“Macroeconomic effects of inflation targeting in advanced and emerging market economies”

AUTHORS	Igor Chugunov https://orcid.org/0000-0002-3612-7236 http://www.researcherid.com/rid/O-8662-2016 Mykola Pasichnyi https://orcid.org/0000-0001-7663-776X http://www.researcherid.com/rid/O-3418-2016 Anton Nepytaliuk https://orcid.org/0000-0002-7890-3889

ARTICLE INFO	Igor Chugunov, Mykola Pasichnyi and Anton Nepytaliuk (2019). Macroeconomic effects of inflation targeting in advanced and emerging market economies. *Banks and Bank Systems*, *14*(4), 153-165. doi:10.21511/bbs.14(4).2019.15
DOI	http://dx.doi.org/10.21511/bbs.14(4).2019.15
RELEASED ON	Thursday, 19 December 2019
RECEIVED ON	Monday, 21 October 2019
ACCEPTED ON	Tuesday, 10 December 2019

JOURNAL	"Banks and Bank Systems"
ISSN PRINT	1816-7403
ISSN ONLINE	1991-7074
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
30	1	4

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

Igor Chugunov (Ukraine), **Mykola Pasichnyi** (Ukraine), **Anton Nepytaliuk** (Ukraine)

MACROECONOMIC EFFECTS OF INFLATION TARGETING IN ADVANCED AND EMERGING MARKET ECONOMIES

Abstract

The article assessed the treatment effects of targeting inflation regime on the real output and consumer inflation persistence in both advanced and emerging market economies. An empirical analysis is based on data from 35 OECD and 40 emerging countries and covers inflation and non-inflation targets over the period 1990–2017. The results showed that inflation targeting (henceforth – IT) had no significant impact on the GDP per capita growth rate but slightly reduced the output volatility. This study founded out that full-fledged IT had the effect of slowing down consumer inflation and reducing its volatility. Moreover, in the OECD countries, the monetary framework had certain advantages during the Great Recession. The authors argued that in order to maintain price stability in emerging economies, a high level of central bank independence and accountability is required.

Keywords inflation targeting, monetary policy, central bank, price stability, economic growth

JEL Classification E31, E52, E58

Received on: 21st of October, 2019
Accepted on: 10th of December, 2019

Igor Chugunov, Doctor of Economics, Professor, Head of the Department of Finance, Kyiv National University of Trade and Economics, Ukraine.

Mykola Pasichnyi, Doctor of Economics, Associate Professor, Department of Finance, Kyiv National University of Trade and Economics, Ukraine.

Anton Nepytaliuk, Postgraduate Student, Vasyl' Stus Donetsk National University, Ukraine.

INTRODUCTION

In today's economic discourse, there is a general agreement that monetary policy should practically address the objective of price stability. Meanwhile, scientists are still debating how to reach this goal most effectively. Achieving price stability is a crucial practical task for the monetary authorities for many reasons. Firstly, high and uncontrolled inflation contradicts the universal objectives of sustainable growth and full employment. Secondly, a high consumer price index triggers inflation expectations and declines the economic agents' confidence in the financial policies. Thirdly, price volatility has a negative impact on public welfare. At the same time, inflation is a usual feature of the economic system and, in general, can even stimulate its development if the monetary policy goals are set properly. There are some strategic options for the central bank behavior design that can reactivate endogenous economic growth. Inflation targeting is a monetary regime that, if fully adopted, eliminates many inflation-related risks and also enhances the financial environment transparency.

Money growth targeting was once considered as a possible alternative to IT. That regime required the central bank to set an explicit target for increasing money supply. Money growth targeting has been tried in several economies and has shown poor performance. It was abandoned because the interrelation between money growth and inflation appeared to be too unstable and unreliable to successfully stabilize prices. The unfortunate experience of some East Asian and Latin

http://dx.doi.org/10.21511/bbs.14(4).2019.15

American economies with pegged exchange rate regimes was marked by much deeper financial crises in the late 1990s. This fact has led these emerging markets to seek alternative monetary strategies and ultimately to apply IT.

It should be also mentioned that IT is not a financial panacea; many emerging markets could find it inappropriate and even harmful. IT is usually associated with a specific framework that is characterized by the unity of a central bank's mandate for price stability, independence, and public accountability. IT exists in both formal and informal versions with different consequences for the national economy. Informal IT, although the fluctuations in the monetary aggregates, despite the financial authorities' declarations, are still regarded as the main and vital elements in the monetary forecasting process, can be described as "eclectic" and "pragmatic". In that case, the central bank monitors changes in a huge range of financial and real indicators, planning appropriate monetary policy measures. Formal IT requires a solid institutional base and relatively high quality of public administration. Hence, the formal IT regime is quite difficult to adopt but effective in the long run.

There are certain reasons for transforming the informal IT monetary policy framework into a formal one. First, the informal IT often creates uncertainties for economic agents about the actual policy stance adopted by financial authorities. Second, consistent formal IT improves the coordination between monetary, fiscal and other public policies. Third, IT disciplines monetary policy and increases the central bank's accountability. And fourth, the IT application effectively reduces inflationary expectations. In other words, formal IT makes the public financial policy clear and transparent to the economic agents.

Over the last three decades, to achieve price stability, a few advanced and some emerging economies have adopted the inflation targeting regime. In general, IT helped to establish an optimal environment for predictable and relatively low inflation, while the vast majority of those economies had been previously characterized by significant financial imbalances. The above regime was often initiated under difficult conditions: against the background of structural and institutional transformation after the global crises, and in highly open and extremely susceptible to external shocks economies. The outcome of the IT adoption should be precisely evaluated, taking empirical data into account. On the one hand, the IT practices have triumphed in advanced countries during the Great Recession, and inflation remained close to the target. On the other hand, if the unemployment outcomes and some additional economic variables were systematically neglected, the monetary forecasts of the central banks were inaccurate and unsatisfactory.

1. LITERATURE REVIEW

In general, informal IT can be seen as a prerequisite for fully-fledged IT adoption. Jha (2008) stated that many emerging markets were pushed to adopt IT, mimicking respective changes in the developed countries. Moreover, monetary mimicry or partial IT adoption in those countries has induced significant institutional changes in their financial space. In countries that have adopted IT, in the context of globalization, domestic monetary powers should impose some restrictions on capital mobility and allow the exchange rate floating. Rose (2007) argued that those economies had quite lower exchange rate volatility and less frequent "sudden stops" of capital flows than the group with the other monetary regime.

While the fully-fledged IT adoption was disclosed by Mishkin (2001, 2004), Heenan, Peter and Roger (2006), other scientists such as Carare and Stone (2006), van der Merwe, (2004), addressed the issues regarding the so-called "eclectic IT" or "IT light". The eclectic IT regime can relate to the situation when high credible monetary institutions maintained low and predictable inflation without full accountability and transparency concerning the target. Meanwhile, the IT light countries announced broad inflation objectives, but due to relatively low credibility, they were not able to preserve the consumer price index as the foremost policy target. Svensson (2010) points out that many non-IT advanced economies have already adopted a monetary policy framework that was very similar to IT. According to Svensson, this

http://dx.doi.org/10.21511/bbs.14(4).2019.15

fact made the role of the latter uninterpretable (Svensson, 2010)

Mishkin (2004), Garcia, Restrepo and Roger (2009), Hammond (2012) emphasize five fundamental criteria for an effective IT regime functioning, which are as follows:

1) the central bank should make public announcement of the medium-term inflation target;

2) an institutional commitment to achieve and maintain the price stability as a primary goal of the monetary policy;

3) the decision to set monetary instruments should be based on current and prospective analysis of a huge array of variables;

4) a high level of monetary policy transparency ensured by regular public communication with society and markets about the central bank plans, goals and tasks; and

5) an institutional framework is required to ensure the central bank accountability for achieving inflation targets.

Lucotte (2010), using panel data, carried out a comprehensive analysis of the main institutional and political factors, which had an impact on the IT adoption in 50 emerging market economies from 1986 to 2005. The scientist concluded that the central bank independence, policymakers' incentives and main characteristics of the national political system, such as political stability and the features of veto procedure, strongly affected the country's choice to determine mentioned monetary regime, while the level of financial market development played a tiny role in that case. Koziuk (2018) investigated 68 commodity economies and found out that only countries that implemented IT demonstrated the best price stability, central bank independence and transparency, the most flexible exchange rates and real economic diversification. The introduction of IT requires overwhelming institutional reforms based on empirical evidence of advanced democracies. Monetary instruments are vitally important in maintaining price stability, but fiscal policy is also a crucial determinant of price stability, especially in rich-resources countries.

Annicchiarico and Rossi (2013) studied monetary policy under the New Keynesian model and found that IT was reduced by general uncertainty in the economy, which affected growth-fostering activities. Mollik, Torres, and Carneiro (2011) examined the impact of IT on real per capita income growth in 22 advanced and 33 emerging market economies over the 1986–2004 period. The obtained results provided support of a positive impact of IT on economic growth for both determined samples. Firstly, 23 out of the aforementioned 55 countries adopted IT and ensured the solid inflation environment, which reduced inflation expectations of economic agents in the medium term. Inflation expectations are the biggest explanatory issue for most sample countries. Also, the disinflation process has a strong impact on investment and trade activities and belongs to fundamental factors that ensure sustainable output growth.

Even though IT has indisputable advantages for advanced economies, its adoption in the case of emerging market countries can cause some controversial effect. That fact is reflected in numerous publications addressing IT-related issues. Bernanke, Laubach, Mishkin, and Posen (1999) investigated international experiences with different monetary regimes and revealed four main IT disadvantages: 1) it was too rigid; 2) it institutionally allowed considerable discretion in financial policy; 3) it had potential to increase production instability; and 4) it was predicted to be the lowering factor for economic growth. In his further research, Mishkin (1999, 2000) disclosed three other disadvantages of the above regime. In general, inflation is hard to be controlled and there are long lags from the monetary policy instruments to the inflation outcome. So, in the examined sample of emerging markets, IT relates to quite weak central bank accountability. Moreover, IT is unable to prevent fiscal dominance, while the required exchange rate flexibility may crucially induce financial instability. The author developed the idea of Masson, Savastano, and Sunil Sharma (1997) that IT could be an effective strategy. Some successful disinflation was named the necessary condition for IT adoption.

Van der Merwe (2004) revealed some methodological disadvantages of IT in the context of emerging markets. While setting the target, this author suggested the principal differentiation between core inflation and the headline consumer price index, highly and directly influenced by the changes in the repurchase rate of the central bank. The drawbacks arose from the fact that core inflation measurement could be difficult for the general public to understand and less credible than headline inflation.

Using the data on advanced economies, Reynard (2007) examined empirical relationships between money and subsequent prices and output. He proved that effective monetary policy should be simultaneously focused both on the inflation target and monetary aggregates. According to this scholar, while monetary analysis could be generally defined as useful, in the analyzed advanced economies some weaknesses and mismatches in the monetary policy modeling systematically occurred. To maintain low inflation, the central bank can seriously restrict economic activity, declining real GDP per capita growth. Those statements were made regarding the USA, the EU, and Switzerland's experience. Thus, the IT adoption in emerging economies with their fragile institutional framework for monetary policy can provoke even more significant misbalances in output production when compared to advanced economies.

Svensson (2010) profoundly explored IT experience in advanced and emerging countries from 1990 to 2010. The scientist argued that IT was the most favorable regime for inflation and output indices stabilization. He also pointed out that IT was never strict but always flexible: all inflation-targeting central banks were simultaneously aiming to stabilize inflation around the determined target and to regulate the real economy. In that case, possible regulative measures, implicitly or explicitly, involved resource utilization, e. g., controlling the gap between actual and potential output. High public confidence in monetary policy enabled the respective central banks to be flexible and to stabilize productive proportions. Thus, sound and consistent monetary policy should cover not only the inflation target but also other variables such as the output gap. Svensson proposed to reconsider vectors of predetermined and forward-looking economic variables as well as the vector of financial policy instruments.

Amato and Shin (2003) studied the theoretical model, in which agents had imperfect information on the main economic parameters, such as inflation, but completely believed in a public signal issued by the government. The authors concluded that agents' beliefs might be distorted since they might put more weight into that "high credible signal" than in actual fundamentals. That paper was followed by numerous publications, addressing IT and its institutional framework. When investigating the role of financial authorities under IT-regime, Borio (2005, 2006), Borio and Lowe (2002) formulated a "paradox of credibility" to explain the above situation with the economic agents' decision-making. Clinton, Freedman, Juillard, Kamenik, Laxton, and Wang (2015) argued that a certain source of monetary policy robustness, if IT adopted, could be associated with the framework of principles, primarily the system transparency. Hence, the central bank should publish the inflation rate forecast explicitly, informing the agents about the target and possible time-losses, which are necessary for the monetary regulator to restore economic equilibrium in case of a critical deviation between real and expected inflation rates. Klomp and de Haan (2014), Fazio, Silva, Tabak, and Cajueiro (2018), and Hove, Tchana, and Mama (2017) disclosed the interrelation between IT and financial stability in terms of the quality of public institutions. These scholars revealed that countries with high quality of monetary institutions were able to formulate financial policies to deal with adverse shocks more effectively than economies that constantly suffered from low institutional quality.

Since the second half of the 1990s, many emerging market economies have adopted IT effectively. Despite sharp swings of commodity prices, the Great Recession and the other types of global financial crises, and dollar appreciation, for two decades, those countries successfully cope with inflation. The evidence showed that IT and transparent monetary policy helped anchor long-term inflation expectations both in emerging and advanced economies. This fact forced confidence in society and was beneficial for steady economic growth and prosperity (WEO, 2018).

http://dx.doi.org/10.21511/bbs.14(4).2019.15

The aim of this paper is to assess the treatment effects of targeting inflation regime on real output and price stability in advanced and emerging market economies.

2. METHODS

IT is commonly considered as one of the most favorable monetary regimes for sustainable economic development. However, its overall impact on the agents' behavior in the long run is rather ambiguous. The main hypotheses of this study relate to the macroeconomic development of countries, which adopted inflation targeting.

H1: The positive impact of IT is represented by disinflation and reduced volatility of the consumer price index.

H2: The full implementation of targeting inflation has generally improved macroeconomic performance.

The paper examined the data sample of 75 countries – 35 advanced economies of the OECD member-states and 40 emerging markets. The economies were in turn classified according to the IT adoption. Therefore, four subsamples were emphasized:

a) 20 OECD countries that have adopted IT (henceforth – $OECD_{IT}$);

b) 15 OECD countries that have not adopted IT yet (henceforth – $OECD_{NIT}$);

c) 17 emerging market economies that have adopted IT (henceforth – EME_{IT}); and

d) 23 emerging market economies that have not adopted IT (henceforth – EME_{NIT}).

To prove the initial hypotheses, the study compared subsample (a) with subsample (b) and subsample (c) with subsample (d). For each subsample, the average consumer price index in terms of four time periods was examined:

1) the last five years before full IT implementation (t – 5);

2) the first five years after the above regime adoption (t + 5);

3) the last five years for which data were available (2013–2017); and

4) 28 years from the first successful episode of the IT implementation in New Zealand in 1990 up to the last year for which data were available (1990–2017).

This empirical investigation considered the consumer price index, inflation volatility and the real GDP per capita growth rate as the main indicators of the adopted monetary regime efficiency. While the first and the second indicators were the direct objects of IT as well as its outcomes, the interconnection between the third indicator and the implemented monetary regime was not so evident. Meanwhile, the significant increase in the real GDP per capita growth rate can be one of the most important and explicit markers of the monetary policy overall effect. The above indicators were assessed regarding the type of the economy, in particular, advanced or emerging. Inflation and economic growth were represented by the weighted arithmetic means of the subsamples' consumer price indices and the GDP per capita growth rates, respectively. Inflation volatility was described by the standard deviation.

For subsample (a), the weighted arithmetic mean year of the IT adoption referred to 1999. So, t – 5 and t + 5 periods for the subsamples (a), (b) and for the OECD countries, in general, were defined as 1993–1998 and 1999–2003, respectively. For the subsample (c), the weighted arithmetic mean year of IT adoption referred to 2006. Hence, t – 5 and t + 5 periods for the subsamples (c), (d) and generally for the examined 40 emerging economies were defined as 2001–2005 and 2006–2010, respectively. Emerging markets were indisputably characterized by a certain time lag in the IT implementation. This fact was interconnected with their quality of financial institutions.

Panel data analysis was used which covers 75 advanced and emerging countries, inflation and non-inflation targets. The main data sources are the World Bank and the IMF International Financial Statistics databases. Furthermore, some

Table 1. Summary statistics

Source: Authors own calculations based on the IMF, World Bank and OECD data.

Country group	Variables	Observations	Mean	Standard deviation	Max	Min
$OECD_{IT}$	Consumer inflation	560	7.06	10.13	555.4	–1.73
	GDP per capita growth		2.95	1.16	11.17	–11.64
$OECD_{NIT}$	Consumer inflation	420	11.15	19.30	1076.1	–4.47
	GDP per capita growth		2.60	1.50	11.88	–19.12
OECD	Consumer inflation	980	8.84	14.91	1076.1	–4.47
	GDP per capita growth		2.80	1.31	11.88	–19.12
EME_{IT}	Consumer inflation	476	69.37	84.51	7481.7	–0.94
	GDP per capita growth		3.48	1.74	13.86	–29.59
EME_{NIT}	Consumer inflation	644	29.66	54.51	1190.3	–9.79
	GDP per capita growth		4.13	1.89	123.14	–62.08
Emerging market economies	Consumer inflation	1120	46.19	70.11	7481.7	–62.08
	GDP per capita growth		3.85	1.80	123.14	–62.08

data were drawn from the OECD database. Table 1 presents summary statistics.

3. RESULTS

Three decades ago, IT was introduced by the Reserve Bank of New Zealand. In the first half of the 1990s, this approach to controlling inflation was adopted by the central banks of many advanced countries such as Canada, Great Britain, Sweden, Finland, Australia, and Spain. Since the second half of the 1990s, after profound structural reforms, IT was also implemented in a number of Central and Eastern European countries and Latin America. Several states have been affected by the 1997 Asian financial crisis. Since the early 2000s, to reach macroeconomic stabilization, those countries approved respective IMF-supported programs and adopted IT. Eventually, that regime was implemented by both advanced and emerging economies. Currently, the number of emerging economies that are using IT exceeds the number of developed ones. The overall efficiency of the above regime is justified by the fact that none of the countries that have adopted IT once ever abandoned it, even in case of recession. Most of the IT-practitioners prefer an adaptive interpretation of the quantitative target when the central bank defines a corridor for the consumer price index.

The consumer inflation rate at the IT adoption date is represented in Figure 1. Empirical data show that the monetary policy regime was implemented under relatively low inflation.

The maximal consumer price index at the IT adoption date for the group of advanced economies was identified in Iceland and equaled 6.39% in 2011. In Poland and Serbia, inflation equaled 11.72% in 1998 and 2006, respectively. Those were the highest inflation rates at the IT adoption date for the group of emerging markets. The average consumer price index at the IT adoption date for all the countries under study equaled 5.63%. This indicated that IT implementation did not lead to a rapid decline in inflation. At the same time, the regime under study significantly lowered inflation expectations in society. Thus, IT is generally considered positive for sustainable economic development.

Until the 1990s, advanced economies often suffered from high inflation volatility. This fact strongly influenced the practice of financial forecasting, caused critical uncertainty and deteriorated the quality of decisions making by monetary institution. Nowadays, this situation is quite familiar with emerging markets. Although the central banks in the mentioned sample are legislatively responsible for IT, the relevant governments still have and often use tools influencing the quantitative inflation targets. Therefore, the independence of the monetary institutions in emerging economies should be enhanced.

Based on the empirical study, some statements on the consumer inflation indicators in the OECD countries and selected emerging market economies (see Table 2) should be formulated. In OECD countries, IT had a positive impact on price stability. First, in $t + 5$ period, compared with $t - 5$

http://dx.doi.org/10.21511/bbs.14(4).2019.15

Source: The World Bank data.

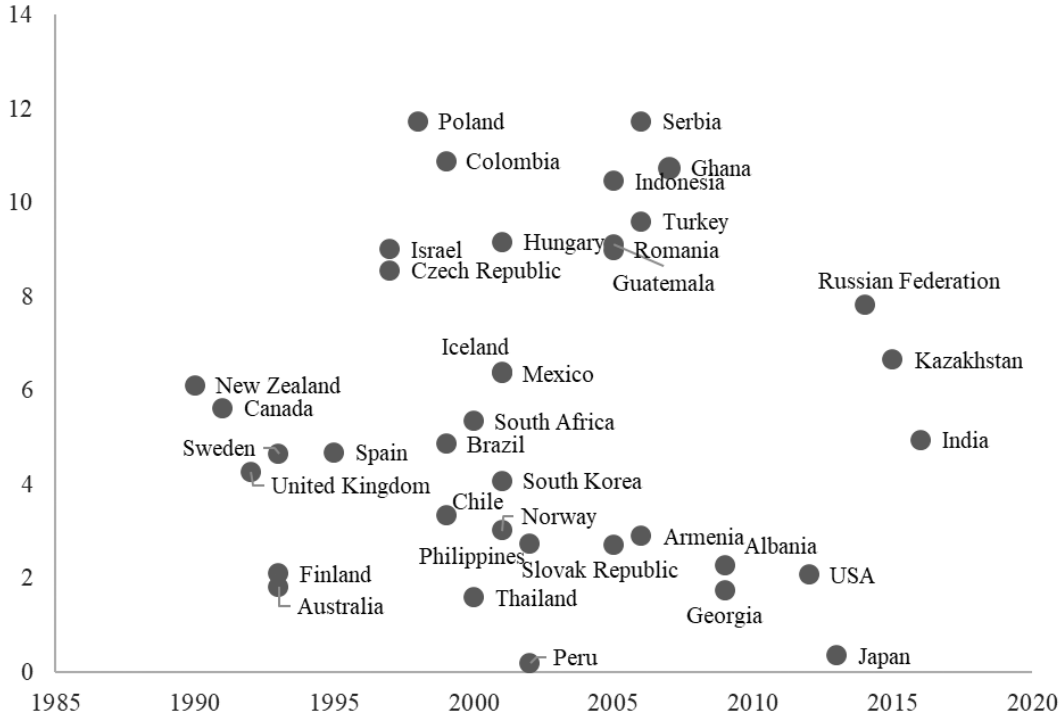

Figure 1. Consumer inflation rate at the date of IT adoption, %

period in the subsample (a), the consumer inflation declined: its reduction was 5.53%. Second, inflation volatility in subsample (a) significantly reduced. Third, the consumer price index decreasing trend was also observed in subsample (b). This fact testified to the existence of other effective mechanisms for price stabilization. In several OECD countries (such as Turkey, Mexico, and Chilly) and Central and Eastern European countries, inflation was higher than in the vast majority of developed economies. That situation can be explained by the quality of their financial institutions and the peculiarities of the model of social and economic development.

Some statements on the IT implementation in emerging market economies should be also made. Firstly, IT was primarily adopted by countries with permanent and urgent inflation-related problems. The standard deviation of the consumer price in-

Table 2. Consumer inflation in OECD and emerging market economies, %

Source: Authors own calculations based on the World Bank and the OECD data.

Country group	$t-5$	$t+5$	2013–2017	1990–2017
$OECD_{IT}$	8.91 (7.93)	3.37 (2.26)	1.71 (1.89)	7.06 (10.13)
$OECD_{NIT}$	7.14 (9.10)	2.60 (1.59)	0.66 (0.57)	11.15 (19.30)
OECD	9.12 (15.82)	4.29 (7.79)	1.24 (1.54)	8.84 (14.91)
EME_{IT}	8.97 (7.76)	6.75 (2.97)	4.95 (3.47)	69.37 (84.51)
EME_{NIT}	5.79 (7.02)	6.78 (3.91)	4.30 (4.87)	29.66 (54.51)
Emerging market economies	7.29 (7.39)	6.77 (3.51)	4.57 (4.39)	46.12 (70.11)

Notes: The numbers in parentheses are standard deviations.

dex for subsample (c) over the 1990–2017 period equaled 84.51%, while the respective indicator for subsample (d) was 54.51%. Secondly, IT practices had a positive impact on consumption through the reduction in the consumer price index. In $t + 5$ period, compared with $t - 5$ period, in subsample (c), consumer inflation slightly reduced: its reduction amounted to 2.22 percentage points. After the IT adoption, inflation volatility in the subsample (c) also decreased. Finally, there was no explicit inflation trend in the subsample (d) in the 2000s. Meanwhile, the current inflation rate in subsample (d) meets the criteria for the IT-practitioners. Comparative analysis of the consumer price indices in subsamples (c) and (d) throughout the Great Recession (which lasted for three years for $t + 5$ period) highlighted the fact that the monetary authorities in the countries included to subsample (c) demonstrated maximum efficiency resulted in significant disinflation. At the same time, inflation in subsample (d) rose influenced by inflationary spikes, while the prices in both subsamples increased equally over the 2006–2010 period. This fact proves the efficiency of IT as an element of anti-crisis measures.

As stated earlier, targeting inflation is not a panacea. Moreover, it is almost useless without profound transformations in the public administration. Ghana, Kazakhstan, and Brazil declared and formally implemented IT, but their actual results have been insufficient due to many factors. To stabilize prices, fiscal dominance should be eliminated; the central bank should be given a high degree of independence, while its institutional capacity should be maximized.

The quantitative inflation targets considerably differ in terms of the actual parameters of the economy. For the years 2013–2017, the average weighted inflation rate equaled 2.00% for advanced countries, and 5.00% ± 1.00 percentage points for emerging markets. The above findings generally depended on the degree of economic openness, the dominant technological paradigm, the complementarity of monetary and fiscal policies and their coordination, and the level of the institutional development.

In the next stage of the study, a comparative analysis of the GDP per capita growth rates before and after the IT adoption was conducted. The results of this analysis (see Table 3) proved to be controversial and rather unexpected.

For subsample (a), a slight decrease in the GDP per capita growth rate after the IT implementation was identified. In $t - 5$ period, the indicator was 3.20%, while after the essential changes in the monetary regime it equaled 3.03%. At the same time, the indicator volatility after IT adoption significantly decreased. For subsample (b), the GDP per capita growth rate was characterized by a similar downward trend, while the indicator volatility was constant. For the years 1990–2017, subsample (a) was characterized by the higher economic development when compared to subsample (b); their growth indicators equaled 2.95% and 2.60%, respectively. Meanwhile, as to subsamples (a) and (b), the numerical study demonstrated a low density of the interconnection between IT adoption and economic growth.

Table 3. Real GDP per capita growth in OECD and emerging market economies, %

Source: Authors own calculations based on the World Bank and the OECD data.

Country group	$t - 5$	$t + 5$	2013–2017	1990–2017
$OECD_{IT}$	3.20 (2.14)	3.03 (1.17)	2.73 (1.15)	2.95 (1.16)
$OECD_{NIT}$	3.95 (1.95)	3.30 (1.94)	1.25 (0.06)	2.60 (1.50)
OECD	3.53 (2.06)	3.14 (1.54)	2.07 (1.12)	2.80 (1.31)
EME_{IT}	4.85 (2.59)	3.97 (2.07)	3.38 (2.06)	3.48 (1.74)
EME_{NIT}	4.75 (2.02)	5.84 (3.97)	3.28 (2.56)	4.13 (1.89)
Emerging market economies	4.80 (2.30)	5.05 (3.39)	3.32 (2.33)	3.85 (1.80)

Notes: The numbers in parentheses are standard deviations.

http://dx.doi.org/10.21511/bbs.14(4).2019.15

The interrelation between the real GDP per capita growth rates and the monetary regime in subsamples (c) and (d) appeared to be even more ambiguous. First, for subsample (c), the adoption of the examined regime significantly reduced economic growth. Similar to subsample (a), in subsample (c), empirical data refuted the initial hypothesis *H1*. Second, IT implementation essentially lowered the real GDP per capita growth rate volatility. Third, in subsample (d), the economic growth rate over the entire 1990–2017 period exceeded the respective indicator for subsample (c) by 0.65%. However, the interconnection was not quite robust according to the empirical data.

An important scientific conclusion of this study was a significant reduction in the volatility of real economic growth. That situation was observed in subsamples (a) and (c). Therefore, if the indicator volatility decreases, economic agents can perform financial forecasting and planning more correctly. In general, IT assists these agents in their decision-making processes and increases confidence in future macroeconomic performance. This fact indirectly proves the initial hypothesis *H2*.

To sum up, inflation targeting can be defined as a specific monetary regime based on the dual institutional and operational independence of the central bank as well as its transparency and accountability. It simultaneously results in a reduction in the consumer price index and inflation volatility. Although the investigated monetary framework has no direct connection to the increase in real GDP per capita growth, there is empirical evidence of its positive impact on economic development. IT remarkably reduces the economic agents' inflation expectations and boosts their confidence both in domestic monetary policy and the national currency. This fact is extremely important for emerging markets in the context of their rather high degree of dollarization and an essential share of cash in money supply.

The experience of emerging economies proves that the objectives of economic growth and price stability cannot be achieved simultaneously. High and volatile inflation has diminished the long-term investment incentives, enhances borrowing, and expand financial planning process. These facts do not contribute to economic development. Given the peculiarities of emerging economies, the central bank's continued failure to achieve CPI targets creates an institutional barrier to integrated IT implementation. As a result, economic agents' confidence in the monetary authority policy declines, while the central bank is unable to conduct efficient regulation. For a long time, plenty of attempts to adopt the IT elements in Ukraine, Ghana, and Argentina have failed. Both fundamental and applied studies reported that inflation is caused by monetary and non-monetary factors. The latter include the general government deficit, fiscal shocks, and regulation of basic social guarantees (i.e., minimum wage, pension, etc.). In addition, non-monetary factors include the abrupt national currency devaluation, certain regulation policies concerning natural monopolies (tariffs for gas, heat, water, electricity, rail transportation, etc.), unfavorable price fluctuations in the commodities markets, and political instability.

The openness of the national economy and the dominance of commodities in the structure of export should be called one of the most powerful threats to maintaining price stability. Sometimes, negative price shocks in world commodity markets lead to a sharp decrease in the export value. This situation provokes the shortage of currency in the interbank market, which leads to currency devaluation. Possible efforts by the central bank to counteract foreign currency deficit, to alleviate market turmoil, and to constantly peg the exchange rate throughout the regular interventions have a little effect in terms of recession, especially driven by exogenous factors. A fixed exchange rate conflicts with the possibility of fully-fledged IT adoption (Svensson, 2010). Key interest rate manipulations and currency interventions (aimed at preventing the sharp fluctuations in the exchange rate) are the most efficient central bank measures, familiar to the majority of advanced and emerging market economies. A free-floating exchange rate framework in commodity economies is a necessary and vital prerequisite for successful IT implementation. The volatility of commodity market may cause devaluation, but it will be smooth and seasonal. Therefore, it is advisable to set slightly higher quantitative inflation targets in the export-dependent countries than in the advanced ones. A certain expansion of the interest rates improves the attractiveness of the assets nominated

in the national currency and reduces the speculative players' aspirations to weaken it. It is also expedient for the supreme financial authorities to focus on the gradual economic diversification and on the creation of incentives for investment inflows.

The full-fledged IT requires the integration of the transparency principles into the policymaking model. Strong communication channels between the central bank and the markets are the key prerequisites for effective monetary regulation. In the context of price stability, regular verbal interventions by the central bank regarding the implemented and potentially feasible policy measures are mandatory and preferable. In determining the medium-term macroeconomic forecast, the supreme monetary institution should correctly reflect the impact of retrospective cumulative factors on inflation dynamics and outline the directions of its further activity. The range of uncertainty in the planning and decision-making by economic agents can be narrowed to the next conditions:

a) the quantitative inflation targeting should be based on complete and prudent provision of information to markets;

b) the inflation target should be adjusted;

c) the targeting tools should be appropriate; and

d) the discrepancy between the actual values of the consumer price index and the projected ones for immanent reasons for these deviations should be immediately explained by the central bank.

4. DISCUSSION

Over the three past decades, IT has been adopted by an increasing number of central banks in advanced and emerging market economies. However, empirical analysis has provided limited evidence of the macroeconomic effects of a particular monetary regime. The authors investigated whether IT as a monetary framework contributes to economic development and financial stability.

Evidence from a sample of 75 countries indicates that economic growth depends on a set of factors, but there is no significant relationship between the real GDP per capita growth and IT adoption. Output volatility has declined for both advanced and emerging economies, which are inflation targets. The link between economic growth and volatility has been the subject of much research. There is much evidence that high volatility negatively influences the real output. This study suggests that rigid and consistent monetary policy in the IT adoption plays a crucial role in anchoring inflation expectations and reducing the CPI persistence. A simultaneous decline in consumer inflation and its volatility formed the key perquisites for ensuring financial stability, intensifying domestic demand and attracting foreign investment (Hammond, 2012). Moreover, fiscal policy has a great impact on macroeconomic stability; fiscal constraints and better coordination with monetary policy are reliable prerequisites for sound financial security. Besides, effective monetary policy communication is required to ensure confidence in the central bank's long-term commitment to low and stable inflation.

CONCLUSION

From the theoretical perspective, a fully-fledged IT adoption has improved macroeconomic performance and had a positive impact on reducing inflation and its volatility. The study has comprehensively evaluated the overall impact of IT adoption on economic development in advanced and emerging market economies.

First, the results showed that the regime under discussion is positively related to maintaining price stability for the OECD and emerging countries. IT has slowed consumer inflation and reduced its volatility. The experience of non-inflation targets showed that inflation has also declined, especially in the subsample of OECD countries. The central bank could successfully cope with inflation by using other meaningful monetary instruments. Nevertheless, the survey of emerging economies subsample high-

http://dx.doi.org/10.21511/bbs.14(4).2019.15

lighted the importance of IT adoption in the process of disinflation and CPI volatility depreciation. The observed monetary framework anchored inflation expectations for medium and long terms. Effectively counteracting inflation spikes, mainly in OECD subsample during the Great Recession, targeting inflation was the preferable framework in crises. Full-fledged IT should be achieved by eliminating fiscal dominance and significant expansion in the monetary authorities' institutional and operational capacity. The implementation of IT by many countries has shifted the perception of the monetary regime potential, which should be used to address the problems of the economy openness arising from fluctuations in commodity prices.

Second, it was found that the surveyed monetary regime did not contribute to per capita GDP growth in both OECD and emerging market economies. However, empirical results have shown that IT gradually reduced the output volatility. IT significantly reduced the inflation expectations and boosted the market confidence in monetary policy and the national currency. Those facts undoubtedly pointed to the benefits of the above regime to ensure sustainable economic growth in the long run. To sum up, IT is an extremely useful monetary regime for both advanced and emerging-market countries to maintain stable and low inflation.

REFERENCES

1. Amato, J. D., & Shin, H. S. (2003). *Public and private information in monetary policy models* (BIS Working Papers No. 138). https://dx.doi.org/10.2139/ssrn.794568
2. Annicchiarico, B., & Rossi, L. (2013). Optimal monetary policy in a New Keynesian model with endogenous growth. *Journal of Macroeconomics*, *38,* 274-285. https://doi.org/10.1016/j.jmacro.2013.10.001
3. Bernanke, B. S., Laubach, T., Mishkin, F. S, & Posen, A. S. (1999). *Inflation Targeting: Lessons from the International Experience.* Princeton, NJ: Princeton University Press. Retrieved from https://press.princeton.edu/books/paperback/9780691086897/inflation-targeting
4. Borio, C. (2005). Monetary and financial stability: So close and yet so far. *National Institute Economic Review, 192*(1), 84-101. https://doi.org/10.1177/002795010519200109
5. Borio, C. (2006). Monetary and financial stability: Here to stay? *Journal of Banking and Finance, 30*(12), 3407-3414. https://doi.org/10.1016/j.jbankfin.2006.06.004
6. Borio, C., & Lowe, P. (2002). *Asset prices, financial and monetary stability: exploring the nexus* (BIS Working Papers No. 114). https://dx.doi.org/10.2139/ssrn.846305
7. Carare, A., & Stone, M. R. (2003). Inflation targeting regimes. *European Economic Review, 50*(5), 1297-1315. https://doi.org/10.1016/j.euroecorev.2005.02.003
8. Clinton, K., Freedman, C., Juillard, M., Kamenik, O., Laxton, M. D., & Wang, H. (2015). *Inflation-Forecast Targeting: Applying the Principle of Transparency* (IMF Working Paper WP/15/132). Retrieved from https://www.imf.org/external/pubs/ft/wp/2015/wp15132.pdf
9. Fazio, D. M., Silva, T. C., Tabak, B. M., & Cajueiro, D. O. (2018). Inflation targeting and financial stability: Does the quality of institutions matter? *Economic Modelling, 71,* 1-15. https://doi.org/10.1016/j.econmod.2017.09.011
10. Fazio, D. M., Tabak, B. M., & Cajueiro, D. O. (2015). Inflation targeting: Is IT to blame for banking system instability? *Journal of Banking and Finance, 59,* 76-97. https://doi.org/10.1016/j.jbankfin.2015.05.016
11. Garcia, C., Restrepo, J., & Roger, M. S. (2009). *Hybrid Inflation Targeting Regimes* (IMF Working Papers No. 533). Retrieved from https://core.ac.uk/download/pdf/6309903.pdf
12. Hammond, G. (2012). *State of the art of inflation targeting* (47 p.). London: Centre for Central Banking Studies. Retrieved from https://www.bankofengland.co.uk/-/media/boe/files/ccbs/resources/state-of-the-art-inflation-targeting
13. Heenan, G., Peter, M., & Roger, S. (2006). *Implementing inflation targeting: Institutional arrangements, target design, and communication* (IMF Working Paper WP/06/278). https://doi.org/10.5089/9781451865387.001
14. Hove, S., Tchana, F. T., & Mama, A. T. (2017). Do monetary, fiscal and financial institutions really matter for inflation targeting in emerging market economies? *Research in International Business and Finance, 39*(Part A), 128-149. https://doi.org/10.1016/j.ribaf.2016.07.025
15. International Monetary Fund (IMF). (2018, October). *World Economic Outlook.* Retrieved from https://www.imf.org/en/Publications/WEO/Issues/2018/09/24/world-economic-outlook-october-2018#Chapter%203
16. Jha, R. (2008). Inflation targeting in India: issues and prospects. *In-*

ternational Review of Applied Economics, 22(2), 259-270. https://doi.org/10.1080/02692170701880783

17. Klomp, J., & de Haan, J. (2014). Bank regulation, the quality of institutions, and banking risk in emerging and developing countries: An empirical analysis. *Emerging Markets Finance and Trade, 50*(6), 19-40. https://doi.org/10.1080/1540496X.2014.1013874
18. Koziuk, V. (2018). Price Stability and Inflation Targeting in Commodity Economies: Macroeconomics versus a Political Economy? *Visnyk of the National Bank of Ukraine, 244,* 4-24. https://doi.org/10.26531/vnbu2018.244.01
19. Lucotte, Y. (2010). *The Choice of Adopting Inflation Targeting in Emerging Economies: Do Domestic Institutions Matter?* (MPRA Paper No. 27118). University Library of Munich, Germany. Retrieved from http://sceco.univ-poitiers.fr/MACROFI/DocMacrofi/D7Lucotte.pdf
20. Mishkin, F. S. (1999). International Experiences with Different Monetary Regimes. *Journal of Monetary Economics, 43*(3), 579-606. https://doi.org/10.1016/S0304-3932(99)00006-9
21. Mishkin, F. S. (2000). Inflation targeting in emerging-market countries. *American Economic Review, 90*(2), 105-109. https://doi.org/10.1257/aer.90.2.105
22. Mishkin, F. S. (2001). *Inflation Targeting.* Columbia: Graduate School of Business, Columbia University. Retrieved from https://notendur.hi.is/ajonsson/kennsla2013/01ENCYC.pdf
23. Mishkin, F. S. (2004). *Can inflation targeting work in emerging market countries?* (NBER Working Paper No. 10646). National Bureau of Economic Research. Retrieved from https://www.nber.org/papers/w10646.pdf.
24. Mollick, A. V., Cabral, R., & Carneiro, F. G. (2011). Does inflation targeting matter for output growth? Evidence from industrial and emerging economies. *Journal of Policy Modeling, 33*(4), 537-551. https://doi.org/10.1016/j.jpolmod.2011.03.010
25. Montes, G. C., & Peixoto, G. B. T. (2014). Risk-taking channel, bank lending channel and the "paradox of credibility": Evidence from Brazil. *Economic Modelling, 39,* 82-94. https://doi.org/10.1016/j.econmod.2014.02.023
26. Reynard, S. (2007). Maintaining low inflation: Money, interest rates, and policy stance. *Journal of Monetary Economics, 54*(5), 1441-1471. https://doi.org/10.1016/j.jmoneco.2007.06.018
27. Rose, A. K. (2007). A stable international monetary system emerges: Inflation targeting is Bretton Woods, reversed. *Journal of International Money and Finance, 26*(5), 663-681. https://doi.org/10.1016/j.jimonfin.2007.04.004
28. Savastano, M. M. A., Masson, M. P. R., & Sharma, M. S. (1997). *The scope for inflation targeting in developing countries* (IMF Working Paper No. 97/130). International Monetary Fund. Retrieved from https://www.imf.org/en/Publications/WP/Issues/2016/12/30/The-Scope-for-Inflation-Targeting-in-Developing-Countries-2356
29. Svensson, L. E. (2010). Inflation targeting (chapter 22). In *Handbook of Monetary Economics, 3,* 1237-1302. https://doi.org/10.1016/B978-0-444-53454-5.00010-4
30. Van der Merwe, E. J. (2004). *Inflation targeting in South Africa* (Occasional Paper No. 19). Pretoria, South Africa: South African Reserve Bank. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.525.3159&rep=rep1&type=pdf

http://dx.doi.org/10.21511/bbs.14(4).2019.15

APPENDIX A

Table A1. The sample of 40 emerging market economies

Source: Authors compilation.

No.	Country	No.	Country
1	Azerbaijan	21	Panama
2	Bangladesh	22	Paraguay
3	Bulgaria	23	Tunisia
4	Belarus	24	Brazil
5	Bolivia	25	Colombia
6	China	26	South Africa
7	Costa Rica	27	Thailand
8	Cyprus	28	Peru
9	Algeria	29	Philippines
10	Ecuador	30	Guatemala
11	Egypt	31	Indonesia
12	Croatia	32	Romania
13	Iran	33	Armenia
14	Kyrgyzstan	34	Serbia
15	Libya	35	Ghana
16	Sri-Lanka	36	Albania
17	Morocco	37	Georgia
18	Montenegro	38	Russian Federation
19	Malaysia	39	Kazakhstan
20	Pakistan	40	India