the other two forms of the regime. This form of the exchange rate targeting allows space for the countries to peg their currencies toward other foreign currencies into two main forms as defined by Fischer (2001), as a crawling peg and as an exchange rate band.

As any other policy, exchange rate targeting has its advantages and disadvantages. The vulnerability of soft-pegs to the self-fulfilling currency crisis is seen as one of the strongest disadvantages of this policie. According to Petursson (2000), seen in the general perspective exchange rate regime encourages transparency of central banks, boosting so the credibility that the public has towards the central bank. This regime also has a positive impact in the stability in economic terms. Fixed exchange rate regime, encourages trade and investments by cutting the premium of exchange rate which are reflected in the interest rate, it prevents the currencies to compete in terms of their depreciation.

On the other hand, floating exchange rate regime allows for the independency of the monetary policy, adjusts to shocks in a more faster and automatic way. One of the most common debates related to this regime is to know which of them is dominant and a better choice than other? But different papers come with different results. Still different countries have different experiences. In 1990s after the crises, it was easily understood that the countries which were using the exchange rate monetary policy framework shifted from the fixed regime to a more flexible one. However, Laxton et al. (2005) stated that because this regime implies less risk in the currency terms, several currency mismatches scenarios might lead to huge crises.

Generally, this regime is simple to be explained to the agents, so the final goal of a lower inflation can be reached. This regime also works quit good for the economies which are growing, emerging because the role that the exchange rate stability takes is huge.

But this regime on the other hand makes interconnection between countries even bigger. If a foreign currency would face a shock, then most probably the domestic economy would be also affected. A nominal anchor is very essential for monetary policies framework since it targets the price stability by lowering down the inflation expectations and allowing the possibility to eliminate time consistency problems. (Mishkin 2000)

2 Literature Review

Inflation targeting is adopted by countries which are emerging and furthermore developing but also by industrialized economies. Many studies are conducted to understand how inflation targeting has impacted growth and development. Even though this study itself is based on emerging economies, we decided to compare the research result of different group of countries including here industrialized economies as well. The division of this chapter is based on the group of countries of different studies and the purpose of the study as well. Most of these studies use the same approach for reaching the conclusions. But, we should keep in mind that because of the differences in sample size, countries taken into consideration or methodologies used the results might contradict one another. Also since inflation targeting as a monetary policy has shown different impacts in different economies, might be a reason for these differences in results. This chapter will be composed of two main parts: empirical evidence of industrialized countries, empirical evidence of emerging economies, an overview of studies which considered both this sample groups into their models and the last part will include some review on the latest papers related to the effect that inflation targeting was expected to have during the financial crises. Did it meet its expectations?

2.1 Evidence of Inflation targeting impact in industrialized economies

For the first researchers in this topic the main focus were developed countries, as these countries were the ones which initially adopted inflation targeting. The outcomes are different depending on the methodology but also the impact that inflation targeting had on the countries chosen in the sample data. Mike Dotsey in 2006, examined 5 developed countries which had already adopted inflation targeting for the past 10 years, Australia, Canada, New Zealand, Sweden and UK. The outcome of his research found no proof that the implementation of inflation targeting as a monetary policy has diminished the economic performance of these countries, instead the policymakers of these countries have seen inflation targeting as a considerably flexible framework well-matched with the robust economic activity. What Dotsey pointed out was that the dataset used in these models is limited due to the short time period of the adaptation of inflation targeting, creating so not too much space for the economies to fully experience all the cycle.

Neumann and Van Hagen through their paper try to understand if inflation targeting matters or not. They conduct their study based on 9 countries of choice, 6 of them are inflation targeting economies and the other three ate non-targeting ones throughout 2 periods, pre and post adaptation of inflation targeting as monetary policy. The period pre-adaptation includes the data from 1978 till 1992 and the period post adaptation includes period 1993 till 2001. The study had three main points of focus:

1. How inflation targeting effect the stability
2. Reaction to large supply shocks through comparison of the central bank reaction to oil prices climb
3. Interest rate policies reactions to inflation shocks by the central banks

The results were very positive. Inflation targeting as a framework played a great role in increasing the credibility of central banks. Central banks became more reliable from year to year since the implementation of inflation targeting, inflation expectations has lowered, inflation rate declined each year and together with it the framework allowed space for the inflation volatility and interest rate volatility to be handled as needed. Similar positive results were seen in the paper from Cukierman (2000) and Geraarts (2010) and also Mishkin (1999) who supported the decline of both expected inflation and inflation rate for adoption countries.

Though, none of the results showed that inflation targeting has fully advantage if compared with other monetary policies.

Another study that tried to compare the policies was written by Mishkin (2000) in his paper he conducted a study on two of the monetary policies; monetary targeting and inflation targeting. He concluded that as successful as monetary targeting was in Switzerland and Germany, the chances that the conditions that make this framework effective to be met in any other country are very low. On the other hand specifically for the countries that have chosen to have a domestic monetary policy, inflation targeting is suggested to be a better choice.

Johnson (2002) using the panel data sample on the other hand brought some new perspective as he pointed out that inflation rate declined sharply for developed countries which had adopted inflation targeting as a monetary policy by up to 2% per year, though the decline was also seen in countries which had not adopted the framework. Raising so a question whether the reason for this decline inflation is indeed targeting framework.

Ball and Sheridan in 2005 wrote an article questioning the matter of inflation targeting. the final data sample is composed of 20 countries of OECD. Countries which were

outliers in terms of high inflation rate and the ones which lacked an in depended currency are left out of the sample. Out of 20 countries, 7 of them are targeting inflation and the other 13 are not. The results completely contradict the previous mentioned studies, the data showed that there is no significant positive impact of inflation targeting into interest rate, inflation rate and output growth. Though, this study did not conclude that inflation targeting affected negatively any of the macroeconomic variables. The results are reached through the reversion to the mean. Initially they used a simple difference in difference model, but they concluded that the results might be misleading since countries which have been facing very high inflation rate before 1990 will show a faster and greater decline in inflation rate compared to countries that had an initial lower rate of inflation. That is why they introduced another variable in the model that would capture their initial position. With their new model they concluded that there is no impact of the framework in inflation rate, interest rate and output growth. The authors considered the positive impact of inflation targeting in two other different aspects: political aspect and possible future impact. The political aspect is mainly related with the principle of the democratic society which implies that through this framework the central banks are much more transparent to the public. And the second aspect is related with the future impact, since the dataset is until 2001, Ball and Sheridan suggest that there might be some impact in macroeconomic indicators due to inflation targeting in the future years with a more updated dataset.

Using the exact same data sample and the same methodology though with a more updated dataset Hyvonen (2004) criticized the results from Ball and Sheridan concluding that during the sample period the inflation targeting as a monetary policy has at least some impact in the convergence of the inflation rates.

Lin and Ye (2007) (2009) conducted two papers using the variety of prosperity score matching method, in the first paper they considered 21 industrialized economies and in the second one 51 emerging economies. They concluded that there is no significant proof that inflation targeting impacts inflation rate and volatility for developed countries, but they found different results in emerging ones. But positive results in both inflation and output growth for target economies using the same methodology were presented by Brito (2011).

2.2 Comparing the evidence of Inflation targeting impact in both industrialized and emerging economies

On the paper written by Fraga et al (2004) we are faced with different outcomes for the emerging economies and for industrialized ones. A higher volatility is seen in emerging economies for inflation rate and the output, interest rate and the exchange rate as well. The authors tried to justify these changes through the through the differences that characterizes these two types of economies. Basically, emerging economies are facing problems with their institutions, they lack both stability and transparency but at the same time they are more exposed and sensitive to the stick of external shocks.

Frederic Mishkin (2004) conclude that inflation targeting as a monetary policy is much more complicated in emerging economies and one of the biggest factors that encourage these complications relate with the exchange rate fluctuations. In another paper written together with Calvo in 2003 they both point out their concerns for the decision of emerging economies to go with such policies that allow discretions to policy makers in the non-so favorable macroeconomic conditions and stability might as well lead to not desirable outcomes. As Fraga et al they agree that emerging economies are a bit more fragile to higher inflation and possible crises due to their weak institutions. In order for inflation targeting to be as successful as desired the economies should be characterized by very healthy and stable fiscal, monetary and financial institutions. They strongly point out the help that IMF can give in different ways to these economies.

Rose (2006) tries to analyze the volatility of exchange rate by comparing inflation targeting and non-targeting economies. The study uses a dataset of 21 inflation targeting economies and 42 non-targeting ones, comparing them in terms of capital inflows and exchange rate volatility. The conclusions favor inflation targeting countries and show that by shifting to this monetary policy declines the amount of the unexpected stops in the capital inflows and a lower exchange volatility.

Mishkin and Hebbel (2007) both conducted another research which compared for the period prior and after the adaptation 21 developed and emerging economies which target their inflation rate to a group of 13 countries which are not targeting inflation. Using quarterly data for period 1989-2004 they concluded their results using panel impulse respond, difference in difference model and panel var. The outcomes show that countries which have adopted inflation targeting showed an initial average inflation rate of 12.6%, which later on declined to 6% in the converge phase to reach

the final average of 2.3 % when meeting the stationary target. For industrial countries which have adopted inflation targeting framework compared to the ones which have not face a more volatile inflation rate but a lower inflation persistence. On the other hand the emerging economies both the output gab and the output volatility decline for target economies and the non-target ones but the output and inflation persistence is lower in inflation targeting emerging economies.

The relative most positive result for inflation targeting success as a framework are seen in studies that mainly relate with emerging economies. As mentioned above Lin and Ye in 2009 conducted a more advance research increasing the number of countries from 21 to 51 including emerging economies and a new timeline. The results show that the impact of inflation targeting as a monetary policy for emerging economies are quite positive, as the numerical results show that the decline to 3% in inflation rate is seen in the economies that are emerging. For developed countries these results are not considered to be significant.

While other studies mentioned above which are not in favor of adopting inflation targeting for emerging economies as these economies are not able to fully meet all the preconditions, Laxton et al (2005) reached to conclusions that actually none of the countries which adapted inflation targeting had all the preconditions fully met and that there is no significant importance of these preconditions in the improvements in macroeconomic aspect from pre to post adaptation of this policy. Though it is quite visible that there exists gab in level of these achieved preconditions between the developed and emerging market economies, still this should not prevent the emerging market economies to take the leap and adopt inflation targeting.

Apart from this aspect their research results which was conducted based on 13 targeting and 29 non-targeting countries show that both the inflation rate and inflation volatility were declined but not at the extend of an output decline.

2.3 Inflation targeting during the financial crises

Inflation targeting during the financial crises has been a very interesting topic for many economists during the past couple of years. During this financial crisis the real economy suffered huge decline in output and growth statistics, increase in unemployment and interest rates. The financial crises of 2008/2009 and the reasons that lead to the huge shock in the world's financial systems are interpreted differently from one economist to another, some question the monetary policies and the others emphasize the lack of effective financial regulations.

Fouejieu A (2012) in his paper compared different studies such as the one written by Conversely and Dooley (2010) together with the paper written by Rose and Spiegle (2009) where they argue that the reason behind the financial crises is not monetary policy but rather financial regulations that created space for "too big to fail" to invest in a much more riskier and less diversified way. Other economists like Tabsoba (2009) used a broad range of countries inflation targeting and non- targeting economies, and he found out that inflation targeting does have a positive statistical significant effect in fiscal discipline. Filho (2011) summed up his outcomes as positive one in favor of inflation targeting as monetary policy during the financial crises. His paper showed that inflation targeting countries have coped better with the crises in terms of falling nominal and real rates, lower thread of deflation, real depreciation in exchange rates which was not in line with an increasing risk, but also in terms of output which showed a lower percentage of fall compared to countries which were not targeting inflation. But on the other hand, one of the papers that shocked the world of inflation targeting by putting the whole blame on it for the financial crises is written by Jeffrey Frankel (2012). He argues that the central banks should have made the proper calculations and know that the asset- bubble can grow and explode even in an environment which is characterized by lower inflation rate. De Gregorio in his speech in 2009 argued his three reasons why monetary policy should not interfere in an asset-bubble. One, he believes that there is no guarantee that an increase in interest rate can encourage a decrease in or at least stop the intensification in asset price. Secondly, a higher then should be interest rate could cause fragility in financial sector. Lastly inflation targeting relates directly with credibility and inflation expectations, so playing with the targets could lead in the weakening of the anchor rather than saving the economy from the crisis.

3 Inflation targeting in Emerging Economies

3.1 Inflation Targeting in Albania

Albania started the transition phase in 1991 and since then it has been progressing a lot considering that no pre-transition reform was taken before 1991. Of course, with the liberation of the economy the immediate effect was an increase in both unemployment and inflation rates together with a sharp decline in output, which respectively increased migration to neighbor countries. Another shock in the Albanian economy was seen right after the collapse of the pyramid schemes in 1997, when inflation and unemployment reached their maximum levels. The recovering process was better than expected in term of the statistics with an average of 6% Real GDP increase and inflation targeting fluctuation around the target of 3%.

If being compared to other countries which were in transition, Albania has performed much better in terms of stabilization of macroeconomic indicators, it managed to decline inflation rate from over 237% to 6% in 1996 and maintain it with very few fluctuations around the target of 3% for the following years, excluding here 1997 when the pyramidal schemes collapsed. This performance was an outcome of the restrictive monetary policy implemented by Bank of Albania. Adopting Monetary targeting regime as a monetary policy made Albania one of the few countries which implemented this regime. This regime in specific monitors M3 as an intermediate target and in this way it controls the money supply in the economy. What simulated mostly the usage of this monetary policy was the IMF technical assistance program which apart from monetary targeting targeted other indicators such as international reserve, total funding of the budget deficit and net internal means. Throughout the years in order to maintain stability and control the monetary supply, Bank of Albania used different instruments and tools both direct and indirect ones. Firstly, central bank settled a ceiling on the level of the credits provided by commercial banks which worked as a primary tool for the control of the monetary supply. A couple of years later, in 1995, central bank used the deposits rate of SOB's as an indirect instrument for

controlling the monetary supply. Another attempt to influence interest rate after the removal of credit celling in 2000 was done through the open market operations, Repos.

Even after taking into consideration all the positive results from the application of this monetary targeting policy regime, Bank of Albania had its own doubts related with the future application of it. As per Estrelle and Mishkin (1997) paper, such monetary targeting regime in times of price stability should not be a reliable regime for emerging economies. The reason behind it is related with the information that could be obtained from the monetary aggregates once inflation is maintained under the borders of the target. According to their results with stability of inflation rate, the velocity shock noises increase causing so the monetary aggregates to be less reliable. This could easily be demonstrated by the difference of planned and actual monetary aggregates and planned, and actual inflation rate expressed in % change. The divergence of M3 (broad money) has been an issue known and analyzed by the central bank, which together with other factors such as supply shocks exchange rate movements and the pressure that they forced on inflation rate encouraged central bank to consider other monetary policies. Without fully applying the IT, Albania has been classified by Stone (2003) as an inflation targeting lite country.

The process of starting to adopt IT as a monetary policy regime started in early 2004 and was officially finalized on 2009, when the government announced Inflation Targeting as the official monetary policy regime. There are three main reasons behind this movement. Firstly, the unresponsive monetary aggregate to velocity shocks in an environment characterized by price stability, was quit a good signal for the Bank of Albania to change the monetary policy regime from the existing one to Inflation Target regime. Secondly, the government would recognize the importance that all of the macroeconomic factors have in the successfully implementing this new, complex regime. Lastly previously used monetary target regime, was inspired by IMF technical assistance program and implementing a new monetary policy regime would independently encourage Bank of Albania to maintain stability through inflation targeting as a nominal anchor.

As many economists and researchers argue being used as a monetary policy the Inflation Targeting does not surely translate to stability and growth. There are other preconditions that should be met for this monetary policy to be successful. In other

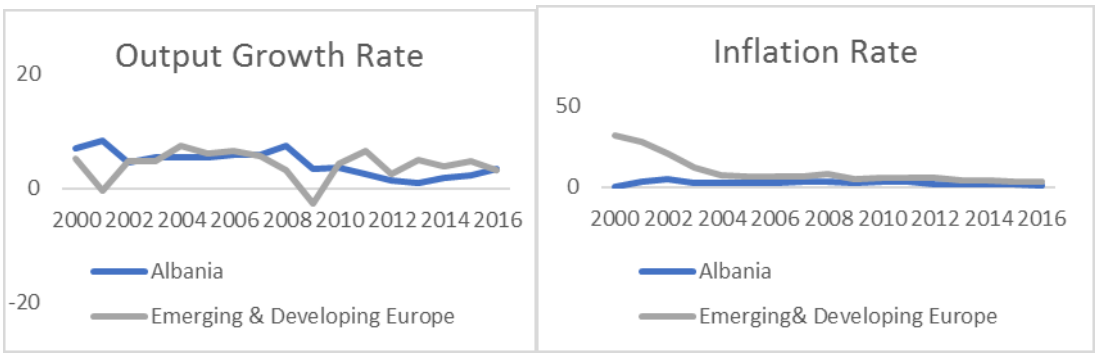
words the effectiveness of the Inflation Targeting should not only be measured by the approach that it has but also by including the function of those other factors such as the relationship between the central bank and the government, the autonomy and transparency of the central bank, the technical infrastructure in terms of analysis and forecasting, together with the stability of the financial environment.(Marco Arnole et Al. 2007) (Carl E. Walsh 2007) (IMF, 2006).

With all these factors combined together, is inflation targeting effective in the economic growth of the country? Based on previous studied, unfortunately there is not a conclusive argument related to this question as different scholars, economists and researches have been showing through their studies different outcomes.

One of the greatest economist, M. Friedman argued through his research that "Inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in output". In order to understand better this statement, which now is being known as the Friedman Theory, inflation should be accept as a phenomena caused by the expansion monetary policies. According to Friedman, there was no time in history that inflation and increase in money supply did not grow side by side. He argues that in the long run the monetary growth does increase inflation as well but not the output.

Studies made by Mishkin (1990), Posen (1997), Walsh (2009) show empirical results that countries which have adopted inflation targeting as a monetary regime perform much better in the macroeconomic indicators point of view. Other studies like Barro (1995) and Judson (1999) argue that the relation between inflation rate and economic growth is strongly negative.

Figure 1- Output Growth and Inflation Rate for Albania



Source: IMF webpage (World Economic Outlook download)

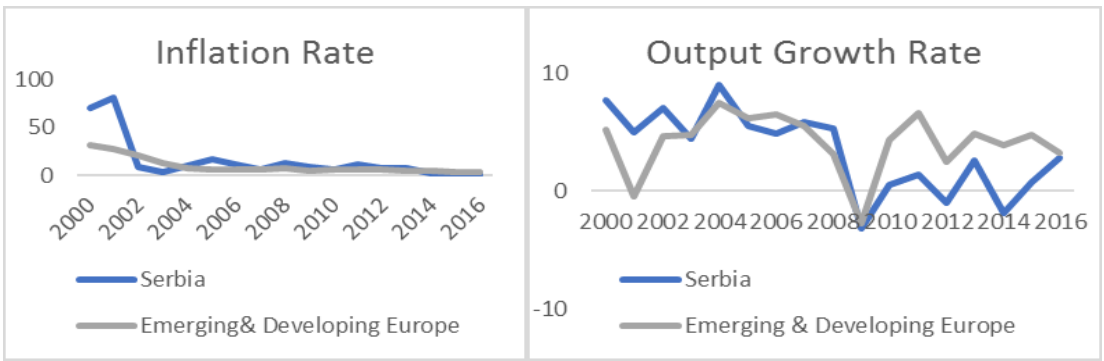
3.2 Inflation Targeting in Serbia

National Bank of Serbia announced Inflation targeting as the new monetary policy framework on September 2006. Other monetary policies were not that useful in terms of assuring stability of inflation rate. One of the main reasons behind this new monetary policy relates with inflationary shocks causes mainly from the shift that Serbian economy has now towards European Union and therefore the euroization which comes included in the package. As expected, the main goals of this new monetary policy relate with increase stability in the local currency, encourage low and stable inflation rate. Together with the inflation targeting another change in the existing policies related with exchange rate regime from fixed to flexible which would possibly reduce the effects of shocks. Generally, floating exchange rate regimes come together with the inflation targeting. The reason why relates with the fact that such regimes need a nominal anchor, and as exchange rate cannot be one, then inflation rate is the winning candidate.

Before shifting to inflation targeting as a monetary policy, the inflation rate was relatively very high and for the first two years (2006 and 2007) inflation rate was maintained below the low target level. The main reason for this decline in inflation rate is the appreciation of the local currency. But slowly the inflation rate started to jump up again from 5.4 % to 10.1% in 2008. 2008 was not a good year not only for the National Bank of Serbia but also for most of the central banks that apply inflation targeting as their monetary policy regime. The external shocks such as the increase in the oil price encouraged the increase in the expected inflation. Apart from the external shocks, the lack of liquidity in the global markets and the local prices for agricultural products which doubled within year time together, another issue that troubled NBS was the depreciation of the local currency. With all the things going on the reference interest rate increased almost 6 time within a year range. Inflation pressure was almost closed to the target by the time the economies in Europe were in the recession period. The depreciation of the local currency throughout all the period that is presented in the table plays a great role in achievement of the targets. Right after the stabilization of the rate in 2009, the depreciation of the local currency once again was reflected in the inflation rate of 2010 and 2011 which were higher compared to the target. The maximum rate was seen in 2012 were inflation rate was twice as much as the target inflation rate. The

following years 2013 and 2014 were of low inflation due to the recession pressure, for most of the countries in Europe negative rates were seen. The target for 2015 and 2016 was 4% with a tolerance of +-1.5%, meaning a low level of 2.5% and a maximum of 5.5%. The target for 2017 was decreased by 1 percentage point. The reason for this decrease in the target relates with the decline in the risk of investments, improvements of the macroeconomic conditions and the stabilization of the global market. All this factor combined together with the decreasing trend of the achieved inflation from 2014 till 2016 has led the National Central Bank of Serbia to believe that Serbia has the potential to maintain the rates within the target. A lower inflation rate will serve better to the local currency, will decrease the currency risk and will furthermore stabilize the financial system in Serbia. (National Bank of Serbia)

Figure 2- Output Growth and Inflation Rate for SErbia



Source: IMF webpage (World Economic Outlook download)

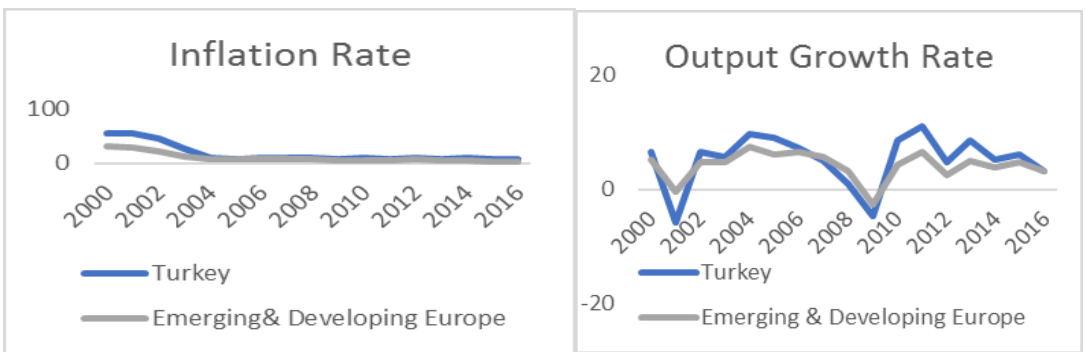
3.3 Inflation Targeting in other countries

3.3.1 Turkey

The macroeconomic situation in 2001 was characterized by a high public debt, high depreciation of the local currency, 67% inflation rate, and a failed tentative for long term adoption of a crawling exchange peg (which temporarily increased the credibility of the central bank). Turkey started applying inflation targeting in 2001 as a respond to the whole macroeconomic situation as a tentative salvation from the financial crises, the need to decline inflation rate, reduce the public debt and stabilize the prices and the local currency. For the following 4 years, up to 2005 Turkey was applying as a monetary policy implicit inflation targeting. The reason why it was called implicit relates with the fact that as a nominal anchor the base money was still being used and

the preconditions such as the low level of inflation and development of a consistent and trustful inflation forecasting systems were not fully achieved. From 2006 till 2010 the full-fledged IT was applied. Inflation by the end of this phase started to decline to comparable values with Emerging and Developing Europe countries. Inflation rate through the time of the application of IT remained on average much more compared to Emerging and Developing Europe countries, but extremely felt in average as a single digit number. The target for 2018-2020 is set to 5% with a border of a plus minus 2 percentage points. The central bank maintains the same target even though for the last 6 year it was not met. (Central Bank of the Republic of Turkey)

Figure 3- Inflation Rate and Output Growth for Turkey



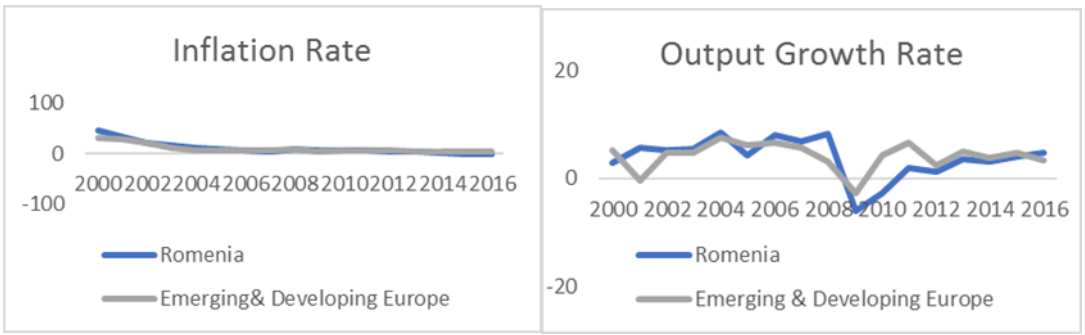
Source: IMF webpage (World Economic Outlook download)

3.3.2 Romania

Romanian economy was characterized from a very high inflation rate since 90's which declined to single digits only in 2004. Inflation targeting was introduced in 2005 and by then the Central bank knew exactly the focus: stabilization of the inflation rate. By the time that inflation targeting was adopted the National Bank of Romania has already been advancing in terms of benefiting from the independence in operational terms from the government, decline in the fiscal dominancy, inflation rate reporting becoming more frequent, increase in the credibility and the exchange rate compatibility with IT. The targets for 2007 was 4% with a band of (+-1.5%) and fir 2008 it was 3.8%. For 2009 and 2010 the target was 3.5% and in 2011 and 2012 it declined to 3% with a +-1% boarder flexibility. Starting from 2013 up to now the inflation target is 2%. There were two main phases identified in the inflation targeting process for the National Bank of Rumania. The phase of declining inflation targeting which started with a target of 7% and ended up in 2012 with a target of 3%, this phase aimed the annual sustainable

inflation rate. And the second phase is the multi-annual inflation phase with started in 2013 and continues up to 2018. This phase works as an intermediary phase to the final phase of long term inflation targeting. (National Bank of Romania)

Figure 4-Inflation Rate and Output Growth for Romania

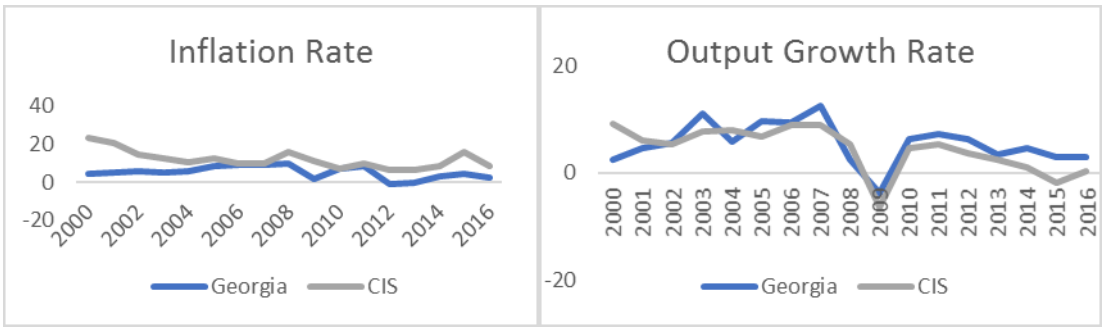


Source: IMF webpage (World Economic Outlook download)

3.3.3 Georgia

Prior to adopting inflation targeting as a monetary policy, National Bank of Georgia (NBG) was relying on monetary targeting. Theoretically if there would be a perfect relation between the money supply and the inflation rate, this regime would be very much preferred. But in the real world and in the Georgian economy, money demand was not that stable causing so issues with the inflation rate. On the other hand the local currency depreciated and no matter how much the central bank tried, moving to a new monetary policy regime was a much preferable solution. So, Georgia announced inflation targeting as a monetary policy in 2009. In medium-term target which should be achieved for 2018-2020 inflation target is set to be 3%. Thought the year inflation targeting reached its peak in 2008 with a rate of 9.95 which declined sharply the next year, just to jump right up again in 2010 and 2011 to 7.1% and 8.5% respectively. IMF (2007), (National Bank of Georgia)

Figure 5- Inflation Rate and Output growth for Georgia

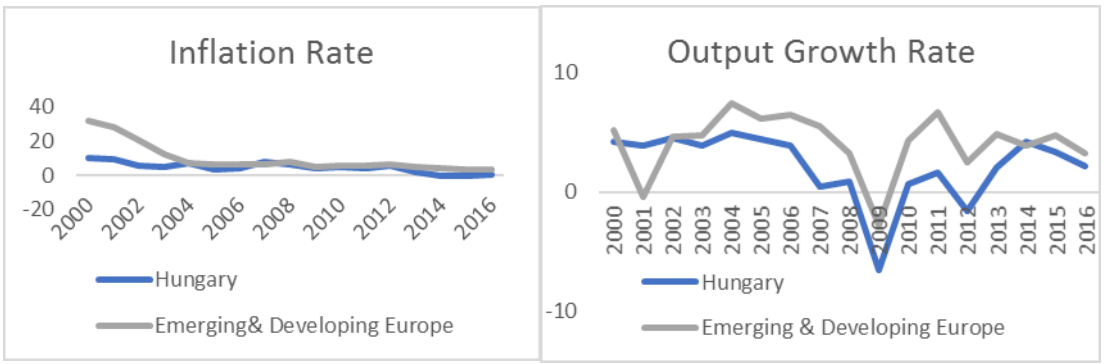


Source: IMF webpage (World Economic Outlook download)

3.3.4 Hungary

Inflation targeting for Hungary has been adapted since 2001. The main reason for such a shift in regimes related with the currency fluctuations. Prior to 2001, the central bank due to the exchange rate regime (which was adopted since 1995) was allowing a currency fluctuation of only 2.5%. This band was increased to 30% and this was the very first step for the shift from an exchange rate regime to the inflation rate regime. The transition to the Inflation Targeting was gradual. Hungary joined European Union, but also it adopted the Euro. Joining European Union and Eurozone made Hungary automatically part of the Exchange rate mechanism (ERM 2), which forced the exchange rate to be as close as possible to the central parity. Still as central bank two main aims were target, stable inflation rate and stable exchange rate. Out of these two goals the price stability was the primary one. Characterized by transparency and accountability inflation target regime was identified from central bank to be the best regime framework to reach the nominal stability. Generally, the Hungarian inflation rate was not that much fluctuating and up to the adoption of inflation targeting the average rate was 18% with a declining trend. And from 2001 till 2016 the average inflation rate is around 4.4%. IMF (2007), (Magyar Nemzeti Bank)

Figure 6- inflation Rate and Output growth for Hungary

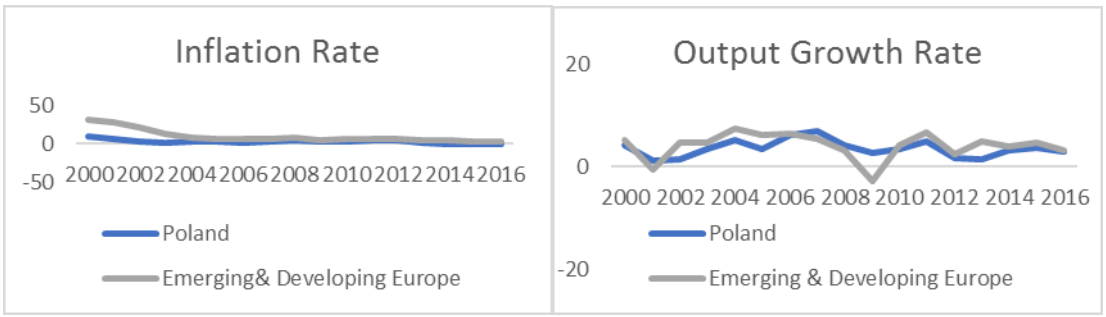


Source: IMF webpage (World Economic Outlook download)

3.3.5 Poland

Poland in order to grow the monetary aggregate (M2) adopted a fixed exchange rate regime and fixed the local currency to dollar. In most of the times the target was missed. The local currency real exchange rate appreciated and this forced the central bank to change the monetary policy in order to prevent the furthermore weakening of the external position of Poland's economy. First the fixed peg was used which was fast substituted by the crawling peg regime with 1.8 crawling rate. From 1991 to 1998 the authorities were switching to targeting from short-term interest rate, to reserve money, again to back short-term interest rates. In 1998 the new regime suggested by the Council was inflation targeting. This new monetary policy came with a lot of benefits. First of all since one of the main characteristics is transparency, the credibility towards the central bank was earned rapidly. But on the other hand, the central bank knew exactly that there were some limitations coming together with this regime, such as the absence of a monetary and a fiscal policy which were co-ordinated together, lack of fully accessibility to the necessary information which captures the reaction of inflation rate to this new regime. But apart from all these differences still Poland managed to maintain a relatively stable and low inflation rate compared to countries in the Emerging and Developed Europe.

Figure 7- Inflation Rate and Output Growth for Poland

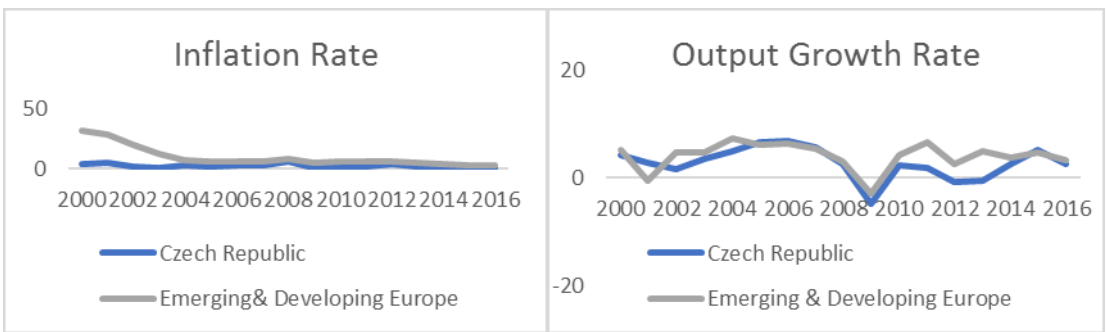


Source: IMF webpage (World Economic Outlook download)

3.3.6 Czech Republic

Czech Republic adopted inflation targeting in 1997 right after giving up on the fixed exchange rate regime which was chosen to be the monetary policy framework since 1991. The reason behind this shift related strongly to the instability of the local currency which later led to the increasing inflation rate. The increasing trend of inflation rate caused huge problems with the trust toward the Czech National bank, another reason why this central bank decided to adopt inflation targeting as a monetary policy. By anchoring inflation rate, the Czech National Bank managed to decrease inflation rate from average 12.17 % before adoption phase to only average 2.49% (1998-2016). The trend of inflation rate responds to the financial cries and after words is the same as in the European countries.

Figure 8- inflation rate and Output Growth for Czech Republic



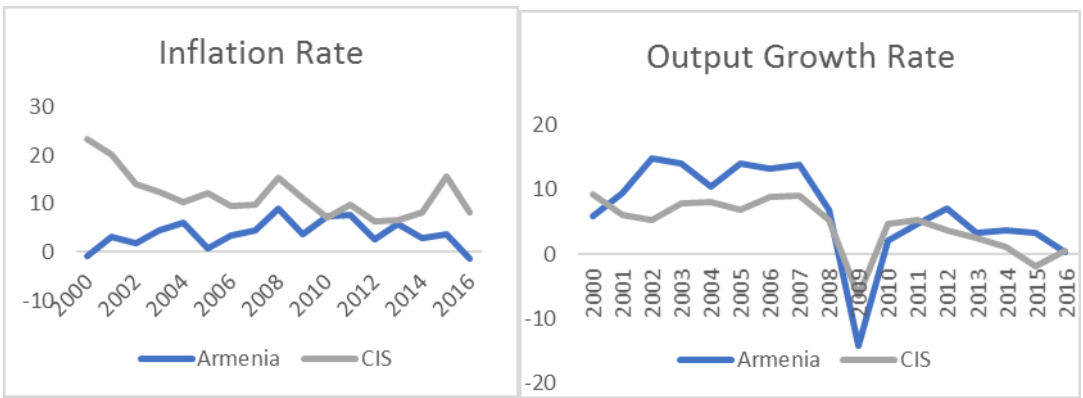
Source: IMF webpage (World Economic Outlook download)

3.3.7 Armenia

The inflation rate for Armenia was double digits till the late 1999. The Central Bank of Armenia announced the transition phase for inflation targeting in early 2006. With

the announcement of this transition the Central Bank of Armenia made the decision to adopt inflation targeting as a monetary policy rather than exchange rate regime. This soothed the inflation rate within a short period of time increasing so the credibility in the central bank and reaching a stable macroeconomic environment. Inflation rate showed a huge increase during the financial crises but was once again stabilized in 2015 with a decline to 3.7% from 9% in 2008 when the crises hit the economy. From the same point of view the output growth faced a sharp decline, reaching below the average of the region in early crises phase. (IMF)

Figure 9- Inflation Rate and Output Growth for Armenia



Source: IMF webpage (World Economic Outlook download)

3.4 Missing the targets

The historical data has shown that for most of the countries, inflation targets were rarely reached. Generally different countries and macroeconomic conditions face different deviations, but for most of the cases, the largest ones are strongly related with exchange rate volatility, such as the Serbian case. But other reasons might relate with possible external and internal shocks. The internal shocks mainly relate with the macroeconomic conditions, lack of co-ordination of monetary and fiscal policy, or any other possible domestic crises. While the external ones relates with the global financial crises, volatility of the fuel prices, inflows and outflows volatility due to risk sensitivity.

What Roger and Stone (2005) in their paper rise as a core question relates with the resilience of the inflation targeting as a monetary regime despite of the failure to reach the target. it is obvious that even though the target is not reached or in some cases the deviation is quite high still central bank consider it as the best possible regime

considering the circumstances. This goes one of two ways, central banks either maintain this regime due to the lack of a more suitable one or they consider that the transparency, credibility and the accountability that this regime entitles to them much more pros rather than the missed targets as a con.

Two of the oldest countries that adopted inflation targeting in this group are Czech Republic and Poland. Both countries inflation rates fluctuated closely around the targeting values especially starting from 2003. In the case of the Poland generally the inflation rate was below the lower bound, forcing so the central bank to readjust the target after it was initially set in 1998.

Albania and Georgia adopted the inflation targeting in 2009. For most of the cases within this time range of almost 9 years the target for Albania was mainly within the borders and the central bank did not adjust it any further, 3% with a border of +-1%. As per the Georgian economy the target was adjusted and after the financial crises it was far below the border, picked up far above the border after 2011 and again declined below zero in 2014. For the last couple of years, the average inflation rate has been 3%, finally now within the target of central bank for 2018-2020.

Turkey, Serbia and Armenia adopted inflation target in 2001, 2007 and 2006 respectively. For all the three cases the inflation rate was very volatile and missing the target for most of the years. The main cause of this volatility relates to the depreciation of the local currency which led to two-digit inflation for Turkey and for some specific years also for Serbia. Average inflation rate for Turkey is around 8% for the last three years, above the target which for 2018-2020 is set to be 5% and only 1.5% for the Serbian economy, which has a target of midpoint 3% with a tolerance of +-1.5%. For the Armenian economy the inflation rate was far above the target for most of the years between the 2009 and 2011.

4 Hypothesis

Hypothesis #1: Output growth performance is improved through Inflation Targeting

The output volatility and growth rate has been studied in many research papers to conclude whether or not inflation targeting has an impact in the improvement of the macroeconomic conditions. Most of the studies concluded that inflation targeting does not have a significant statistical effect on the output growth. Mainly the results from Ball and Sheridan (2005) suggest that both targeting and non-targeting economies have faced a declining rate of output growth from the period before the targeting to the one after the targeting, but no statistical background supports that inflation targeting has a negative effect on the economic growth. What we expect from our results is to see that inflation targeting dummy variable is statistically insignificant against the output growth rate. In other words, we expect that inflation targeting does not have any significant effect on the output growth rate and it's. This will be tested through difference in difference model and explained through the graphs.

Hypothesis #2: Inflation rate is lower after implementing inflation targeting

The focus of inflation targeting is to maintain the inflation rate within some announced target by the central bank. Many studies have been made to measure the real impact that inflation targeting as a monetary policy has on the inflation rate and the inflation volatility. Ball and Sheridan (2005) concluded that inflation targeting does not impact the inflation rates, and his results were also supported by Lin and Ye (2007) who found the same results for developed. But they supported the result of Cukierman (2000) and also Mishkin (1999) for the decline of both expected inflation and inflation rate for adoption emerging countries. Same result was found by Geraarts (2010). Generally, countries that have been facing higher inflation rate have a greater chance of adopting inflation targeting and as a result the decline in the average inflation rate will be higher for these specific countries compared to the ones which faced initially a lower rate. From the description it is visible that the decline in inflation rate for targeting economies is higher than non-targeting one, but the question arises if this decline is statistically significant or not. We will test this hypothesis through difference in difference model and expect to find positive and significant results for the impact that inflation targeting has in emerging economies inflation rate.

Hypothesis #3: Inflation targeting is predominant in terms of issued stability in the post-crises period

The last hypothesis relates with the financial crises of 20018/2009. Many recent studies after the crises were conducted to analyze whether inflation targeting economies have been coping with the crises better than the ones who have not targeted inflation targeting. We do expect from our testing that countries which have been targeting inflation will show a smoother transition and improvement after the financial crises. The dataset until 2016 will capture the financial crises impact. Jeffrey Frankel (2012) concluded that the fault for the crises related with the inflation targeting as a monetary policy, but his outcomes were strongly rejected by De Gregorio. (2009). Positive results were also seen from other writers like Filho (2011) and Fouejieu A (2012).

5 Empirical Analysis

The effect of inflation target has been studied through different econometric methods, where the most common ones are VAR analysis, difference in difference model and panel estimation and many others. These approaches have been used to measure statistically the effect of inflation targeting and point out mainly these differences through comparison to a control group of non targeters.

The most common of these methods and the one that we are going to use in this paper is difference in difference model. Difference in difference method has been commonly used since 1985 to provide the necessary evidences on many policy questions. This thesis will test the hypothesis through the usage of this specific model. In other words, this method will allow us to compare the changes in inflation for a specific set of countries before and after the implementation of inflation targeting to the changes in control group's variable. Also, this method will be used to compare the performance of treatment and control group during and after the crises period. This model has been criticized mostly for the revision to mean bias. This has been very well explained in the paper of Ball and Sheridan (2005) "Does inflation targeting matters?", where both of the writers point out that countries which are targeting inflation had a higher inflation rate prior to targeting it, and that is easily explained as generally these countries which showed problems with inflation rate are the ones that prefer to target inflation. And just because initially they did not perform good, after targeting they will show better results compared to the countries which do not target inflation and have a difference initial performance. All these statistical results might be confusing. That is why both authors encourage as a solution to include the average in the model and this would eliminate the revision to mean bias and provide more convincing results. These suggestions had been followed from further more authors Geymael et al (2011), Salles and Goncalves (2008).

5.1 Inflation and output description

The descriptive statistics for the group of targeters and non-targeters is presented below. The mean and the standard deviation results are calculated for 27 countries in total from which 8 are targeting inflation and the other 19 are not. The results are not completely conclusive. Inflation rate for the targeting countries are calculated as average of 1990 until the year when the specific country announced inflation targeting as their monetary policy. The average is 17.52 % and it has declined after the adopting inflation targeting to 5.06%. This is a sharp decline if compared to the statistics from the countries which are not targeting inflation rate. The average for non targeters prior to adaptation of inflation targeting was 13.09%. For this statistic we used year range of 1990-2004 (2004 considered to be the average year used in our calculations for control group as the year of adopting inflation targeting). The calculations show that this statistic declined for non-targeting economies 6.19%. The decline in inflation rate is also considerable for non-targeting economies, but the relative decline for targeting economies is higher.

Table 1- Average percentage for Inflation Rate and Output Growth

	Inflation Pre	Inflation Post	Output Growth Pre	Output Growth Post
NIT	13.09%	6.19%	5.71%	4.04%
IT	17.52%	5.06%	4.76%	3.12%

Source: IMF webpage (World Economic Outlook download)

Table 2- Average Percentage for Inflation Volatilty and Output Growth Volatility

	Inflation Volatility Pre	Inflation Volatility Post	Output Growth Volatility Pre	Output Growth Volatility Post
NIT	9.23%	4.53%	4.13%	4.38%
IT	10.40%	4.12%	4.73%	3.47%

Source: IMF webpage (World Economic Outlook download)

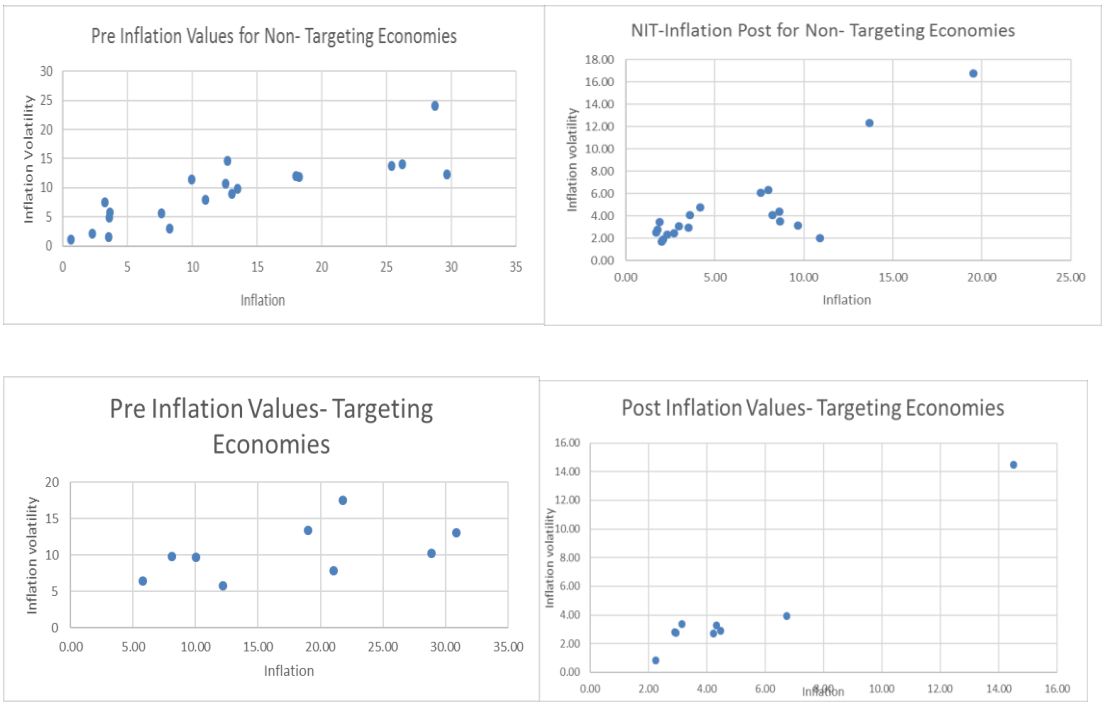
While, inflation volatility also decreased from 9.23 % to 4.53% for non-targeting economies and declined from 10.04% to 4.12 % for non-targeting economies. The relative decline is higher in targeting economies. But as both the groups has shown improvements in terms of volatility and inflation rate nothing can be said conclusively.

Output growth rate has started almost the same for both groups and has shown a higher declining rate for targeting economies, from 4.76 % to 3.12% if compared to non-targeting economies where the percentage decreased from 5.71% to 4.04%. These calculations, same as inflation ones are based on range of years from 1990-2003 for the pre-results and from 2003-2016 for the post results. Output volatility has decreased from 4.73% to 3.47% for targeting economies, but it has increased for non-targeting economies from 4.13 % to 4.38%. To sum up in terms of output growth and volatility both targeting and non-targeting economies faced a decline in the rates relatively close to each other, but the output growth volatility had increased for non-targeting economies by less than 0.25% but decreased by more than 1% for inflation targeting economies.

As per visual side of these statistics, we can compare the graphs and see that for countries which have adopted inflation targeting a tendency of converging to lower

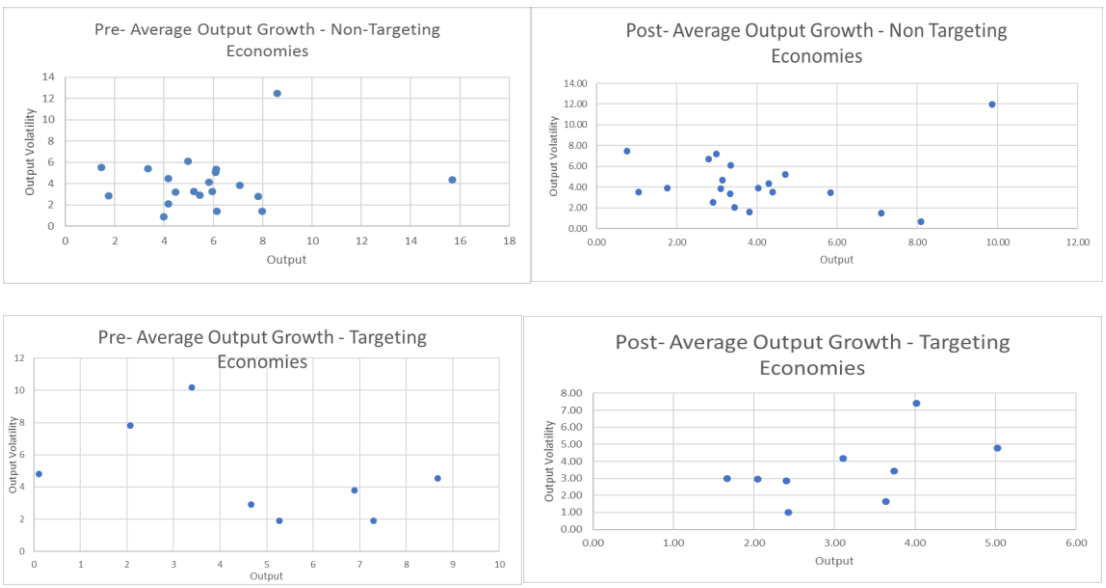
rates of both inflation rate and volatility is seen. The only outlier is the statistic of Turkey, which is historically known for being a country with a double-digit inflation rate. But the outcomes from the output are a little bit more difficult to understand.

Figure 10- Inflation Pre and Post Averages for IT and NIT economies



Source: IMF webpage (World Economic Outlook download)

Figure 11-Output Pre and Post Averages for IT and NIT economies



Source: IMF webpage (World Economic Outlook download)

5.2 Dataset

Dataset used in our model is composed of 29 countries from which 20 are not targeters of inflation and the rest has adopted inflation targeting as a monetary policy. Eight of these countries are in Europe and the rest are part of Commonwealth. Apart from taking into consideration if they have adopted inflation or not another reason why we choose these countries relate with the possibility of reducing the bias as it is believed that being in the same region plays an important role.

The original data range is 1990 until 2016, were every period of this range which includes values of inflation more than 50% are automatically excluded. For this reason, our base model will include the dataset from 1997 to 2016. In this way the observations which have more then50 % of inflation rate do not impact the role of inflation targeting, in other words, it is known that countries which are facing very high inflation will have a higher chance of adopting this framework. Because of the convergence factor, this country will face a sharper decline in inflation rate and in this way, it will inflate the impact of inflation targeting.

To capture how the implementation of this framework has affected the statistics we split the time range into two groups the pre and the post inflation targeting group. Countries which have adopted inflation targeting have as a breakpoint of this range the year that they have announced inflation targeting as their monetary policy. While for the non targetors 2004 is the breakpoint year. The same year is going to be used for the Dummy variable.

We are interested to see the impact that inflation targeting has on our two main variables: inflation rate and output growth. The data are download from IMF webpage.

5.3 Methodology

Difference in difference model is a statistical approach which is commonly used to analyze the impact that a treatment has on treated group. In other words this approach which uses panel data investigates whether the treatment has any significant effect on the group which has adopted it by comparing it to the group which has not adopted this treatment (control group). Difference to difference model has been commonly used by economists to reach some conclusive opinions regarding the impact of inflation targeting in different economies. One of the key papers which brought up a different perspective of this model is written by Ball and Sheridan in 2005. Trying to answer the question whether inflation targeting matters or not they pointed out the importance of revision to the mean.

The initial model which was not considering the revision to the mean is as follows:

$$X_{post} - X_{pre} = \alpha_0 + \alpha_1 D + \epsilon$$

Where:

X_{post} : is the mean value of the variable X after IT implementation

X_{pre} : is the mean value of the variable X before IT implementation

α_0 : Constant

α_1 : Measures the coefficient of the variable D (Dummy variable, if a country is targeting inflation then it is 1 and if not it is 0)

ϵ : Error term

X_{post} and X_{pre} are the mean values of the variable X after and before the adoption of IT respectively. Calculating these two variables is the first step of conducting this model, we first calculate the average of each of the countries being studied and from the first outcomes without regressing the model it is visible that the inflation rates have declined from the pre to the post period. But this decline is also seen for non-targeting

economies as well. This will be explained in much more details in the Empirical results part.

The most important variable is α_1 which measures the effect of inflation targeting in the economies. α_1 is the coefficient of the variable D, which is the dummy variable equaling 1 in case the country is targeting inflation or 0 in case the country is not. If variable X would be inflation and the dummy coefficient would be negative and significant, this would mean that targeting economies faced a sharper decline in inflation rate compared to non-targeting economies. And if the X variable would be output and the dummy coefficient would be negative and significant, then this would mean that targeting economies are facing lower improvement in output growth compared to non-targeting economies.

This model is our first model in this thesis. It is regressed using as data set period 1997-2016. In order to improve the results, as this is believed to be a misleading model, we conducted a series of regressions but this time taking into consideration the revision to the mean. The models follow the below formula:

$$X_{post} - X_{pre} = \alpha_0 + \alpha_1 D + \alpha_2 X_{pre} + \epsilon$$

Where, $\alpha_2$is the coefficient of the average values before the adaptation of inflation targeting. As mentioned before in this paper, Ball and Sheridan (2005), suggested that countries which have been performing poorly in terms of output and inflation, will have a higher tendency of adopting inflation targeting as a monetary policy and as a result will show higher improvement if compared to other countries which are not targeting inflation at all or were performing better before targeting it. So adding this variable in the model will amortize a bit the regression to the mean bias.

Model 2 in this thesis uses dataset of 1990-2016 excluding all of the values which have a higher inflation rate above 50%. Considering that some of the countries did not have all the data for inflation and output we conducted Model 3 based on the logic of Model 1 dataset but this time including the average values before the adoption of IT as an explanatory variable. Model 3 is our base model. The last model we run excludes countries like Montenegro, Kosovo and Bosnia Hercegovina for the lack of the data for a period of three year.

Table 3-Summary of Models

Model discription
Model 1. All countries apart from Czech Republic, included 1997-2016
Model 2. All countries included, 1990-2016, revision to the mean
Model 3. All countries apart from Czech Republic, included 1997-2016, revision to the mean
Model 4. All countries apart from Czech Republic, Montenegro, Kosovo and Bosnia Hercekovina included 1997-2016, revision to the mean

5.4 Empirical Results

4.4.1 Inflation

Table 4- Results for Inflation Rate

	Model 1	Model 2	Model 3	Model 4
DID	-3.836	-1.693	-2.088	-3.568
	(0.233)*	(0.888)*	(0.851)**	(1.103)**
Pre-Inflation		-0.983	-0.984	-0.987
		(0.002)**	(0.0028)*	(0.003)**
Constant	3.242	3.726	3.834	5.209
	(0.124)*	(0.211)**	(0.299)**	(0.620)**
Prob >F	0.000	0.000	0.000	0.000
R Square	0.01	0.89	0.90	0.89

Note: Standard Error are in the parentheses

**** statistically significant at 1% level of significancy*

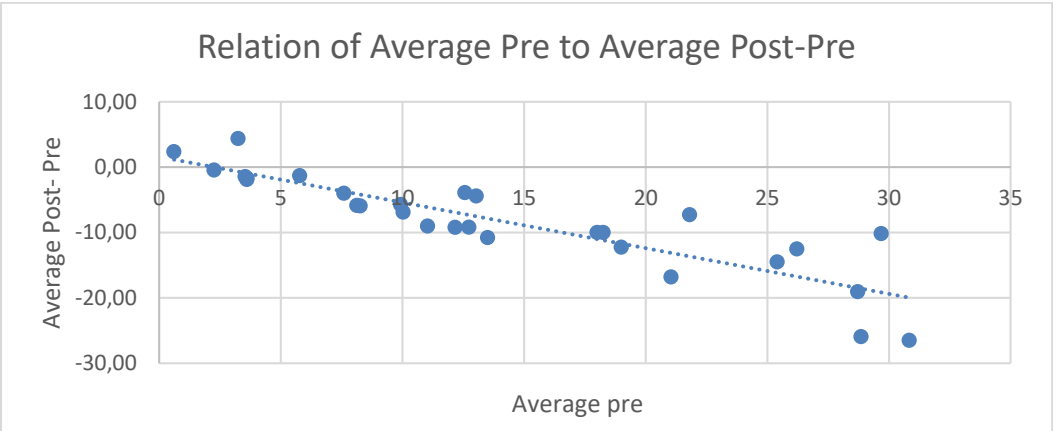
*** statistically significant at at 5 % level of significancy*

**statistically significant at 10% level of significancy*

In all the models run in this paper inflation dummy is statistically significant and has a negative sign. Analyzing first the third model as it is our main model, we have regressed the data of period 1997-2016 excluding all the values of inflation that are above 50%, we see that our outcomes are statistically significant at 90% significance level and have an R square of 0.9. The coefficient for the difference in difference shows that if non-targeting economies would have targeted inflation then they would have faces a decrease in the inflation rate by 2.08 percentage points more than they do. Also, the coefficient of pre-inflation rate is significant and relatively strong -0.98 percentage points. If comparing so the results from this model which includes the regression to mean to the first model where the regression to mean is not considered we see that R square is relatively small in model 1, equaling to 0.1. The difference in difference coefficient is still statistically significant though the value is different from our core model. The sample used in Model 1 and Model 3 show that the average inflation for group of inflation targeting economies was quit higher compared to the group of non-inflation targeting economies. And after implementation of inflation targeting it is seen that the average inflation rate for both targeting and non-targeting economies move around 5 to 6 percentage points.

Another way we can show the significance of the regression to mean for the model is through the graphical point of view. The graph shows on the y-axes the average difference between the post and the pre-period of inflation targeting, while the x-axis shows that average pre-values. The relation is quite visible. The graph shows a declining trend in other words a negative relation between these two variables

Figure 12- Relation of Average Pre -Inflation to average differnece of Post-Inflation and Pre-Inflation (Regresion to mean)



Source: IMF webpage (World Economic Outlook download)

On the other hand, the last model regresses the same dataset as Model 1 and Model 3 though it excludes countries like Kosovo, Montenegro and Bosnia and Hercegovina since these countries do not have all the data until 2001. The coefficient for difference in difference variable for this model is relatively high compared to the Model 1 and Model 3 results, though it is still significant and negative. Standard errors are higher compared to Model 3 and the R square is 89%.

4.4.2 Output

Table 5- Results for Output Growth

	Model 1	Model 2	Model 3	Model 4
DID	-1.366	-0.809	-1.039	-1.859
	(1.561)	(0.243)	(0.312)	(0.390)
Pre-GDP		-1.035	-1.0332	-0.900
		(0.040)	(0.058)	(0.116)
Constant	-0.897	3.679	3.716	3.828
	(1.002)	(0.151)	(0.220)	(0.441)
Prob>F	0.002	0.000	0.000	0.000
R Square	0.012	0.52	0.54	0.35

Note: Standard Error are in the parentheses

**** statistically significant at 1% level of significancy*

*** statistically significant at at 5 % level of significancy*

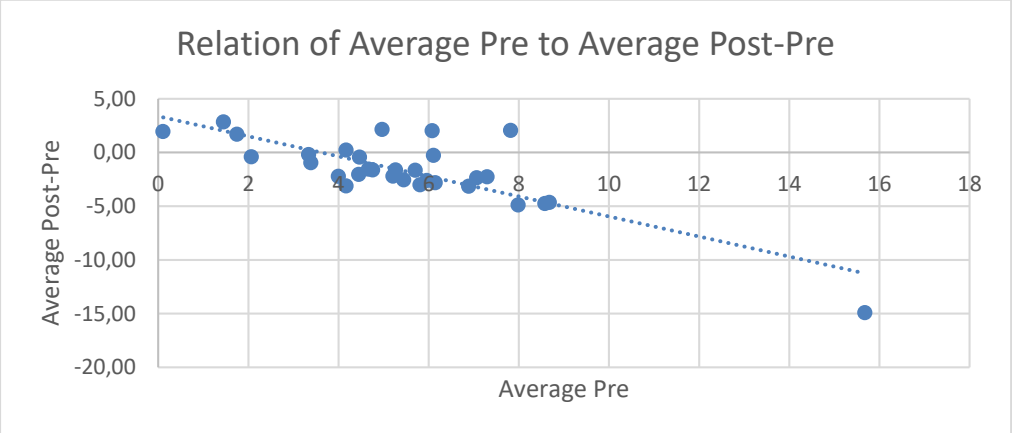
**statistically significant at 10% level of significancy*

Following the same method, we regressed the models once again using now GDP growth rate as the independent variable. As expected the impact of inflation targeting in GDP is not high. We analyzed the GDP growth rate in the previous parts of this chapter and concluded that based on the descriptive table GDP growth rate has declined for both, targeting and non-targeting economies. This decline raises the question whether it is statistically significant or not?

The results for output show that the variables have a negative sign, meaning that the effect of inflation targeting in output is not positive, but none of the coefficients are statistically significant leading us to conclude that even though the growth has slowed down, a lower inflation rate is not significantly reached through a decline in growth rate. The R squares are relatively low.

As per the revision to the mean from the graph point of view the trend is still declining, which implies that revision to the mean is still important though the trending line as seen is not as steep as it is for the inflation dataset.

Figure 13-Relation of Average Pre -Output Growth to average differncee of Post-Output Growth and Pre-Output Growth (Regreasion to mean)



Source: IMF webpage (World Economic Outlook download)

6 Conclusion and Remarks

Studying the effect that inflation targeting has in emerging economies is not a very unexplored topic for the first years of this monetary policy framework. The literature is broad with very conflictual results and outcomes. Though the question has always been the same: Does inflation targeting matter? Up to a point it might have been a question of countries chosen to be studied, the composition of both the control group and the treatment group, the methodology used, or the years included in the sample that might lead in conflictual outcomes between different studies.

The country choice in this paper was made based on previous studies and most importantly based on the location of these countries, because through this way we tend to decrease as much as possible the selection bias. Most of the countries being studied in detail are in the Balkan, Central and Eastern Europe Region considering that the macroeconomic environment is relatively flowing around the same levels. Applying the same logic, we decided to go with Commonwealth countries as well. As mentioned this dataset has been used before up to 2011 and our results are reached based on an addition of 5 more years in the dataset including here the longer effect that financial crises might have had on these economies. What also characterizes these countries is the similar framework of inflation targeting. It is obvious that the differences between the countries are not only in cultural and economic terms but also in political and policy making terms. Despite these differences still the policy makers have chosen a similar framework for adaptation of inflation targeting though a different transition path.

As literature review supports inflation targeting is not proven to be affecting the economy of a country in a negative way. In other word maybe, the effect is not as positive as desired in terms of economic growth and inflation rate stability, but indeed none of the studies have proven that countries that are adopting inflation targeting are becoming worst off. The same case is for our paper as well.

We concluded that based on the graphical point of view for inflation targeting countries volatility has shown improving trend and improvements are also seen in inflation rate by dropping it from average two-digit numbers to relatively small average values of 3-4%. These graphical outcomes are supported by our empirical results as well. We run four different models and for all of them we concluded that inflation targeting has a statistical significance on inflation rate. Also based on Ball and Sheridan (2005) results revision to the mean bias is reduced with the inclusion of the average inflation rate for

the pre-adoption phase as a explanatory variable. This variable was statistically significant for inflation rate results and as seen also in the graph the declining trend supports the negative relation between these variable, emphasizing so the relevance and importance of revision to the mean in our calculations.

On the other hand, as per the graphical point of view results for output growth and volatility we reached to very non-inclusive results since the trends were not that much visible. Our empirical results have shown also that inflation targeting has a negative effect in output growth rate, as we understood from the graphs and the descriptive data, though from the econometrics point of view this effect was not statistically significant. Inflation targeting, as supported also by the literature, does not affect the economy negatively.

Lastly but not least, the impact of inflation targeting during the financial crisis have been a very interesting topic as well, which has been studied thought the recent years. As per the results of Fouejieu (2012) and Filho (2010) inflation targeting economies have been performing better in terms of inflation rate but not the output growth, results supported also by our dataset.

Inflation targeting benefits as mentioned in this thesis but also in the paper by Ball and Sheridan (2005) are not seen only in the economical point of view, but also in the political one. Adopting inflation targeting comes with the promise to the economy for a stable targeted rate, which indirectly infuses trust to the central banks and adjust inflation expectations rate. Inflation targeting has shown to be a preferable framework chosen not only by economies which are facing double digit inflation rates, but also from developed countries, at the end of the day, no harm is proven to be done to the economy if this framework is adopted.

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Appendix: Tables

Table 6- Descriptive Data

	Pre Inflation	STDs	Post Inflation	STDs	Pre Output	STDs	Post Output	STDs
Azebijan	3.25	7.47	7.60	6.10	7.82	2.79	9.87	11.96
Belarus	29.69	12.29	19.51	16.79	7.07	3.82	4.71	5.24
Bosnja	2.26	2.18	1.79	2.76	5.45	2.9	2.90	2.52
Bulgaria	7.6	5.6	3.60	4.07	6.15	1.4	3.33	3.36
Croatia	3.54	1.61	2.08	1.92	4.17	2.12	1.05	3.55
Estonia	12.74	14.61	3.53	2.95	5.81	4.14	2.79	6.70
Kazakistan	12.57	10.65	8.66	3.52	6.11	5.38	5.83	3.44
kosovo	3.62	5.7	1.90	3.47	8.58	12.51	3.81	1.60
Kyrgys	18.01	12.07	8.00	6.31	4.17	4.48	4.38	3.52
Latvia	9.93	11.36	4.20	4.74	5.21	3.26	2.99	7.21
Lithunia	0.61	1.04	2.96	3.08	5.96	3.25	3.35	6.12
Macedonia	3.61	4.83	1.72	2.49	1.75	2.89	3.44	2.06
Moldova	18.26	11.81	8.25	4.07	1.45	5.51	4.29	4.36
Montenegro	13.51	9.79	2.72	2.45	7.99	1.41	3.10	3.86
Russia	28.72	24.08	9.66	3.14	3.34	5.44	3.13	4.67
Slovak Republic	8.27	2.97	2.33	2.31	4.47	3.23	4.03	3.90
Slovania	11.04	7.92	2.02	1.70	4	0.89	1.76	3.88
Ukraine	13.04	9	8.61	4.40	4.97	6.13	7.10	1.47
Uzbekistan	26.22	14.09	13.68	12.34	15.68	4.38	0.75	7.50
Tajikistan	25.41	13.76	10.89	2.01	6.08	5.04	8.09	0.66
Average NIT	13.09	9.23	6.19	4.53	5.71	4.131	4.04	4.38
ALB	8.13	9.82	2.26	0.84	3.39	10.19	2.42	0.99
ARM	5.78	6.41	4.46	2.89	8.68	4.52	4.02	7.39
CZ	12.17	5.78	2.94	2.78	4.45		2.405	2.86
GEO	10.03	9.69	3.14	3.35	6.89	3.79	3.74	3.43
HUN	21.05	7.8	4.24	2.73	0.11	4.82	2.05	2.96
POL	28.86	10.28	2.91	2.78	5.27	1.89	3.64	1.63
ROU	30.84	13.04	4.34	3.26	4.67	2.92	3.11	4.17
SRB	19.00	13.34	6.74	3.92	2.07	7.81	1.66	2.97
TUR	21.81	17.48	14.52	14.50	7.3	1.91	5.02	4.78
Average IT	17.52	10.40	5.06	4.12	4.76	4.73	3.12	3.47

Source: IMF webpage (World Economic Outlook download)

Table 7- Descriptive Data for CIS and EDE

	Commonwealth of Independent States	Commonwealth of Independent States	Emerging and developing Europe	Emerging and developing Europe
	GDP	Inflation	GDP	Inflation
2000	9.287	23.351	5.222	31.724
2001	6.086	20.226	-0.448	28.031
2002	5.293	14.102	4.646	20.366
2003	7.767	12.359	4.795	12.185
2004	8.016	10.381	7.453	6.943
2005	6.867	12.109	6.199	6.098
2006	8.929	9.46	6.511	6.124
2007	9.047	9.681	5.546	6.097
2008	5.338	15.45	3.192	8.015
2009	-6.337	11.069	-2.769	4.816
2010	4.641	7.184	4.342	5.663
2011	5.325	9.76	6.646	5.45
2012	3.662	6.196	2.484	6.063
2013	2.483	6.457	4.911	4.465
2014	1.049	8.088	3.88	4.105
2015	-1.951	15.533	4.744	3.216
2016	0.419	8.266	3.232	3.243

Source: IMF webpage (World Economic Outlook download)