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The Influence of Inflation Targeting on Economic Growth in the OECD and Developing Countries

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ABSTRACT

Inflation targeting (IT) is a monetary policy regime that has been successful in terms of stabilizing both inflation and the real economy. Twenty members of OECD and about 20 developing countries have adopted this monetary regime. This paper aims to evaluate the influence of targeting inflation regime on economic growth in advanced and developing countries. The results showed that IT had no remarkable impact on the GDP per capita growth rate in the five-year post-inflation targeting period. Empirical research revealed that the inflation level has no significant influence on economic growth in the long-run. We observed a positive influence of the IT regime on decreasing volatility of real output in both advanced and developing countries. After full-fledged IT adoption, consumer inflation and its volatility in the OECD and emerging economies decreased steeply. However, the onward inflation trend existed for "non-IT-targeters," too. The study also describes the Ukrainian experience with monetary-policy strategy. Data showed that IT caused to reduce inflation in Ukraine after its 2014–2015 economic and financial crises.

INTRODUCTION

The pivotal objectives of modern macroeconomic policy are associated with permanent improvements in the population's life-quality and tremendously increased public welfare. The above goals remain unreachable without the achievement of sustainable economic growth (Ciegis and Dilius, 2019). Public authorities have a wide range of applicable institutional mechanisms and instruments for that purpose

(Cizmovic, 2019). The main task for authorities is to provide the preferable institutional framework, ensuring the agent's confidence in the undertaken measures. Even though a cliché of a crucial lag-effect characterizes monetary policy, it primarily contributes to public welfare. While a sound monetary regulation enables the agents to improve their economic strategy, it is mutually interconnected with the national social, demographic, migration strategies.

A broad settlement that monetary policy should be pragmatically concentrated on the aim of price stability dominates in the actual scientific discourse. The scholars are still arguing how that task could be reached most efficiently. Price stability achievement is a vital practical aim for the monetary institutions because of the plurality of causes. First, considerably high, and rather unrestrained inflation contradicts the ubiquitous objectives of sustainable development and full employment. Secondly, a high consumer price index (CPI), inspires inflation expectations and slumps the agents' confidence in the provided economic policy. Finally, public welfare is negatively impacted by price instability. Meanwhile, inflation is an internal economic system's feature and, overall, can even revitalize its expansion, if the monetary policy's targets are correctly calibrated. There are some strategic occasions for the central bank's behavior design that can positively exhilarate endogenous economic development. IT, in general, is a monetary regime that, in case of a fully-fledged implementation, eradicates several inflation-produced risks and contributes to the economic environment transparency's expansion.

Money growth targeting was formerly considered as a strategic alternative to IT. To increase the money supply, the regime, as mentioned earlier, obligated the central bank to proclaim an explicit inflation target. Money growth targeting has been tried in many advanced and developing countries and has shown poor performance. It has been dropped out because of the connection between money growth and inflation happened to be hugely impermanent and unreliable for the victorious price stabilization. The unlucky experience of the particular Eastern Asian and Latin American countries with pegged exchange rate regimes was marked by noticeably deep financial crises in the late 1990s. Eventually, that fact led those emerging countries to dig for alternative monetary strategies and to adopt IT.

It should be mentioned that IT cannot be concerned as a financial panacea; a plethora of emerging economies could find it unsuitable and even unhealthy. IT is commonly associated with a specific institutional framework that is denoted by the unity of a central bank's mandate for price sustainability, independence, and transparency as well. IT exists both in formal and informal variants with divergent consequences for the economy. Easygoing IT, while the variations in the monetary aggregates – despite the respective institution's statements – are still regarded as the vital elements in the forecasting process, could be described as "eclectic" and "pragmatic." In the observed case, the central bank monitors the essential developments in a range of financial and real indexes, while planning on the proper monetary policy's measures. Formal IT craves for a solid institutional base and a considerably significant quality of public management. Here from, the formal IT is rather tricky in adoption, but quite useful in perspective.

There are reliable reasons to change the informal IT framework to a formal one. Primarily, informal IT often generates uncertainties amidst the agents regarding the actual policy stance adopted by the authorities. Secondly, accordant formal IT upgrades the coordination between monetary, fiscal and the other financial policies. Thirdly, IT disciplines monetary regulation and enlarges the central bank's transparency and accountability. Finally, the IT application effectively reduces the economic agents' inflationary expectations. Mainly, formal IT makes financial policy clearer and much more comprehensive.

Over the last decades, aiming to gain price stability, some advanced and developing countries have adopted the IT regime. Generally, IT helped to set up an optimal environment for foreseeable and somewhat low inflation. At the same time, the notable financial imbalances had formerly characterized the vast majority of the economies under investigation. The regime above was often launched under demanding conditions: midst structural and institutional modification, after the global disasters, in supremely open and extremely susceptible to external shocks national economies. The result of the IT implementation should be promptly evaluated regarding the empirical data. The IT practice during and after the Great Recession in several advanced countries was undefeated and inflation remained close enough to the proclaimed target. On the other hand, if the unemployment consequences and some extra-economic variables were methodically neglected, the central banks' monetary scientific predictions had been erroneous and dissatisfactory. In 2019, the global economy changed due to external reasons. The

COVID-19 pandemics affected not only the particular people's life but the macro-financial systems as well. In the above conditions, it is vital to propose efficient modifications for monetary policy to achieve its strategic tasks.

1. LITERATURE REVIEW

Both theoretical and applied relationships between the undertaken and possible monetary policy's measures and the subsequent economic growth have been profoundly studied over the last decades. Twinoburyo and Odhiambo (2017) reviewed a plethora of scientific articles on the issue under study from 1972 to 2014, considering both advanced and developing economies. In some cases, monetary policy's transmission into economic growth was quite explicit in the long-run, but its overall impact in the short-run was rather insignificant. Nevertheless, the general favorable monetary policy's impact on economic development was detected. The main application peculiarities of monetary policy in a modified neoclassical economic growth framework were examined. Rather significant fiscal interventions' impact on the monetary regulation was observed, while public expectations played a crucial role in the monetary policy's efficiency and eventual transmission into economic growth. Koraus et al. (2017) studied the effect of monetary variables on both economic growth and sustainable development, regarding the indicator of GDP in constant prices. Price stability contributed to the sustainable "growth-friendly" environment (maximized GDP and employment, stable interest rates, increased households' welfare, optimized enterprises' value, etc.) formation and expressed the central banks' responsibility for the industrial development as well. In Central and Eastern Europe, the investigated interrelations substantially varied. Chu and Ji (2016) disclosed the monetary policy's impact on the endogenous market structure in a Schumpeterian economy, taking both micro- and macro-level into account. Considering emerging markets, Saqib and Aggarwal (2017) comprehensively studied both fiscal and monetary policies' effects on economic growth. They argued that, in particular cases, the latter had a much more significant impact than it was previously believed.

Moreover, the coordination of both monetary and fiscal policies was highly recommended as the growth determinant. Gil and Iglésias (2019) studied the objective long-run structural stance monetary policies and inflation's effects on economic development, regarding the specific monetary growth model where research and development expenses (R&D) were practically complemented with physical capital accumulation. In comparison, a strong negative long-run interrelation between inflation and economic development, real interest rate, and R&D intensity was identified.

Generally, informal IT applications could be regarded as the prerequisite for a fully-fledged IT adoption. Jha (2008) pointed out that a plethora of emerging economies was forced to adopt IT, mimicking the changes in advanced countries. Additionally, monetary mimicry or so-called "partial" IT adoption in the above countries has promoted some institutional changes in their financial space. In the IT-practicing countries, under current conditions of globalization, domestic monetary powers should inflict some limitations on capital mobility and allow the exchange rate's free-floating.

While a fully-fledged IT adoption was generally unveiled by Mishkin (2004), in the other articles, e. g., van der Merwe (2004), the scientific issues regarding the so-called "eclectic IT" or "IT light" were emphasized as well. "Eclectic IT" regime could be linked with the situation when high credible monetary institutions maintained both low and entirely predictable inflation level without full accountability and transparency concerning the target. "IT-light"-countries announced extensive inflation objectives, but due to somewhat low credibility, they were not able to preserve the CPI as the prime policy target. Svensson (2010) noticed that lots of non-IT developed economies have already adopted a monetary policy framework that was remarkably homogeneous to IT.

According to Mishkin (2004) there were five essential criteria for an effective IT implementation: a) central bank should make some specific public proclamation of the medium-term inflation target; b) an institutional adherence to reify and retain the price stability as the main objective of monetary policy; c) the decision to set monetary instruments should be based on the actual and prospective analysis of a vast massive of relevant variables; d) the highest level of monetary policy transparency assuring through punctilious public communication with the agents about the central bank's plans, aims, and

tasks; e) an institutional framework to ensure central bank's accountability for the declared inflation targets.

Lucotte (2010) performed a comprehensive study of the leading institutional and political factors that impacted the IT adoption in more than 50 emerging market economies from 1986 to 2005, using the panel data method. The central bank's independence, policymakers' incentives, and the main characteristics of the national political system (e. g., the political stability and the technical peculiarities of veto procedure) strongly impacted the country's choice to implement the above regime. At the same time, the financial market's development level played an insignificant role in that case. Koziuk (2018) examined 68 commodity economies and found out that among that sample, only the IT-practicing democracies demonstrated the best price stability, central bank's independence and transparency, the most flexible exchange rates, and real economic diversification. The introduction of IT required forceful institutional reforms based on empirical evidence of developed democracies.

Annicchiarico and Rossi (2013) scrutinized monetary policy in New Keynesian economics and unveiled that IT declined general uncertainty, which influenced growth-fostering activities. Mollik, Cabral and Carneiro (2011) highlighted the effects of IT on real per capita income growth in 22 advanced and 33 emerging economies over the 1986–2004 period. A positive impact of IT on economic growth for both determined samples was observed. Firstly, 23 of the 55 states have adopted IT and ensured the solidified inflation environment, which reduced the economic agents' inflation expectations in the medium-term period. Inflation expectations were the most contributing critical issue for the vast majority of the sample's countries. Secondly, the disinflation process had a substantial impact on investment and trade activities and belonged to the underlying factors to ensure sustainable output production.

Even though IT has undeniable advantages for the developed economies, its adoption in the case of emerging markets could cause some controvertible consequences. That fact was reflected in numerous publications addressing IT. Bernanke, Laubach, Mishkin, and Posen (1999) checked out the international experiences with different monetary regimes and declared the four main IT-related disadvantages: 1) it was described as too stiff; 2) it institutionally allowed substantial discretion in financial policy; 3) it had potential to induce production instability; 4) it was predicted to be the lowering factor for economic development. Mishkin (2004) pointed out three other disadvantages of the above regime. In general, inflation was hard to be regulated and there were considerable lags from the monetary policy instruments to the inflation outcome. Thus, in the sample of emerging economies, IT has been associated with the weak central bank's accountability.

Van der Merwe (2004) argued certain methodological disadvantages in IT, considering emerging economies. While setting the target, the critical differentiation between core inflation and the headline CPI, profoundly and directly impacted by the central bank's repurchase rate fluctuations, was suggested. The drawbacks arose from the fact that core inflation's measurement could be described as obscure for the public to understand and less credible than headline inflation.

Regarding the advanced economies, Reynard (2007) carried out some empirical relationships between the monetary variables' dynamics and subsequent prices and output. Hence, an effective monetary policy should be focused on the inflation target and monetary aggregates simultaneously. The monetary analysis could be useful; in the analyzed advanced economies, some weaknesses and mismatches in the monetary policy's modeling occurred systematically. Aiming to maintain low inflation, the central bank could severely restrict economic activity, declining real GDP per capita growth. Those statements were made regarding the USA, the EU, and Switzerland's experience. So, IT adoption in emerging economies with their frangible institutional framework for monetary policy could evoke even more significant imbalances in output production, than in advanced ones.

Svensson (2010) profoundly examined IT practice in advanced and emerging countries from 1990 to 2010. IT was a preferable regime for inflation and output indexes stabilization. It was never strict, but always flexible: all inflation-targeting central banks were aiming to stabilize inflation around the target and to regulate the real economy simultaneously. The possible regulative measures implicitly or explicitly involved resource utilization, e. g., controlling the gap between actual and potential output, etc. A high degree of public confidence in the central monetary institutions' policy enabled the respective central banks to be flexible; that fact stabilized productive proportions as well. Consequently, sound and con-

sistent monetary policy should cover not only the inflation target but other variables, such as the output gap.

Investigating the financial authorities' role under conditions of IT-regime, Borio (2006) composed a "paradox of credibility" to explain the situation above with the economic agents' decision-making. A source of the monetary policy's robustness, in case of IT adoption, could be associated with the framework of principles, primarily the system's transparency. Thus, the central bank should publish the inflation rate forecast explicitly, informing the agents about the target and possible time-losses needed for the monetary regulator to restore economic equilibrium in case of a critical divergence between the real and expected inflation rates. Fazio, Silva, Tabak and Cajueiro (2018); Hove, Tchana and Mama (2017) uncovered the interrelation between IT and financial stability, regarding the quality of public institutions: the countries with the high quality of monetary institutions were able to formulate financial policies to deal with adverse shocks more effectively than countries that constantly suffered from low institutional quality.

Since the second half of the 1990s, in a considerable number of developing countries, IT has been effectively implemented. Despite some sharp swings of commodity prices, the Great Recession, and the other types of global financial crises even under COVID-19 global pandemics, those countries successfully coped with inflation. The evidence showed that IT and transparent monetary policy helped anchor the long-term inflation expectations in emerging and advanced economies. This fact forced confidence in society and was rather beneficial for steady economic growth and prosperity.

This paper *aims* to evaluate the influence of targeting inflation regime on economic growth in advanced and developing countries.

2. DATA AND METHODOLOGY

Inflation targeting is one of the most favorable monetary regimes for sustainable economic development, which including price stability and real output growth. Still, its overall impact on the agents' behavior, in the long run, is somewhat ambiguous. The central hypothesis of our study is the full-fledged IT improved macroeconomic performance.

We assessed the data sample of 75 countries, which combined 37 members of the OECD and 38 emerging market economies. Then we divided countries by the criterion of IT adoption. So, we formed four subsamples: a) 20 OECD countries that have adopted IT (OECD_{IT}); b) 17 OECD countries that have not adopted IT yet (OECD_{NIT}); c) 18 developing countries that have adopted IT (DEV_{IT}); d) 20 developing economies that have not adopted IT (DEV_{NIT}). To carry out the influence of IT on consumer inflation, we compared subsample (a) with (b) and (c) with (d), respectively. For each subsample we evaluated the average CPI, regarding some periods: 1) the five years before full-fledged IT implementation (t-5); 2) five consistent years after the regime's adoption (t+5); 3) the last five years, on which the data were available (2015-2019); 4) 30 years from the first episode of IT implementation (1990-2019).

In this research, we examined consumer inflation, its volatility, and the real GDP per capita growth rate as the leading indicators of the efficiency of the explored monetary regime. The first and second indicators were the direct objects and outcomes of IT. But the interconnection between economic growth and IT was not so obvious. Meanwhile, the visible increase in the real output growth rate could be one of the vital markers of the monetary policy's overall effect. Inflation and economic growth were represented by the average of the subsamples' CPI and the GDP per capita growth rates, respectively. The standard deviation described inflations and real outputs volatility.

For the subsamples (a) and (c) t-5 and t+5 periods were defined as five years before and after implementation of inflation targeting regime. It was an individual for each country. The average year of IT adoption in the OECD referred to 1999. So, t-5 and t+5 periods for the subsample (b) were defined as 1993-1998 and 1999-2003. In turn, the average year of IT adoption in developing countries referred to 2007. Hence, t-5 and t+5 periods for the subsample (d) were defined as 2002-2006 and 2007-2011. For the *OECD* and *Developing economies* subsamples, we used a combined approach, respectively. A time lag characterized developing countries in IT implementation compared with the OECD-members.

That fact was interconnected with the quality of institutional framework for the monetary and fiscal policy's formulation and conducting.

We used a panel data analysis. In some years, data is unavailable (the early 1990s), especially for Eastern Europe and the Baltic states. That is why we should use unbalanced panel data. The analysis covers 75 advanced and developing countries, inflation, and "non-IT targeters." The primary sources of research are the World Bank's and the IMF's International Financial Statistics database.

3. RESULTS

Three decades ago, the Reserve Bank of New Zealand was the first central bank that launched IT. In the first half of the 1990s, several members of the OECD, namely Canada, the United Kingdom, Sweden, Finland, Australia, and Spain, adopted this monetary practice to cope with inflation. Since the end of the 1990s, after balanced structural economic transformations, Central and Eastern European countries and Latin America have also implemented the mentioned monetary regime. Various states have been affected by the Asian financial crisis in 1997. Since that time, such countries as Brazil, Colombia, Chile, Thailand, Korea, Peru have approved IMF-supported programs and adopted full-fledged inflation targeting to obtain long-run macroeconomic stability. Eventually, both advanced and developing economies implemented an investigated monetary regime. Nowadays, the number of emerging-market economies that are using this monetary-policy strategy exceeds the number of advanced. Inflation targeting continued to spread among the OECD economies (the USA (2012) and Japan (2013)) and developing countries (India (2015), Argentina (2016), Ukraine (2016)). So far, since monetary regime inception, inflation targeting has been a great success. The central banks did not cancel full-fledged inflation targeting ever, even in the case of the Great Recession or other economic crisis. Many countries implemented the innovations associated with inflation targeting without official adoption of the mentioned monetary-policy strategy. Most of the "IT-targeters" prefer a flexible quantitative inflation target when the central bank defines a particular corridor for consumer inflation.

Empirical data revealed that the majority of countries adopted IT under conditions of low inflation—the maximal CPI at the year of IT adoption for the observed countries identified in Poland and Serbia. Inflation equaled 11.72% in 1998 and 2006, respectively. The average CPI at the IT adoption date for all "IT-targeters" equaled 5.63%. The mentioned data proved that the launch of IT as a central monetary-policy regime had no apparent results in a rapid reduction in inflation. At the same time, the examined monetary-policy strategy has substantially lowered inflationary expectations. Thus, IT has a positive result for sustainable economic growth in a gradual way.

Before the 1990s, even the most advanced countries of the OECD suffered from significant inflation volatility. The indicator mentioned above had a robust influence on social and economic forecast practices, caused uncertainty, and deteriorated the quality of the central bank decision-making. Currently, a similar situation is somewhat familiar with developing countries. Even though the central banks in emerging economies are officially responsible for monetary policy formulating and maintaining price stability, the governments still have and often use the instruments to influence the inflation targets. The option for inflation targeting meant that country chose to have an independent monetary policy. Developing countries should ensure the independence and transparency of the monetary institutions.

Based on empirical research, some statements on the consumer inflation indicators in the OECD and 38 selected developing countries should be formulated (Table 1). For OECD countries, the explored monetary-policy strategy had a positive visual impact on price stability persistence. Firstly, in t+5 period compared with t-5 period in the subsample (a) consumer inflation sharply declined: its reduction amounted to 6.19 percentage points. Secondly, inflation volatility in the mentioned subsample reduced significantly. Thirdly, the CPI decreasing trend was also observed in the subsample (b) as well. That latter fact indicated the existence of the other efficient mechanisms to cope with inflation, which are directly not associated with targeting inflation. In several countries of the OECD (e. g., Turkey, Mexico, Chile, Colombia), Central Europe and Baltic states, inflation was higher than in most advanced economies. The quality of institutions and the specific features of the economic model are the main factors of those situations. Several statements on IT adoption in developing countries should be made as well. Firstly, countries with

permanent and high consumer inflation primarily adopted the inflation-targeting regime. The CPI standard deviation for the subsample (c) over the 1990–2019 period equaled 97.64%, while the respective indicator for the subsample (d) equaled 52.96%. Secondly, the examined monetary-policy strategy had a positive impact on consumption through the decrease in the CPI. In t+5 period compared with t–5 period in the subsample (c), consumer inflation sharply lowered: its reduction amounted to 26.80 percentage points.

Table 1. Consumer inflation in the OECD and developing countries, %

<i>Group of countries</i>	<i>t–5</i>	<i>t+5</i>	<i>2015–2019</i>	<i>1990–2019</i>
OECD _{IT}	9.93 (8.00)	3.74 (2.29)	2.23 (2.48)	7.14 (9.45)
OECD _{NIT}	7.04 (8.82)	2.61 (1.54)	1.00 (0.58)	10.01 (16.38)
OECD	8.61 (15.44)	3.22 (4.68)	1.66 (3.90)	8.46 (12.98)
DEV _{IT}	33.28 (100.17)	6.48 (3.16)	4.97 (4.55)	65.37 (97.64)
DEV _{NIT}	6.79 (5.17)	8.33 (5.10)	5.33 (5.12)	36.13 (52.96)
Developing economies	19.33 (69.31)	7.45 (4.33)	5.16 (4.80)	49.95 (77.72)

Notes: The numbers in parentheses are standard deviations.

Source: authors own calculation based on the World Bank data [<https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG>]

After full-fledged IT adoption, inflation volatility in the subsample (c) decreased steeply too. Finally, we observed the onward inflation trend in the subsample (d) in the 2000s. At the same time, the current inflation rate (2015–2019 years) in the subsample (d) meets the criteria for the "IT-targeters." Additional comparative analysis of the CPI in the subsamples (c) and (d) throughout the Great Recession highlighted the fact that the monetary authorities that adopted full-fledged inflation-targeting practice demonstrated their efficiency, resulted in significant disinflation. Simultaneously, inflation in the subsample (d) rose under conditions of the inflationary spikes. That fact proves the efficiency of IT as an element of anti-crisis measures. Maintaining price stability is the overriding monetary policy goal, but the central bank could substitute the target of inflation in some cases to foster economic growth. We draw attention to the different methods and instruments of inflation control; in many advanced economies, inflation remains remarkably stable without using flexible inflation targeting. Besides, only simple targeting inflation is almost useless without systematic transformations in the fiscal-monetary framework and governance. The ability of IT to deliver low inflation persistence as a policy result depends on the economic environment and institutional basis. For instance, Argentina, Ghana, Kazakhstan, and Brazil officially adopted the mentioned monetary practice, but their actual situations were insufficient due to the plurality of factors. To maintain price stability, the government needs to eliminate fiscal dominance and to conduct a balanced fiscal policy. The central bank should gain a high degree of independence. The monetary framework could be improved with increased transparency and institutional capacity. An essential advantage of IT is to provide information by the monetary regulator to the public and financial markets regularly. Markets are better operating if they are well-informed about the central bank's decision-making process to cope with inflation and output.

The inflation targets as a nominal anchor considerably differ regarding the type of the economy. During the 2015–2019 period, for the OECD member-states, the average inflation targets equaled 2.00%; for developing countries – 5.00% ± 2.00 percentage points. The above findings were generally dependent on the degree of economic openness, the level of the financial environment, the technological paradigm, the quality of fiscal and monetary policy coordination, and the institutional framework. The central bank, applying the coherent tools, can carry out the expansionary monetary policy. At the same time, the

government is responsible for the fiscal policy's development focused on fostering economic growth. Budget expenditures have a substantially different influence on the dynamics of the real GDP growth rates due to the division of public expenditures into productive and unproductive, the respective fiscal institutions' quality, and the GDP through the budget system's redistribution level as well. Fiscal policy, directly and indirectly, affects macroeconomic dynamics. The cumulative effect of the appropriate monetary and fiscal policy measures' implementation could be reflected in the system 1:

$$\begin{cases} GDP = GDP' + \alpha i + \beta (CPI - CPI^{exp}) \\ CPI = m + xi + \gamma \end{cases} \quad (1),$$

where:

- GDP' – real GDP, disregarding the fiscal policy incentives' impact;
- i – the expansionary fiscal policy's measures;
- CPI^{exp} – the expected consumer price index;
- β – the supply effect in case of an unexpected increase in the price level;
- m – the monetary instruments' impact on the CPI;
- xi – the fiscal expansion instruments' impact on the CPI;
- γ – the other factors' impact on the CPI.

The actual CPI level equals to the comprehensive factors' impact, including the monetary ones (directly controlled by the central bank) – even if fiscal stimuli were not implemented – as well as fiscal and other non-monetary factors. We analyzed the correlation between the real annual GDP per capita growth rate and consumer inflation in 75 countries from 1990 to 2019 (Figure 1). Despite hyperinflation at the end of the 1980s and early 1990s, such post-Soviet countries as Armenia, Azerbaijan, Belarus, Kazakhstan, Baltic states, and Moldova and Central Europe (Poland, Hungary, Slovakia, Romania, and the Czech Republic) demonstrated good macroeconomic performance. Nonetheless, Brazil and the Russian Federation showed a low average economic growth rate (roughly 1% per year) in the long-run, and only Ukraine had a negative indicator of economic growth for three decades.

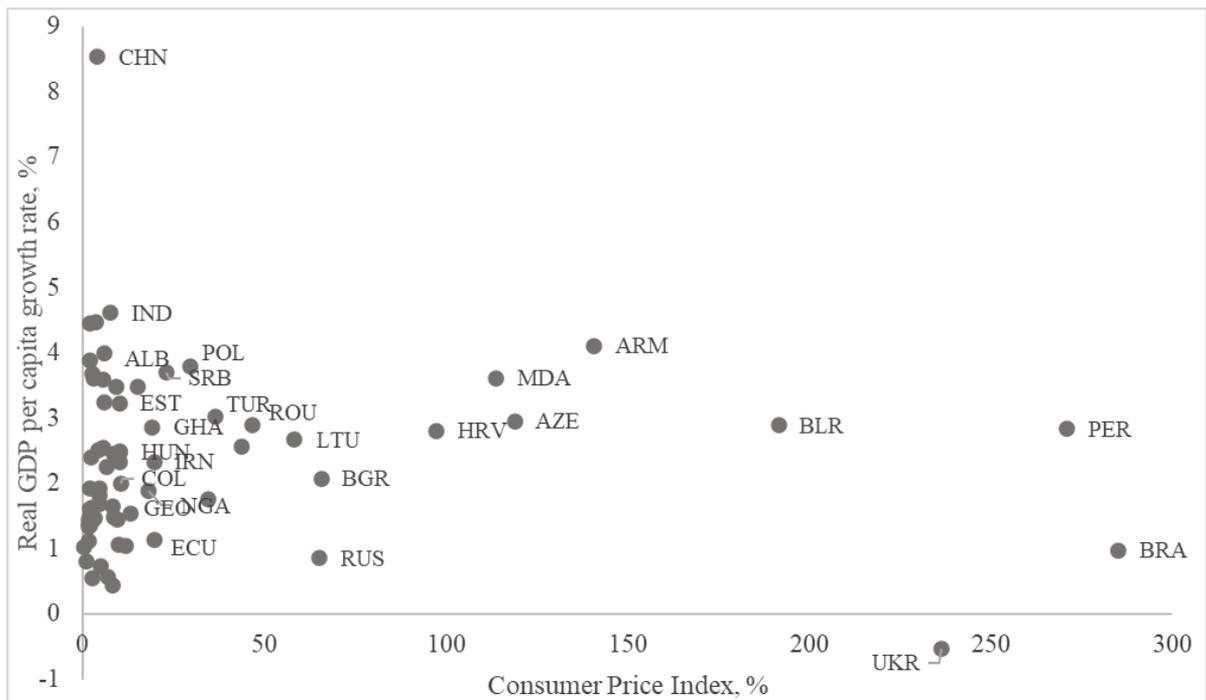


Figure 1. Real GDP per capita growth rate and consumer inflation in 75 selected countries over the 1990–2019 period, %

Source: authors calculation based on the World Bank data

Empirical research revealed that the inflation level has no significant influence on economic growth in the long-run. Still, in a short-term period, high consumer inflation is associated with lower economic growth or recession. During the analyzed period increase in CPI by one percentage point caused a tiny reduction in real GDP per capita growth by 0.006 percentage point. Nevertheless, the approximation ratio (R^2) was extremely low, which highlight the statistically insignificant interconnection between the analyzed indicators. A further stage of our investigation required a comparative analysis of the GDP per capita growth rates for a continuous five-year pre-inflation targeting period and post-inflation targeting period. The results of the survey (Table 2) appeared to be somewhat unexpected.

Table 2. Real GDP per capita growth in the OECD and developing countries, %

<i>Group of countries</i>	<i>t-5</i>	<i>t+5</i>	<i>2015-2019</i>	<i>1990-2019</i>
OECD _{IT}	2.27 (1.72)	2.07 (1.45)	1.84 (1.15)	1.95 (0.82)
OECD _{NIT}	2.66 (2.37)	3.25 (2.32)	2.44 (2.00)	1.94 (1.18)
OECD	2.45 (2.03)	2.61 (1.91)	2.12 (1.60)	1.95 (0.99)
DEV _{IT}	3.62 (3.54)	3.45 (1.69)	2.67 (2.03)	2.39 (1.39)
DEV _{NIT}	5.11 (3.70)	3.74 (2.06)	2.48 (2.18)	2.75 (1.65)
Developing economies	4.41 (3.66)	3.60 (2.10)	2.56 (2.08)	2.58 (1.53)

Notes: The numbers in parentheses are standard deviations.

Source: authors own calculation based on the World Bank data [<https://data.worldbank.org/indicator/NY.GDP.PCAP.KD.ZG>]

For the members of the OECD, which adopted IT, we identified a slight decrease in the GDP per capita growth rate in the post-inflation targeting period. In a five-year pre-inflation targeting period, that indicator equaled 2.27%, while after the implementation of the explored monetary-policy practice, it equaled 2.07%. The volatility of real output after IT adoption declined simultaneously. For the subsample (b), the GDP per capita growth rate was characterized by the onward trend, while the indicators' volatility was almost constant. For the 1990–2019 period, the first and second subsample of the OECD – "IT-targeters" and "non-IT-targeters" had an identical level of annual economic growth; their rates of real output per capita equaled 1.95% and 1.94%, respectively. Meanwhile, regarding the subsamples (a) and (b), the numerical study demonstrated a low density of the interconnection between the adoption of inflation targeting and economic growth.

The impact of IT on real GDP per capita growth for developing countries both "IT-targeters" and "non-IT-targeters" is quite similar and obscure. First, for subsample (c), the adoption of the investigated monetary practice caused a slight decline in the annual economic growth rate. Thus, empirical data for the subsamples (a) and (c) rejected the presence of the positive relation between IT and economic growth. Second, the implementation of a monetary-policy strategy substantially lowered the volatility of real output growth. Third, for the subsample (d), the GDP per capita growth rate over the 1990–2019 period exceeded the indicator for the subsample (c) by 0.36 percentage points. But that relationship was not quite robust, according to the empirical data.

Based on the results of the research, we could see a positive influence of the IT regime on decreasing volatility of real GDP growth. The observed situation occurred in the subsamples (a) and (c). So, if the index's volatility is fallen, economic agents could prepare a better adequate financial forecast and plan. Generally, the monetary-policy practice helps those agents in their decision-making and induces confidence towards the forthcoming macroeconomic performance. Also, IT enormously alleviates the inflation expectations and supports confidence in sound monetary policy and the national currency. That fact is

immensely crucial for developing economies, regarding their critical degree of dollarization and a significant share of cash in M3 and GDP.

The experience of the emergent market economy proves that the aims of economic development and price stability are not reachable synchronous. High and volatile inflation has declined the long-run investment incentives and enhanced credit activity. The above facts do not contribute to economic growth. Taking the developing countries' peculiarities into account, the central bank's constant nonsuccess in the CPI targets forms an institutional barrier for the full-fledged IT adoption. As a result, the agents' confidence in the monetary authority's policy slips down, while the central bank is unable to conduct a valid regulation. Plenty of attempts to adopt the IT elements in Ukraine, Ghana, and Argentina as well have not demonstrated a suitable effect. Both underlying and applied investigations reported that inflation is related to monetary and non-monetary factors. The latter include the public deficit, fiscal shocks, and calibration of the basic social guarantees. Additionally, non-monetary factors include the sudden national currency devaluation, evident regulation practices concerning natural monopolies, unfavorable price fluctuations in the commodities markets, and political instability.

It is vital to present some facts of IT adoption in Ukraine (Table 3). First, the Ukrainian flexible IT has started immediately after a remarkable economic and financial crisis. Before the recession of 2014–2015 existed a fixed-exchange-rate regime. Despite that situation, the government has a strong willingness to perform system economic reforms. Legislative power increased the independence of the central bank to climb the credibility of the new monetary-policy strategy. In 2016 exchange rate stabilized, and this helped the monetary regulator to reduce consumer inflation and reach the inflation target set for that year. Then, in 2017, Ukraine was hit by a significant inflation spike because of a sharp grow up in tariffs for gas, heat, and electricity that made the 8.0%± 2.00 percentage point inflation target unfeasible. Besides, fiscal policy affected consumer inflation by doubled minimum wage and increased the wage in the government sector. Altogether the result of these two factors was a 1.3 percentage point boost in CPI in 2017 compared with 2016. Conducting an adequate regulation of key policy rate and balanced fiscal policy without any crucial spikes in expenditures, consumer inflation in Ukraine have demonstrated a downward trend since 2017. The inflation rate reached one-digit levels at the end of 2018, the firstly in five consecutive years. Overall, IT performed well in 2016–2019. However, one of the disadvantages of IT in the early adoption stage is the rising of the real interest rate. That fact could restrict credit activity in the country and adverse to the real output growth rate. But the main objective of monetary policy is to reach price stability.

Table 3. CPI, exchange rates, real GDP per capita growth and interest rates in Ukraine, %

	2011	2012	2013	2014	2015	2016	2017	2018	2019
<i>CPI:</i>									
End of the year	4.6	-0.2	0.5	24.9	43.3	12.4	13.7	9.8	4.1
Average of the year	8.0	0.6	-0.3	12.1	48.7	13.9	14.4	10.9	7.9
<i>Quantitative inflation target</i>									
Target	NA	NA	NA	NA	NA	12.0	8.0	6.0	5.0
Ceiling	NA	NA	NA	NA	NA	15.0	10.0	8.0	6.0
Floor	NA	NA	NA	NA	NA	9.0	6.0	4.0	4.0
<i>Nominal exchange-rate variation</i>									
End of the year	0.5	0.0	0.0	95.3	49.9	12.0	5.0	1.0	-15.0
Average of the year	0.4	0.3	0.0	48.7	83.8	16.7	4.1	2.3	-5.0
GDP growth rate	5.5	0.2	0.0	-6.6	-9.8	2.4	2.5	3.4	3.2
Key policy rate	7.8	7.6	7.0	10.4	25.5	17.9	13.2	17.0	16.3
Real interest rate	1.3	8.0	8.3	1.5	-20.4	5.1	0.7	8.0	15.6

Notes: The exchange-rate variation refers to the hryvnia/US dollar exchange rate. The real interest rate was obtained by deflating the nominal interest rate "overnight" by the CPI. NA – Not Applicable

Source: National Bank of Ukraine [<https://bank.gov.ua/en/>] and author's calculation

The economy's openness and the commodities' domination in the structure of export should be named amid the toughest threats for price stability preservation. On occasions, negative price shocks in the global commodities markets lead to a decline in the export value radically. The above situation evokes the currency shortage in the inter-bank market, resulting in the national currency devaluation. The attainable central bank's attempts to offset the foreign currency deficit, to facilitate market turmoil, and to peg the exchange rate perpetually throughout the regular interventions have limited effect in terms of recession, principally driven by the exogenous factors. A fixed exchange rate contradicts the chance of fully-fledged IT adoption (Svensson, 2010). The key interest rate manipulations and currency interventions (targeted to prevent the sharp fluctuations in the exchange rate) are the most effective central bank measures, familiar to the bulk of developed and emerging economies. A free-floating exchange rate institutional framework in the commodity economies forms the vital precondition for the successful monetary-regime implementation. The commodities economies' volatility could cause devaluation, but it would be smooth and seasonal. Thus, it is reasonable to set slightly exaggerated quantitative inflation targets in export-commodity-dependent economies than in the developed ones. A certain expansion in the interest rates upgrades the attractiveness of the assets, nominated in the national currency, and cuts the speculative players' aspirations to debilitate it. It is advantageous to focus the financial institutions on the gradual economic diversification and the incentives' creation for the investments' inflow.

The full-fledged IT requests the transparency principle's incorporation into the model of policy-making. Powerful communication channels between the central monetary institution and the financial markets are the key prerequisite to effective monetary regulation. In the context of the price stability achievement, the central bank's systematic verbal interventions on the performed and potentially suitable policy measures are required and advantageous. While preparing the medium-term macroeconomic forecasts and plans, the central monetary institution should correctly reflect the retrospective cumulative factors' effect on the inflation dynamics and sketch the directions of its more distant activity. The range of riskiness in the economic agents' planning and decision-making could be straitening under the following conditions: a) the quantitative inflation target should be based on the complete and prudent information provision to the markets; b) the above target should be adjusted; c) the targeting tools should be suitable; d) the mismatches between the actual CPI values and the projected ones, considering those deviations' inherent reasons, should be explained promptly by the central bank.

4. DISCUSSIONS

The study demonstrated that it is no significant link between the real GDP per capita growth rate and IT adoption. Similar results were obtained by (Mishkin, 2004; Reynard, 2007). At the same time, for advanced and developing "IT-targeters," we found out the reduction in economic growth volatility. The interrelation between real output growth and its volatility has been into the focus on many kinds of research (Svensson, 2010; Koziuk, 2018). We suppose that significant transformations of the institutional framework for monetary policy formulating played a vital role in anchoring inflation expectations and maintaining low and stable CPI. A simultaneous decline in consumer inflation and its volatility formed the fundamental prerequisites to ensure financial stability, fostered domestic demand, and attracted foreign investment. The ability of IT to deliver low inflation persistence as a policy result depends on the economic environment and institutional basis. For instance, Argentina, Ghana, Kazakhstan, and Brazil officially adopted the mentioned monetary practice, but their actual situations were insufficient due to the plurality of factors. To maintain price stability, the government needs to eliminate fiscal dominance and conducts a balanced fiscal policy. The central bank should gain a high degree of independence. The monetary framework could be improved with increased transparency and institutional capacity. An essential advantage of IT is to provide information by the monetary regulator to the public and financial markets regularly. Markets are better operating if they are well-informed about the central bank's decision-making process to cope with inflation and output.

CONCLUSIONS

For OECD countries, IT had a positive impact on price stability persistence. Consumer inflation sharply declined in a five-year post-inflation targeting period: its reduction amounted to 6.19 percentage points compared with a five-year pre-inflation targeting period. Inflation volatility in the mentioned subsample reduced significantly. The CPI decreasing trend was also observed in the "non-IT-targeters" subsample of the OECD-members as well. The different methods and instruments of inflation control exist; in many advanced and emerging-market economies, inflation remains remarkably stable without using flexible inflation targeting. Besides, only simple targeting inflation is almost useless without systematic transformations in the fiscal-monetary framework and governance. Developing countries with permanent and high consumer inflation primarily adopted the inflation-targeting regime. The examined monetary-policy strategy had a positive impact on consumer inflation for that subsample: its reduction amounted to 26.80 percentage points.

Empirical research revealed that the inflation level has no significant influence on economic growth in the long-run. Still, in a short-term period, high consumer inflation is associated with lower economic growth or recession. For selected 75 countries from 1980 to 2019 increase in CPI by one percentage point caused a tiny reduction in real GDP per capita growth by 0.006 percentage point. Nevertheless, the approximation ratio was extremely low, which highlight the statistically insignificant interconnection between the analyzed indicators.

For the members of the OECD, which adopted IT, we identified a slight decrease in the GDP per capita growth rate in the post-inflation targeting period. The volatility of real output after IT adoption declined simultaneously. For the other OECD countries, the GDP per capita growth rate was characterized by the onward trend, while the indicators' volatility was almost constant. The influence of IT on real GDP per capita growth for developing countries both "IT-targeters" and "non-IT-targeters" is quite similar and obscure. The adoption of the investigated monetary practice caused a slight decline in the annual economic growth rate. However, a monetary-policy strategy substantially lowered the volatility of real output growth.

Ukrainian flexible IT have started immediately after a remarkable economic and financial crisis. Enhanced independence and credibility of the central bank with a balanced fiscal policy helped to reduce consumer inflation. Overall, IT performed well in 2016–2019. However, one of the disadvantages of IT in the early adoption stage is the rising of the real interest rate. That fact could restrict credit activity in the country and adverse to the real output growth rate.

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SUPPLEMENTARY MATERIALS

Appendix A. The sample of 38 selected developing countries

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

Source: the authors' compilation