PANOECONOMICUS, 2019, Vol. 66, Issue 1, pp. 1-23
Received: 06 February 2019.

UDC 336.748.12(81)
https://doi.org/10.2298/PAN1901001A
Original scientific paper

Eliane Araújo
State University of Maringá, Brazil
elianedearaujo@gmail.com

Philip Arestis
Corresponding author
University of Cambridge, UK
pa267@cam.ac.uk

Paper by invitation

Acknowledgment: Eliane Araújo acknowledges the financial support given by Brazilian National Research Council (CNPQ).

Lessons from the 20 Years of the Brazilian Inflation Targeting Regime

Summary: This paper analyzes the Brazilian experience with the inflation targeting regime (ITR) since its adoption in June 1999. The theoretical analysis starts by covering the New Consensus Macroeconomics (NCM) only policy, in which the ITR is the monetary policy recommendation. This discussion is then complemented first by the current debate in the international mainstream on the need for a flexible ITR that considers the effects of monetary policy on the economy and second by the heterodox discussion on the need to completely abandon the ITR. The discussion on the Brazilian experience and its comparison with international experiences show that Brazil is one of the few countries where the monetary policy objective is restricted to price control and where the horizon for returning inflation to the target is only one year. Within this institutional framework, the Brazilian economy under the ITR is marked by the maintenance of extremely high real and nominal interest rates and with difficulties in meeting the inflation targets. The price control obtained also did not generate the expected externalities in terms of economic growth and employment. After almost 20 years of adopting the ITR in Brazil, it has generated exaggerated contractionary pressures on the Brazilian economy, indicating the need for a thorough examination of monetary institutions in Brazil in order to resume economic growth with price stability and social equity.

Key words: Inflation targeting, Brazilian experience, Contractionary effects, Price stability, Social equity.

JEL: E06, E12, E42.

Despite the stabilization of prices, achieved in Brazil with the Real Plan in 1994 and maintained through the inflation targeting regime (ITR) adopted in 1999, inflation has not been dropped in terms of the priority in Brazilian economic policies. Inflation, or the constant threat of its return to past levels, justifies a large part of the Brazilian government's macroeconomic policy, even to the detriment of other variables such as a production and employment. In view of this, this paper evaluates the almost twenty years of the ITR in Brazil using a theoretical discussion of international experiences with the ITR and an empirical analysis of the Brazilian case.

In theoretical terms, this paper will emphasize that the ITR is the economic policy recommendation of the New Consensus Macroeconomics (NCM), which assumes that price stability is the main objective of monetary policy and that inflation is always a demand phenomenon. Within such a theoretical framework, monetary policy

becomes the foundation of macroeconomic policy, having price stability as its only goal and the interest rate of monetary policy its only instrument.

However, recent international literature, especially after the 2008 crisis, has critically discussed many of the ITR hypotheses. Authors such as Olivier Blanchard, Giovanni Dell'Ariccia, and Paolo Mauro (2010, 2013) and Janet L. Yellen (2014) point out the need for flexibility in the ITR, contemplating other targets and other instruments. In addition, authors such as Blanchard (2017), Blanchard and Lawrence Summers (2017), Robert Solow (2018), and Paul Romer (Forthcoming) argue that the effects of monetary policy on the economy are real and go far beyond just maintaining price stability, breaking in some ways from the key economic policy recommendations of the NCM. Some other authors like Philip Arestis and Malcolm Sawyer (2011) go even further, seeking a theoretical paradigm and a set of economic policies that can lead economies to an economic performance superior to that achieved through the NCM.

In light of the discussion on the NCM assumptions and the international mainstream's position, in that perhaps those assumptions are not a good approximation of reality, this paper begins with a summary of the institutionality of the ITR in the 27 countries that follow this regime. The objective is not only to compare the main institutional aspects of the ITR, but also to highlight the Brazilian case. What is striking is that Brazil is one of the few countries where the only goal of monetary policy is price stability and where the horizon for returning inflation to the target is only one year.

In order to evaluate the Brazilian ITR performance in terms of its effects on the economy, this paper presents an empirical exercise under the hypothesis that there is a low sensitivity of inflation to the interest rate in Brazil, resulting from weak transmission mechanisms of monetary policy. This would explain why maintaining price stability requires setting real and nominal interest rates at such high levels.

These points are discussed in the next sections, which are arranged as follows. Section 1 summarizes the NCM model and its main economic policy implications. Section 2 presents important questions on the international monetary policy debate. Section 3 synthesizes the institutionality of the ITR in the 27 countries that adopted this as their monetary policy regime. Section 4 covers the Brazilian experience with the ITR and provides an econometric model to discuss the effectiveness of Brazilian monetary policy by analyzing the effectiveness of the monetary policy transmission mechanism. The paper then concludes with a discussion of some lessons of the experience with the ITR in Brazil in light of the recent theoretical discussions on the topic.

1. New Consensus Macroeconomics Model and Its Policy Implications

The adoption of the ITR is based on the NCM theoretical framework. For the purpose of this paper, we follow the NCM version for open economies, as presented in Arestis (2007) and Arestis and Ana Rosa González-Martínez (2015)[1]. This is because working in the context of open economies allows a more realistic analysis of the relationship

[1] The NCM is presented in the context of closed economies in Bennett T. McCallum (2001) and Laurence H. Meyer (2001).

between the interest rate, the exchange rate and inflation. It also highlights the transmission of monetary policy *via* the exchange rate channel.

Arestis (2007) uses a six-equation model to synthesize the NCM and give its economic policy implications:

$$Y^g{}_t = a_0 + a_1 Y^g{}_{t-1} + a_2 E_t (Y^g{}_{t+1}) + a_3 [R_t - E_t (p_{t+1})] + a_4 (rer)_t + s_1, \quad (1)$$

$$p_t = b_1 Y^g{}_t + b_2 p_{t-1} + b_3 E_t (p_{t+1}) + b_4 [E_t (p_{wt+1}) - E_t \Delta (er)_t] + s_2, \quad (2)$$

$$R_t = (1 - c_3) [RR^* + E_t (p_{t+1}) + c_1 Y^g{}_{t-1} + c_2 (p_{t-1} - p^T)] + c_3 R_{t-1} + s_3, \quad (3)$$

$$(rer)_t = d_0 + d_1 [[(R_t - E_t (p_{t+1})] - [(R_{wt}) - E(p_{wt+1})]] + d_2 (CA)_t + d_3 E(rer)_{t+1} + s_4, \quad (4)$$

$$(CA)_t = e_0 + e_1 (rer)_t + e_2 Y^g{}_t + e_3 Y^g{}_{wt} + s_5, \quad (5)$$

$$(er)_t = (rer)_t + P_{wt} - P_t, \quad (6)$$

where: a_0 is a constant, Y^g is the domestic output gap (the difference between actual output and potential output), $Y^g{}_w$ is the world output gap, R is the nominal interest rate, R_w is the world nominal interest rate, p is the domestic inflation rate, p_w is the world inflation rate, and p^T is the target inflation rate. RR^* is the "equilibrium" real rate of interest, that is, the rate of interest consistent with zero output gap, which implies from Equation (2) a constant rate of inflation; *(rer)* stands for the real exchange rate; and *(er)* for the nominal exchange rate, defined in Equation (6) and expressed as foreign currency units per domestic currency unit. P_w and P (both in logarithms) are world and domestic price levels respectively, CA is the current account of the balance of payments, s_i (with i = 1, 2, 3, 4, 5) represents stochastic shocks, and E_t refers to expectations held at time t. The change in the nominal exchange rate, as it appears in Equation (2), can be derived from Equation (6) with $\Delta er = \Delta rer + p_{wt} - p_t$.

In this six-equation system, Equation (1) is the aggregate demand equation, in which the output gap is determined by the past and expected output gap, the real interest rate and the real exchange rate (through the effects of demand on exports and imports). Equation (2) is a Phillips curve, in which inflation is determined by the current output gap, by past and future inflation and by expected changes in the nominal exchange rate and in expected world prices. Equation (3) is a monetary policy rule, according to which the nominal interest rate is related to expected inflation, the output gap, the inflation deviation from the target, and the equilibrium real interest rate. Equation (4) determines the exchange rate as a function of the real interest rate differentials, the current account position and the expectations of future exchange rates (through domestic factors such as risk premiums, domestic public debt, degree of credibility of the inflation target, etc). Equation (5) determines the current account position as a function of the real exchange rate and the domestic and world output gap. Finally, Equation (6) expresses the nominal exchange rate in terms of the real exchange rate.

The NCM, based on the assumption that price stability is the main objective of monetary policy and that inflation is always a demand phenomenon, has important implications for economic policy. The first is that inflation must be controlled through monetary policy, whose instrument is the interest rate, which is controlled by the

central bank. The central bank, in turn, must be independent and its decisions and actions must not be affected by politicians or the National Treasury.

In view of these assumptions, monetary policy is implemented through the ITR in the form of interest rate policy, whose objective should be to maintain price stability. Fiscal policy should only be concerned with finding a balance between government spending and taxation, effectively reducing its importance as an active instrument of economic policy. In addition, price stability is assumed to lead to macroeconomic and financial stability.

According to Arestis and González-Martínez (2015), another important assumption of the NCM model is the existence of short-term nominal rigidity, which manifests itself in wage, price and information rigidity. It follows from this assumption that the central bank, by manipulating the nominal interest rate, is capable of influencing the real interest rate and, therefore, real spending in the short-run. However, in the long-run, the only effects of monetary policy are nominal, affecting the inflation rate.

The aforementioned authors also highlight the role of expected inflation, incorporated in Equation (3). According to them, the model posits that the inflation target and the forecasts of the central bank provide an important direction for the perception of expected inflation. Given the lags in the transmission mechanism of the interest rate for inflation and the imperfect control of inflation, inflation forecasts become the intermediate target of monetary policy, in such a framework where the ultimate target is the current inflation rate (Lars E. O. Svensson 1997, 1999). The target and forecasts also add an element of transparency, seen as a primary ingredient in inflation targeting regimes. However, Arestis (2007) notes that this can become a problematic issue, considering the large margins of error in inflation forecasting, which can easily damage the reputation and credibility of central banks. This poses a major challenge for countries that adopt the ITR.

Arestis (2007) further questions the ability of the central bank to control inflation, noting that factors such as oil prices, exchange rate fluctuations, wages and taxes can have a significant impact on inflation, factors to which the central bank has no control. The author also notes that in as much as the source of inflation is from any of those factors, the ITR would have no impact at all. He also points out that, in a context of negative supply shocks, which are associated with rising inflation and falling output, a central bank that adopts the ITR would have to take action to contain inflation, even if it meant deepening the economic recession. Arestis (2007) concludes that even when a central bank has as its monetary policy objective output growth and price stability (dual mandate), it would tend to act in a similar way simply because central banks are evaluated on the basis of their ability to meet inflation targets, not economic growth targets.

The NCM assumptions, therefore, are based on the hypotheses that inflation is a demand phenomenon, that the conduct of monetary policy should be done through rules, in the absence of a financial sector, and that money is a residual. However, these economic policy implications may prove problematic with respect to the role and behavior of the central bank, the view on the effects of monetary policy on the economy, and the origins of the inflationary process.

The theoretical discussion that follows thus intends to show that despite the dominance of the NCM in terms of its economic policy prescription, mainly for monetary policy, the ongoing international debate. This draws particular attention to the experience of the management of macroeconomic policy after the 2008 financial crisis, which raises questions of great importance to the current debate on monetary policy. The subsequent section will also discuss a theoretical paradigm beyond the NCM framework and a set of economic policies that can lead economies to an economic performance superior to that achieved with the adoption of the NCM, as proposed by some authors.

2. Rethinking Monetary Policy: The Current International Debate

This section discusses some criticisms by mainstream authors of the monetary policy of the ITR as well as providing theoretical suggestions from authors who propose economic policy recommendations quite different from those suggested by the ITR.

In this context, Blanchard, Dell'Ariccia, and Mauro (2010) highlight how some policies that were consensual before the 2008 crisis began to be questioned after it. Initially, there was a consensus that monetary policy should have a single target – low inflation – and that the interest rate be the only instrument of monetary policy to meet it. Another consensus was that if inflation were stable, the output gap (the difference between actual output and potential output) would probably be small and stable, so that monetary policy would do its job. It was also commonly understood that fiscal policy played a secondary role, having political constraints that greatly limited its usefulness. Lastly, the discussion in terms of financial regulation was, for the most part, outside the sphere of macroeconomic policy; it was actually completely ignored.

Regarding just the objective of monetary policy, the subject of this research, Blanchard, Dell'Ariccia, and Mauro (2010) emphasize that, prior to the 2008 crisis, low and stable inflation was presented as the central bank's sole mandate. The authors explain that, in the benchmark version of the NCM, constant inflation is the optimal monetary policy since it implies an output gap equal to zero. This divine coincidence, as it has been called, meant that by keeping inflation stable, monetary policy would bring economic activity as close to its potential as possible; so that if policymakers were concerned about economic activity, the best they could do was to keep inflation stable.

However, the authors point out that in the practice of conducting monetary policy, few central banks had stable inflation as their only target. Most of them pursued "flexible inflation targets", that is, the return of inflation to a stable target in some non-intermediate time horizon. Many central banks also watched passively for changes in their inflation caused by external shocks, such as those arising from a rise in the price of oil. They also paid attention to asset prices (housing prices, stock prices, exchange rates, etc.) and showed concern for external sustainability and the risks associated with the effects of the balance sheet.

Concerning monetary policy instruments, Blanchard, Dell'Ariccia, and Mauro (2010) point out that the monetary policy adopted prior to the 2008 crisis had focused on the use of a single instrument, the policy interest rate. Behind this choice, the authors explain that there was the assumption that the real effects of monetary policy

occurred through interest rates and asset prices, and that all interest rates and asset prices were linked by arbitrage. Under these two assumptions, little attention was given to the rest of the financial system from a macroeconomic point of view.

Therefore, the discussion that emerges from Blanchard, Dell'Ariccia, and Mauro (2010) is that central banks would have to move from a broadly based approach on one target and one instrument (inflation rate and interest rate, respectively) to an approach with more targets and more instruments.

In Blanchard, Dell'Ariccia, and Mauro (2013), the choice of the set of targets and instruments were still a controversial issue in the search to rethink macroeconomic policies after the 2008 crisis. This is because, according to the authors, the general outlines of the NCM on macroeconomic policy were uncertain.

The authors focus on the relationship between inflation and output, which has direct implications for monetary policy. Like in Blanchard, Dell'Ariccia, and Mauro (2010), they emphasize that one of the arguments for central banks to focus on inflation was the divine coincidence. For the authors, although no central bank believed that the divine coincidence would hold up in practice, they considered it a good enough approximation to justify the primary focus on inflation and the adoption of inflation targeting regimes.

Since the 2008 crisis, however, Blanchard, Dell'Ariccia, and Mauro (2013) argue, the relationship between inflation and output in the advanced economies has been substantially different from that observed before the crisis. Given the sharp fall in output and employment, most economists also expected a significant fall in inflation, even deflation. However, in most advanced economies, inflation remained close to the range observed before the crisis.

In view of this evidence, Blanchard, Dell'Ariccia, and Mauro (2013) offer two interpretations of what occurred: either the potential output fell almost as much as the real output, making the output gap small and thus putting little pressure on inflation; or the output gap remained substantial, but the relationship between inflation and the output gap changed significantly. The authors conclude their analysis by pointing out that if the relationship between output and inflation is weak, the divine coincidence becomes an extremely poor approximation of reality. In this case, central banks should use explicit targets on economic activity, unlike what they had been doing in the pre-crisis time.

In this same perspective, Yellen (2014) argues that although many central banks around the world adopt the ITR with the objective of controlling inflation and with the short-term interest rate as their only instrument, the results of the 2008 financial crisis have implied profound changes and transformed the way central banks consider this issue. The author focuses her analysis on the case of the United States, which despite not adopting explicit inflation targets, conducts its monetary policy following the main characteristics of the inflation targeting regime. This includes things such as a commitment to promote low and stable inflation over a long-time horizon, a predictable monetary policy, and clear and transparent communication on monetary policy. Following this experience, the author notes that the best choice for central banks operating under inflation targeting regimes is to replace the traditional ITR (only one target and one instrument) with more flexible inflation targeting regimes (with several targets and

many instruments). Also, flexible institutional rules, such as the extension of the time horizon to meet the inflation target, the use of the core measure of inflation, among others.

Yellen (2014) further states that central banks can use other unconventional measures in a context of a very low interest rate, measures which are key points in a flexible framework of inflation targeting regimes. These include, for example, clear communication on targets and how central banks intend to meet them. The author also highlights quantitative easing and future orientation, along with higher inflation targets than the standard ones for developed countries as suggestions for alternative measures.

With specific regard to the effects of monetary policy on the economy, Romer (Forthcoming) is quite emphatic in stating that a restrictive monetary policy can in fact cause a recession. In presenting data for the United States on the monetary base, inflation, output and employment, the author concludes that, in the disinflation episode of Paul Volcker (1979), high interest rates reduced aggregate demand and increased unemployment. Inflation, in turn, was reduced both by the combination of higher unemployment and a larger output gap, and by the changes in expectations created by the US Central Bank (FED). Considering these data, according to the author, it is absurd to assume that monetary policy has no real effects on the economy and it is even more absurd to use this as a hypothesis in economic models.

For the purpose of investigating the ability of monetary policy to affect output and employment, Blanchard (2017) analyzes the natural rate of unemployment hypothesis, expressed by Milton Friedman (1968), and composed of two sub-hypotheses. These are: (i) that the natural rate of unemployment is independent of monetary policy; and (ii) that there is no long-term trade-off between deviations in the unemployment rate from the natural rate and inflation. In macroeconomic terms, the author investigates the degree of persistence of the effects of monetary policy on potential output and the natural rate of unemployment. Regarding the microeconomic effects, the author seeks to identify which channels of transmission explain the persistence of monetary shocks.

Blanchard (2017) stresses the macroeconomic evidence, as suggestive in indicating persistent effects of monetary policy on the natural rate of unemployment and the potential output. Of the microeconomic channels that can potentially explain this high persistence, the most important for the author are employment and productivity. In the former, the lack of employment causes some workers to be less employable or to cease looking for work, which can increase unemployment or reduce the workforce. This implies persistent effects on potential output. With respect to productivity, contractionary monetary policy can have negative effects on capital accumulation, reducing labor productivity, and thus permanently affecting total factor productivity.

Blanchard (2017), therefore, concludes that the macroeconomic evidence is suggestive in terms of the persistent effects of monetary policy on the natural rate of unemployment and the potential output. However, with a hint of caution, the author points out that the evidence is not conclusive, so policymakers should maintain the hypothesis of the natural rate as their null hypothesis; while, at the same time, keeping an open mind when considering the weight of other alternatives.

In the same vein, Blanchard and Summers (2017) point to a clear acceptance of the need to use demand policies more aggressively to combat deep recessions. The authors state that, following the global financial crisis of 2008, NCM authors formed a growing consensus on the role of economic policies, especially monetary policy. According to the authors, there is a consensus regarding the use of "aggressive" monetary policy as a counter-cyclical measure in deep and long-lasting recessions characterized by persistent unemployment (*via* hysteresis) and lower productivity, which negatively affect the potential output of the economy.

Solow (2018) also joins this debate, discussing the ideas of Friedman (1968) on the uses and conduct of monetary policy, of which Solow said were intended to undermine American Keynesianism in the 1950s and 1960s. According to Solow's summary on what monetary policy cannot do, it stated that Friedman (1968) argued that the FED could fix the nominal rate of federal funds, but not the real interest rate. The basic reason for this was that the FED controls a nominal variable of the size of its own balance and can use that nominal variable to determine another nominal variable, but not a real variable.

To discuss whether or not the FED can control the real interest rate of the economy, Solow (2018) refers to Romer (Forthcoming) who shows evidence of how the FED deliberately managed to control the US interest rate over a significant period of time, and with considerable effects. Solow (2018) concludes that Friedman's project, which sought to demolish Keynesianism and the ability to adopt counter-cyclical monetary policy, seems to have failed in a pragmatic economy, although it succeeded in persuading so many economics professionals.

Another contribution of Friedman (1968) that was discussed by Solow (2018) was the natural rate of unemployment, along with the long-run vertical Phillips curve and its accelerationist implications. To address this point, the author mentions Blanchard (2016), who presents empirical evidence that there is still a Phillips curve, in the sense that inflation responds to unemployment.

Solow's (2018) conclusion is that all of this evidence is starkly different from the story told, with so much confidence and eloquence, by Friedman in 1968, which according to Solow certainly helped to bring macroeconomics to its present state of refined irrelevance. Solow (2018) is even more emphatic in pointing out that the important shortcomings he mentions may not be sufficient to reject the doctrine of Friedman and his various successors, but they are certainly sufficient to justify an intense skepticism of these hypotheses, especially among economists, for whom skepticism should always be the standard approach.

The discussion summarized above implies substantial changes in the way monetary policy is conducted, by highlighting, for example, the need to relax the ITR and to recover from the counter-cyclical role of monetary policy.

This critique of the ITR by the mainstream economic authors has been proposed since the international financial crisis of 2007/08. Heterodox authors, however, have been presenting a critical analysis to the theoretical foundations and empirical evidence on the ITR for many years.

The discussion in Section 2 showed some critical aspects of the NCM and the ITR based on Arestis (2007) and Arestis and González-Martínez (2015), but in Arestis

and Sawyer (2002a, b, 2004, and 2006) it is also possible to find many criticisms of the core propositions of the NCM. These are summarised by the authors in the following five topics: (a) the secondary role of fiscal policy; (b) the support of inflation targeting as a nominal anchor for stabilising the economy; (c) the acceptance of the classical neutrality of money; (d) the agreement that the Phillips curve is vertical in the long-run, which means that there is a Friedman's "non-accelerating inflation rate of unemployment" (NAIRU); and (e) the use of the policy interest rate as the main economic policy instrument for stabilising both the output gap and inflation.

Arestis and Sawyer (2002b) also show in an empirical exercise that, although several countries have adopted the ITR in an effort to reduce inflation, this tendency of falling inflation is not an exclusivity of countries that adopt this regime. This is because countries that adopt the ITR and those that do not have both registered lower inflation rates.

To address these issues, Arestis and Sawyer (2011) go beyond the theoretical framework of the NCM in the search for a theoretical paradigm and a set of economic policies that can lead the economy to an economic performance superior to that reached with the adoption of the NCM. Thus, the authors propose the analysis of a monetary production economy where financing and credit play a significant role; the economy is subject to instability, and inadequacy of aggregate demand and the level and distribution of productive capacity may often be inadequate to sustain full employment of labor.

This proposed theoretical framework implies a series of economic policies, including: (1) the use of fiscal policy in the short- and long-term to solve demand problems; (2) the interest rate policy being such that the real rate of interest is in line with the trend rate of growth in the economy; (3) the objective of the central bank being financial stability; (4) having the central bank control the exchange rate; (5) employing regional and industrial policies to create the necessary capacity; and (6) inflation only being a problem when it reaches high rates and can be controlled with income policies.

Although NCM monetary policy is based on very strong hypotheses and extremely restrictive economic policy recommendations, it is the theoretical basis that guides the ITR, and as will be seen in the next section, this regime has been explicitly adopted in 27 countries, with several others following its the main elements. Thus, what follows details the salient features of the ITR frameworks in place in all these 27 countries.

3. The Institutionality of the ITR and the Brazilian Case

Currently, 27 countries have adopted the inflation targeting regime: Armenia, Australia, Brazil, Canada, Chile, Colombia, the Czech Republic, Ghana, Guatemala, Hungary, Iceland, Indonesia, Israel, Mexico, New Zealand, Norway, Peru, the Philippines, Poland, Romania, Serbia, South Africa, South Korea, Sweden, Thailand, Turkey, and the United Kingdom. These countries are considered fully-fledged inflation targeting regimes, but many others adopt the ITR implicitly and follow its main elements, namely the United States and the European Union.

Following Gill Hammond (2012), the ensuing discussion will focus only on the 27 countries that have adopted the full ITR. This author presents a synthesis of the

structure of the ITR in these counties and with this it is possible to identify important institutional characteristics of the regime, particularly characteristics related to its objective, independence of the central bank, time horizon to meet targets and inflation measures.

Table A1 in the Appendix summarizes some aspects of the institutionality of monetary policy in the 27 countries that adopted the ITR. It shows considerable diversity in the legal mandates of the central banks. It is also possible to see that not all the central banks establish price stability as the main objective of monetary policy. Instead, some central banks consider other objectives such as economic growth, welfare, low unemployment, and financial stability.

Regarding the central bank's independence in terms of autonomy to define the monetary policy objective, Hammond (2012) notes that this becomes a second-order issue in inflation targeting regimes, as suggested by Kenneth S. Rogoff (1985)[2]. This is so since the monetary policy objective of price stability is generally established by law. However, it is worth mentioning that central banks in the countries that adopt the ITR have operational independence. In other words, as managers of monetary policy, the central banks are free to choose the instruments necessary to meet the inflation target previously established. In theoretical terms, this is suggested by Carl E. Walsh (1995), who discusses the independence of the central bank in terms of the independence of its economic policy instruments.

Regarding the inflation-target horizon, most countries adopt a medium-term horizon of between two and three years. These medium-term horizons give more flexibility to the inflation targeting regime because they anchor inflation expectations while at the same time allowing short-term divergences from the target. It should be stressed that an important aspect in choosing the time horizon to return inflation to the target is the extension of the monetary policy transmission mechanisms. That is to say, if the process by which monetary policy decisions are transmitted to the real output and inflation is slow, the central bank is not able to influence inflation in the short-run.

Another important feature of the ITR is the definition of a point target or a band. A point target, by implying a more rigid regime, can be more difficult to meet, but the established target in the form of bands gives greater flexibility to the regime, facilitating its achievement. Table A1 shows that, in general, countries opt for both, that is, a point target with upper and lower tolerance limits for inflation.

The definition of the price index, be it a full index or a measure of core inflation, is also an important issue of the ITR. All 27 countries that have adopted the ITR use the consumer price index as a measure of inflation, especially because of its monthly frequency. However, despite using the full index, many central banks also analyze core inflation measures as an indicator of inflationary pressure in the economy. Hammond (2012) points out that Australia, Canada, the Czech Republic, Ghana, Hungary, Norway, Poland, Sweden, and Turkey also publish forecasts of core inflation, not just global inflation. These measures of core inflation are characterized by the exclusion of components that are more sensitive to various types of shocks when calculating

[2] Rogoff (1985) proposes the construction of a central bank that has independence in both objectives and instruments; that is, the central bank is free to define the ultimate goals of monetary policy and which instruments will be used to meet them.

inflation. The use of core inflation is intended to reduce the volatility of the price index and thus avoid the excessive use of monetary policy in face of supply shocks.

Finally, in the majority of countries that have adopted the ITR (15 countries), the inflation target is established jointly between the government and the central bank. In nine of the countries, the central bank alone defines the target, and among those nine, only Sweden is considered a developed economy. In the remaining three countries (Norway, South Africa, and the United Kingdom), the government has the task of stipulating the inflation target.

With specific reference to Brazil, which will be evaluated in the next section, it is worth highlighting here the issues related to the objective of monetary policy and the inflation-target horizon. By looking at column two, which gives the legal mandate, Table A1 shows that Brazil is one of the few countries where the central bank has price stability as its only objective, leaving monetary policy underutilized with regard to achieving broader economic objectives. This is unlike many other countries, even the ones under the institutional framework of the ITR.

Furthermore, the third column of Table A1 shows that Brazil is one of the few countries that have a one-year inflation-target horizon. Therefore, when the economy suffers shocks, the Brazilian Central Bank (BCB) needs to respond quickly to the shocks to meet the inflation target in the established horizon.

This implies that price stability is the essence of monetary policy and that inflation must be combated, albeit to the detriment of other economic variables, such as increased production and employment. And given the short-horizon, this creates difficulties for the economy to accommodate the occurrence of supply shocks or for the transmission mechanisms of monetary policy to have the desired effects on the final targets.

To test the effectiveness of the ITR in Brazil in the period 1999-2018, in the next section we will implement two empirical procedures. First, we will analyze the performance of the Brazilian economy under the ITR, highlighting the behavior of the main macroeconomic indicators. Second, we will analyze the effects of monetary shocks on inflation, on the exchange rate, and on aggregate demand, as well as their interaction with the gross public debt and whether inflation dynamics in Brazil are predominantly a demand-pull or a cost-push phenomenon.

4. The Brazilian Experience with the ITR and Some Empirical Evidence on the Effectiveness of Monetary Policy

4.1 The Brazilian Experience with the ITR

Since 1999, Brazilian economic policy has been based on a tripod consisting of inflation targeting regimes, floating exchange rates, and fiscal surplus targets.

The ITR adopted in Brazil can be summarized as follows: (i) the inflation targets are represented by annual changes in the Broad Consumer Price Index (IPCA), calculated by the Brazilian Institute of Geography and Statistics (IBGE); (ii) these targets and respective tolerance intervals are set by the Brazilian National Monetary Council (CMN), upon proposals by the Minister of Finance; (iii) such targets and intervals are set for the next two years; (iv) the BCB is responsible for executing the policies

necessary to meet the set targets; (v) the inflation target is considered met when the cumulative inflation variation (measured by the adopted price index, for the period January to December for each calendar year) is within range of its respective tolerance interval; (vi) when the target is not met, the central bank president shall publicly disclose, by means of an open letter to the Minister, a detailed description of the causes of noncompliance, the measures to ensure the return of inflation to the established limits, and the time frame in which the measures would be expected to take effect; and (vii) the BCB shall disclose by the last day of each quarter a civilian inflation report**,** addressing the performance of the ITR, the results of past monetary policy decisions, and the prospective evaluation of inflation.

In this structure, inflation control is fundamentally achieved by fixing the short-term basic interest rate, the Selic rate, at a level compatible with the inflation target defined by the CMN. The Monetary Policy Committee (COPOM) is composed of the central bank's board of directors and meets periodically (every 45 days) to decide on the basic interest rates considered adequate to meet the inflation target.

Regarding the performance of the Brazilian economy after the adoption of the ITR, it can be observed that inflation remained at relatively high levels when compared to the average of the world economy' inflation. In order to discuss these issues, Table 1 shows the point targets, the tolerance intervals, and the inflation rates measured by the IPCA for 1999-2018. By examining Table 1, it is noticeable, on the one hand, that over this period the tolerance intervals were missed for the years 2001, 2002, 2003, and 2015 by a substantial margin, especially in 2002 and 2015, and in 2004 the inflation target was only met after it was raised by mid-2003. On the other hand, the inflation rates were above the point targets in ten years (1999, 2003, 2005, 2008, and 2010-2015).

Regarding economic growth, Table 1 shows that, under the ITR, despite the various institutional reforms that were introduced, the Brazilian economy slowed considerably, both in relation to its own historical trend and in comparison to other developing economies, having an average growth rate of 2.25% in the period 1999-2018.

Not only have growth rates been low and unstable, but other domestic macroeconomic indicators have deteriorated and/or entered a worrying trajectory, as can be seen in the case of Public Sector Net Debt.

While the causes of this performance are varied and complex, monetary institutions certainly play a central role in explaining this. This is because, after the adoption of the ITR in 1999, one of the most striking features of the Brazilian economy is the persistence of high nominal and real interest rates in comparison with most developed and developing countries. The average nominal interest rate for the period was 13.65%, against an average inflation rate of 6.50%.

In short, the indicators of the Brazilian economy under the ITR indicate that this regime was not able to bring the level of the real interest rate closer to that of other developing economies. It also failed to prevent the volatility of the real gross domestic product (GDP) growth rate and appears to have been ineffective at returning inflation to the set targets.

Table 1 Inflation Targets, Inflation Rates (IPCA), Selic, Debt and Growth Rates, %: 1999 to 2018

Year	Point targets	Tolerance intervals	Inflation rates (IPCA)	Annual interest rate (Selic)	Net public debt % of GDP	Annual growth rate
1999	8	6 to 10	8.94	19.0	45.5	0.3
2000	6	4 to 8	5.97	15.75	48.4	4.3
2001	4	2 to 6	7.67	19.0	51.5	1.3
2002	3.5	1.5 to 6.5	12.53	25.0	59.9	3.1
2003	4	1.5 to 6.5	9.3	16.5	54.3	1.3
2004	5.5	3.5 to 8	7.6	17.75	50.2	5.7
2005	4.5	2.5 to 7.5	5.69	18.0	47.9	3.1
2006	4.5	2.5 to 7.5	3.14	13.25	46.5	4.0
2007	4.5	2.5 to 6.5	4.46	11.25	44.6	6.0
2008	4.5	2.5 to 6.5	5.9	13.75	37.6	5.0
2009	4.5	2.5 to 6.5	4.31	8.75	40.9	-0.2
2010	4.5	2.5 to 6.5	5.91	10.75	38.0	7.6
2011	4.5	2.5 to 6.5	6.5	11.0	34.5	3.9
2012	4.5	2.5 to 6.5	5.84	7.25	32.2	1.8
2013	4.5	2.5 to 6.5	5.91	10.0	30.5	2.7
2014	4.5	2.5 to 6.5	6.41	11.75	32.6	0.1
2015	4.5	2.5 to 6.5	10.67	14.25	35.6	-3.8
2016	4.5	2.5 to 6.5	6.3	13.75	46.2	-3.6
2017	4.5	3.0 to 6.0	2.95	9.93	51.6	1.0
2018	4.5	3.0 to 6.0	4.05	6.5	53.8	1.4

Notes: The original inflation target for 2004 was 3.75%. Subsequently, the BCB changed the inflation target.

Source: Authors' own elaboration based on the BCB (2019)[3].

Even the authors who defend the inflation targeting regime in Brazil recognize that in the Brazilian economy there are factors that "make controlling inflation more difficult and generate costs for society, making inflation and interest rates, in general, higher and more volatile than necessary" (Tony Volpon 2016, p. 90). This issue is analyzed in the following subsection.

4.2 An Empirical Investigation on the Mechanisms of Monetary Transmission and the Effectiveness of the Inflation Targeting Regime in Brazil

The objective of this section is to present an empirical investigation on the mechanisms of monetary transmission and the effectiveness of the inflation targeting regime in Brazil. The timing and magnitude of these effects are evaluated using the impulse response functions of the Vector Autoregression (VAR) models[4].

One hypothesis that will be tested is whether there is low sensitivity of inflation to the interest rate in Brazil, resulting from weak transmission mechanisms of monetary policy. This would explain why the maintenance of price stability requires fixing real and nominal interest rates at relatively high levels.

In order to observe the Brazilian economy in the period in which the ITR entered into force, a set of data with monthly observations is analyzed, from June 1999 to

[3] **Brazilian Central Bank (BCB).** 2019. Sistema Gerenciador de Series Temporais (SGP). http://www3.bcb.gov.br/sgspub/localizarseries/localizarSeries.do?method=prepararTelaLocalizarSeries (accessed February 01, 2019).

[4] For more information on this methodology, see Walter Enders (2014).

December 2018. The VAR model, which serves as the basis for the analysis of this section, contemplates the following variables: industry GDP (*output*); inflation rate, measured as the percentage change in the General Price Index (*inflation*); the exchange rate real/US dollar (*exchange*); and the Selic interest rate (*Selic*). All variables were transformed in logs to facilitate the interpretation. Since the inflation rate was negative in some months, a constant $c = 1$ was added to it throughout the period.

The first step in the time series analysis was to investigate the order of integration of the series by unit root tests[5]. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests indicate that the inflation rate is stationary in level and that the Selic interest rate, exchange rate and industry output variables are non-stationary in level, but stationary in first difference. Therefore, these last variables were used in the first difference in the model.

The order of variables in VAR is as follows: *Selic*, *inflation*, *output*, and *exchange*. The interest rate was chosen as the most exogenous variable since it is the monetary policy instrument and, as a rule, is readjusted only eight times per year at the meetings of the COPOM. The exchange rate was chosen as the most endogenous variable since, through the expectations channel, it can be affected contemporaneously by all other variables. The contemporary effect of inflation on output can be justified by the Granger causality test, which indicates that inflation causes the output[6]. It should also be highlighted that changes in the ordering of variables did not imply significant changes in the results of the model.

The VAR model was estimated with eight lags, after checking the usual robustness tests applied to model residuals, such as heterogeneity, autocorrelation and stability[7].

With the methodological procedures explained, Figure 1 shows the output, inflation and exchange rate responses to a shock in the monetary policy interest rate.

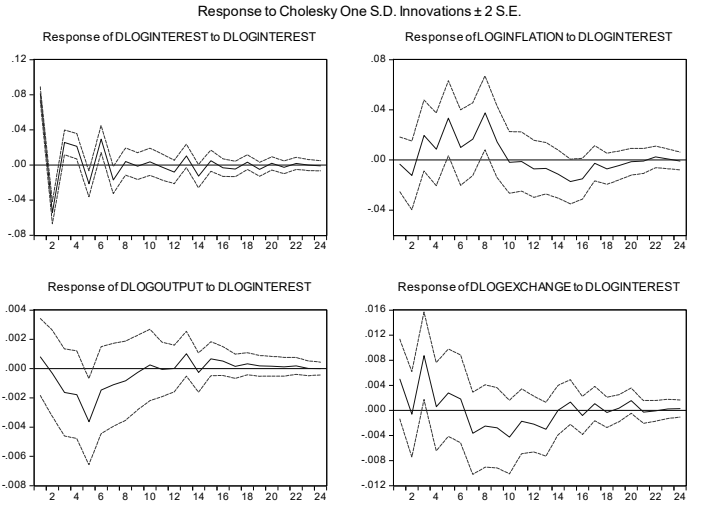
Firstly, it is worth noting the effect of a rise in the interest rate on inflation, the objective of monetary policy (in the upper right quadrant). Inflation initially accelerates, becomes negative after six months and begins to stabilize after 14 months. This initial effect of rising inflation in response to an interest rate shock, known in the literature as "price puzzle" (Martin Eichenbaum 1992), is characteristic of the Brazilian economy, and authors such as Viviane Luporini (2008) and André de Melo Modenesi and Eliane Araújo (2013) also found this behavior in their empirical investigations.

The orthodox explanation of this phenomenon would be the violation of the classical hypotheses of linear regression models, such as the omission of variables relevant to the model (Christopher A. Sims 1992; Lawrence J. Christiano, Eichenbaum, and Charles Evans 1996; Sims and Tao A. Zha 1998). However, this hypothesis is tested by Luporini (2008), who even with the inclusion of other variables, such as the commodity price index and an oil price index, do not solve the "price puzzle" situation in her model.

[5] See Enders (2014).

[6] The Granger causality test can be used as a method for ordering the variables of the model with the Cholesky ordering, considering that there is a positive correlation between the Granger causality and the contemporary causality (see Enders 2014).

[7] All the quantitative results reported above in the text are available upon request.



Source: Own construction.

Figure 1 Responses of Output, Inflation and the Exchange Rate to a Monetary Shock

The heterodox approach to the issue highlights the existence of a cost channel in the transmission of monetary policy, as seen in Arestis (1992) and Thomas I. Palley (1996)[8]. According to this literature, a monetary contraction, in principle, induces an increase in costs that is quickly transmitted to prices. Then, the increase in the interest rate reduces economic activity and ultimately has a negative impact on inflation.

The results of the model, as reported above, also call attention to the low sensitivity of inflation to interest rates. In other words, as a result of a rise in interest rates, the reduction in the inflation rate is relatively small and takes time to happen. Modenesi and Araújo (2013) and Elisangela Araújo, Araújo, and Fernando Ferrari-Filho (2018) argue that this low sensitivity of inflation to interest rates can be interpreted in part due to failures in the transmission mechanisms of Brazilian monetary policy, so that to achieve the desired effect, the ITR requires an excessively rigid monetary policy.

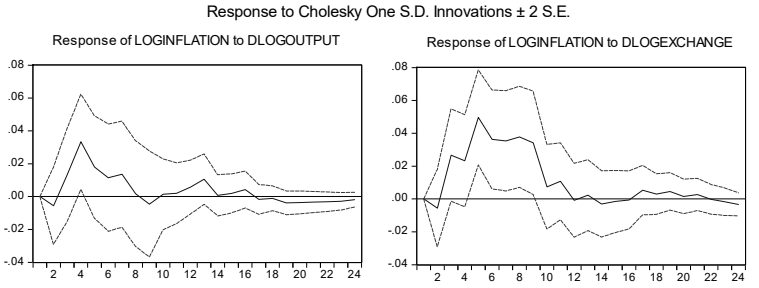
Next, the lower left quadrant shows the response of output to an interest rate shock. It can be observed that the effects of a rise in the interest rate on industrial production, used here as a proxy for GDP, is clearly negative. This would be the traditional channel of monetary policy transmission, according to which an increase in the interest rate discourages private investment, cools the economy and implies lower economic growth rates.

Finally, the lower right quadrant shows the behavior of the exchange rate as a result of a shock in the monetary policy interest rate. It is worth noting the presence of an exchange rate puzzle in the first months, as Luporini (2008) also found, according to whom a contractionary shock in monetary policy initially leads to a depreciation of the national currency relative to the trend. The author removes the exchange rate puzzle

[8] This follows the analysis of Michal Kalecki (1978), to whom prices are determined in accordance with a markup rule on production costs.

by including the debt/GDP ratio in her model, indicating that fiscal variables play an important role in the set of government information. However, in the model presented, it suffices only to observe that after a few months of the negative shock in monetary policy, the exchange rate appreciates, contributing to the reduction in inflation *via* the reduction in international prices and aggregate demand.

With this description of the results, Figure 2 shows the response of inflation to shocks in the exchange rate and in the output of the economy. The objective is to discuss, in a little more depth, the transmission mechanisms of monetary policy in Brazil.



Source: Own construction.

Figure 2 Responses of Output and Inflation to an Exchange Rate Shock

As shown in Figure 2, the response of inflation to an increase in output is positive. Inflation accelerates and then peaks in the third month after the shock, and from there it decelerates and then stabilizes in approximately one year.

The huge influence of the exchange rate on prices when compared to a shock on the output is worth highlighting as it emphasizes the importance of the exchange rate to affect the price levels in Brazil. In fact, several authors have presented estimates of the exchange rate pass-through coefficient to prices in the Brazilian economy, authors such as Agnes A. Belaisch (2003), André Minella et al. (2003), Arnildo da Silva Correa and Minella (2005), and Dionísio Dias Carneiro, Felipe Monteiro Salles, and Thomas Yen Hon Wu (2006). The empirical evidence shows that, as a result of a rise in the interest rate, there are variations in the inflow of foreign capital, causing an appreciation in the exchange rate and a consequent reduction in prices. Analogously, the authors show that in the occurrence of exchange rate depreciations, the effects on prices are extremely significant, reinforcing the existence of an important exchange rate pass-through coefficient to prices in Brazil.

Regarding the lower sensitivity of inflation to demand, the current discussion on the Brazilian economy points out that changes in monetary policy were not fully transmitted to prices as a result of problems in the transmission mechanisms related to asset prices, interest rates and credit. This has made the effects of monetary policy highly dependent on the level of the exchange rate and has required even higher interest rates.

The first problem of monetary policy transmission, as pointed out by Brazilian researchers (as reported in Footnote 9 below) was the significant share of government

bonds, indexed to the interest rate of monetary policy, in the federal debt securities[9]. Contrary to what the transmission mechanism of monetary policy suggests, *via* asset prices – according to which the increase in the interest rate reduces the market price of the securities and makes the holder of these assets poorer – the government bonds indexed to the Selic, the so-called Treasury Financial Bills (LFTs), are characterized by the inoperability of such mechanisms. Thus, the increase in the Selic rate increases the income of the LFT holders, which eliminates the negative impact of the interest on the price of the securities and on the wealth of its holders[10].

Another explanation to highlight for the poor functioning of the monetary policy transmission mechanisms comes from the structure and functioning of the Brazilian banking system. This system causes problems due to the obstruction of the interest rate channel and the credit channel. Regarding the obstruction of the interest rate channel, Fernando J. Cardim de Carvalho (2005) stresses that the absence of longer segments of financing in the Brazilian credit market, which primarily focuses on short-term credit, suggests that the stimuli generated by the monetary policy are not transmitted to these segments, being, for example, the segment of investment financing. Regarding the transmission channel of monetary policy *via* credit, the empirical evidence presented by Carneiro, Salles, and Wu (2006), for example, shows that its effectiveness is doubtful in Brazil due to factors such as reduced depth of the Brazilian financial system and the high share of directed credit in the total granted credit.

Another aspect that limits the functioning of the monetary policy transmission mechanism, making changes in the interest rate to have limited effect on the fall in prices, is the existence of administered prices. João Sicsú and Oliveira de Castro (2003), for example, suggest that administered prices are slightly insensitive to the conditions of supply and demand because they are established by contract or by a government agency, and do not change with changes in monetary policy. Since in Brazil around 28% of the IPCA, which is the initial inflation index, is composed of administered prices, monetary policy needs to be even more contractionary to return inflation to the set target. This is because this share of prices does not respond to changes in interest rates or prices in aggregate demand.

Therefore, by increasing interest rates, the BCB can contract aggregate demand. However, the slowdown of the economy is not transmitted entirely to prices: the cooling of inflation seems to be disproportionate to the fall in the level of activity. Thus, this corroborates the hypothesis that inflation is not very sensitive to the interest rate (Modenesi and Araújo 2013; Araújo, Araújo, and Ferrari-Filho 2018; André Nassif, Carmen Aparecida Feijó, and Araújo 2018). It is in this sense that the evidence presented here can be interpreted as favorable to the thesis that there are problems in the transmission of monetary policy.

[9] Although the share of Selic indexed securities has declined over the years, they still represent a significant share of the government bonds in Brazil.

[10] Theoretical and empirical analyses on this topic for the Brazilian economy can be found in Affonso Celso Pastore (2006), Rafael Quevedo do Amaral and José Luís Oreiro (2008), and Joaquim Pinto de Andrade and Manoel Carlos de Castro Pires (2009).

5. Final Remarks and Lessons from the 20 Years of the Brazilian Inflation Targeting Regime

This paper argues that the ITR, adopted in the Brazilian economy in 1999, follows the recommendations of the NCM since it has inflation control as the primary objective of the economic policy conducted by the monetary authority, albeit at a significant cost in terms output and employment.

Some characteristics stand out in relation to the Brazilian ITR. The first is that Brazil is one of the few countries that have an inflation-target horizon of only one year. Thus, in the face of supply shocks, the BCB has to respond immediately to ensure the target is met within the short-time horizon.

Another striking feature is the single objective of price stability, which implies the absence of other monetary policy objectives, such as economic growth, the welfare of the population, low unemployment and financial stability. This underutilizes monetary policy in terms of its ability to achieve broader economic objectives.

Yet another marked characteristic of the Brazilian ITR is the empirical evidence that indicates low sensitivity of inflation to the interest rate. This means that even higher interest rates are required for monetary policy to meet the desired effects on inflation. This was evident both with the data presented on the Brazilian economy, which showed that even at extremely high interest rates, inflation remained relatively high, and with the empirical analysis, which showed that in the face of a monetary shock, inflation was slow to respond and seemed to respond more to a shock in the exchange rate than to a shock in aggregate demand. In view of these results, it is possible to state that the rigidity of the monetary policy adopted by the ITR conditioned the Brazilian economy to a trajectory of low output growth and with little autonomy to manage monetary policy. This is so in view of the high interest rates, the difficulty in returning inflation to the target, the adverse effects on the exchange rate and the government debt.

This paper also argues that the ongoing, mainstream international debate, which is based on the knowledge gained on the management of macroeconomic policy after the financial crisis in the United States and its developments in Europe, offers important lessons for Brazilian policymakers to rethink central elements about the monetary policy regime being followed in Brazil. In line with this literature, which asserts the need for relaxation of the ITR as well as for the real impacts of monetary policy on variables such as production and employment, it is possible to conclude that reformulations in Brazilian monetary institutions are fundamental. This would improve on the ITR results, in terms of effective inflation, economic performance and the capacity to reduce interest rates.

However, following the heterodox authors that discuss this subject, it is possible to go further and conclude that, after almost 20 years of adopting the ITR in Brazil, this regime has generated exaggerated contractionary pressures on the Brazilian economy, reducing its potential output. Furthermore, the repeated failures to achieve the inflation target, as evidenced in this paper, clearly indicate, as already stated, the need for a complete reformulation of monetary institutions in Brazil in order to resume economic growth with price stability and social equity.

References

Araújo, Elisangela, Eliane Araújo, and Fernando Ferrari-Filho. 2018. "Monetary Institutions and Macroeconomic Performance in Brazil after the Inflation Targeting Regime: Theoretical Aspects and Empirical Evidence." *Investigación Económica*, 77(304): 72-101.

Arestis, Philip. 1992. *The Post-Keynesian Approach to Economics: An Alternative Analysis of Economic Theory and Policy (New Directions in Modern Economics Series)*. Aldershot: Edward Elgar Publishing Ltd.

Arestis, Philip, and Malcolm Sawyer. 2002a. "Can Monetary Policy Affect the Real Economy?" Levy Economics Institute Working Paper 355.

Arestis, Philip, and Malcolm Sawyer. 2002b. "Does the Stock of Money Have Any Causal Significance?" Levy Economics Institute Working Paper 363.

Arestis, Philip, and Malcolm Sawyer. 2004. "On Fiscal Policy and Budget Deficits." *European Journal of Economics and Economic Policies: Intervention*, 1(2): 61-74.

Arestis, Philip, and Malcolm Sawyer. 2006. "The Nature and Role of Monetary Policy when Money Is Endogenous." *Cambridge Journal of Economics*, 30(6): 847-860.

Arestis, Philip. 2007. "What Is the New Consensus in Macroeconomics?" In *Is there a New Consensus in Macroeconomics?*, ed. Philip Arestis, 17-33. Basingstoke: Palgrave Macmillan.

Arestis, Philip, and Malcolm Sawyer. 2011. "A New Paradigm for Macroeconomic Policy." *International Papers in Public Policy*, 7(1/2/3): 22-39.

Arestis, Philip, and Ana Rosa González-Martínez. 2015. "The Absence of Environmental Issues in the New Consensus Macroeconomics is Only One of Numerous Criticisms." In *Finance and the Macroeconomics of Environmental Policies*, ed. Philip Arestis and Malcolm Sawyer, 1-36. Basingstoke: Palgrave Macmillan. http://dx.doi.org/10.1057/9781137446138

Belaisch, Agnes A. 2003. "Exchange Rate Pass-Through in Brazil." International Monetary Fund Working Paper WP/03/141.

Blanchard, Olivier, Giovanni Dell'Ariccia, and Paolo Mauro. 2010. "Rethinking Macroeconomic Policy." International Monetary Fund Staff Position Note SPN/10/03.

Blanchard, Olivier, Giovanni Dell'Ariccia, and Paolo Mauro. 2013. "Rethinking Macro Policy II: Getting Granular." International Monetary Fund Staff Discussion Note SDN/13/03.

Blanchard, Olivier. 2016. "The U.S. Phillips Curve: Back to the 60s?" Peterson Institute for International Economics Policy Brief PB16-1.

Blanchard, Olivier. 2017. "Should We Reject the Natural Rate Hypothesis?" Peterson Institute for International Economics Working Paper 17-14. http://dx.doi.org/10.2139/ssrn.3071974

Blanchard, Olivier, and Lawrence Summers. 2017. "Rethinking Stabilization Policy: Back to the Future." http://piie.com/system/files/documents/blanchard-summers20171012paper.pdf.

Carneiro, Dionísio Dias, Felipe Monteiro Salles, and Thomas Yen Hon Wu. 2006. "Juros, Câmbio e as Imperfeições do Canal do Crédito." *Economia Aplicada*, 10(1): 7-23. http://dx.doi.org/10.1590/S1413-80502006000100001

Christiano, Lawrence J., Martin Eichenbaum, and Charles Evans. 1996. "The Effects of Monetary Policy Shocks: Evidence from the Flow of Funds." *The Review of Economics and Statistics*, 78(1): 16-34.

Correa, Arnildo da Silva, and André Minella. 2005. "Mecanismos Não-Lineares de Repasse Cambial: Um Modelo de Curva de Phillips com Threshold para o Brasil." Brazilian Association of Graduate Programs in Economics Working Paper 33.

De Andrade, Joaquim Pinto, and Manoel Carlos de Castro Pires. 2009. "A Transmissão da Política Monetária pelo Canal do Efeito Riqueza no Brasil." In *Política Monetária, Bancos Centrais e Metas de Inflação: Teoria e Experiência Brasileira Política Monetária*, ed. José Luís Oreiro, Luiz Fernando de Paula, and Rogério Sobreira, 209-235. Rio de Janeiro: FGV Editora.

De Carvalho, Fernando J. Cardim. 2005. "Uma Contribuição ao Debate em torno da Eficácia da Política Monetária e Algumas Implicações para o Caso do Brasil." *Revista de Economia Política*, 25(4): 323-336. http://dx.doi.org/10.1590/S0101-31572005000400001

Do Amaral, Rafael Quevedo, and José Luís Oreiro. 2008. "Relação Entre o Mercado de Dívida Pública e a Política Monetária no Brasil." *Revista de Economia Contemporânea*, 12(3): 491-517. http://dx.doi.org/10.1590/S1415-98482008000300004

Eichenbaum, Martin. 1992. "'Interpreting the Macroeconomic Time Series Facts: The Effects of Monetary Policy': By Christopher Sims." *European Economic Review*, 36(5): 1001-1011. http://dx.doi.org/10.1016/0014-2921(92)90042-U

Enders, Walter. 2014. *Applied Econometric Times Series*. 4th ed. New York: Wiley.

Friedman, Milton. 1968. "The Role of Monetary Policy." *American Economic Review*, 58(1): 1-17.

Hammond, Gill. 2012. *State of the Art of Inflation Targeting*. London: Centre for Central Banking Studies, Bank of England.

Kalecki, Michal. 1978. *Os Economistas: Teoria da Dinâmica Econômica.* São Paulo: Abril Cultural.

Luporini, Viviane. 2008. "The Monetary Transmission Mechanism in Brazil: Evidence from a VAR Analysis." *Estudos Econômicos*, 38(1): 7-30.

McCallum, Bennett T. 2001. "Monetary Policy Analysis in Models without Money." *Federal Reserve Bank of St. Louis Review*, 83(4): 145-160.

Meyer, Laurence H. 2001. "Does Money Matter?" *Federal Reserve Bank of St. Louis Review*, 83(5): 1-16. http://dx.doi.org/10.20955/r.83.1-16

Minella, André, Paulo Springer de Freitas, Ilan Goldfajn, and Marcelo Kfoury Muinhos. 2003. "Inflation Targeting in Brazil: Constructing Credibility under Exchange Rate Volatility." Banco Central do Brasil Working Paper 77.

Modenesi, André de Melo, and Eliane Araújo. 2013. "Estabilidad de Precios Bajo Metas de Inflación en Brasil: Análisis Empírico del Mecanismo de Transmisión de la Política Monetaria con Base en un Modelo VAR, 2000-2008." *Investigación Económica*, 72(283): 99-133. http://dx.doi.org/10.1016/S0185-1667(13)72588-8

Nassif, André, Carmen Aparecida Feijó, and Eliane Araújo. 2018. "Monetary and Fiscal Policies in Brazil before and after the 2008 Global Financial Crisis: Brazilian Policy-Makers Still Trapped in the New Macroeconomic Consensus Guidelines." Paper presented at the Anais do XI Encontro Internacional da Associação Keynesiana Brasileira, Faculdade de Ciências Econômicas, Porto Alegre.

Palley, Thomas I. 1996. *Post Keynesian Economics: Debt, Distribution and the Macro Economy*. Basingstoke: Palgrave Macmillan. http://dx.doi.org/ 10.1057/9780230374126

Pastore, Affonso Celso. 2006. "As Letras Financeiras do Tesouro e a Eficácia da Política Monetária." In *Mercado de Capitais e Dívida Pública: Tributação, Indexação, Alongamento*, ed. Edmar L. Bacha and Luiz Chrysostomo de Oliveira Filho, 261-272. Rio de Janeiro: Contra Capa.

Rogoff, Kenneth S. 1985. "The Optimal Degree of Commitment to an Intermediate." *The Quarterly Journal of Economics*, 100(4): 1169-1189. http://dx.doi.org/10.2307/1885679.

Romer, Paul. Forthcoming. "The Trouble with Macroeconomics." *The American Economist*.

Sicsú, João, and Oliveira de Castro. 2003. "Taxa de Juros e Controle da Inflação no Brasil." In *Agenda Brasil: Políticas Econômicas para o Crescimento com Estabilidade de Preços*, ed. João Sicsú, José Luís Oreiro, and Luiz Fernando De Paula, 29-64. Rio de Janeiro: Editora Manole.

Sims, Christopher A. 1992. "Interpreting the Macroeconomic Time Series Facts: The Effects of Monetary Policy." *European Economic Review*, 36(5): 975-1000.

Sims, Christopher A., and Tao A. Zha. 1998. "Does Monetary Policy Generate Recessions?" Federal Reserve Bank of Atlanta Working Paper 98-12.

Solow, Robert. 2018. "A Theory Is a Sometime Thing." *Review of Keynesian Economics*, 6(4): 421-424. http://dx.doi.org/10.4337/roke.2018.04.02

Svensson, Lars E. O. 1997. "Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets." *European Economic Review*, 41(6): 1111-1146. http://dx.doi.org/10.3386/w5797

Svensson, Lars E. O. 1999. "Inflation Targeting as a Monetary Policy Rule." *Journal of Monetary Economics*, 43(3): 607-654.

Volpon, Tony. 2016. "Why Is Inflation so High and Volatile in Brazil? A Primer." Bank for International Settlements Working Paper 89.

Walsh, Carl E. 1995. "Optimal Contracts for Central Bankers." *American Economic Review*, 85(1): 150-167.

Yellen, Janet L. 2014. "Many Targets, Many Instruments: Where Do We Stand?" In *What Have We Learned? Macroeconomic Policy after the Crisis*, ed. George Akerlof, Olivier Blanchard, David Romer, and Joseph Stiglitz, 31-36. Cambridge, M.A.: MIT Press.

Appendix

Table A1 The Institutionality of Monetary Policy in the Countries that Adopted the ITR

Country and date IT adopted	Legal mandate	Target horizon	CB operational independence	Target type and measure	Target set by
Armenia, Jan. 1996	Price stability	Medium-term	Yes	P + T; HCPI	G and CB
Australia, Jun. 1993	Currency stability, full employment, economic prosperity and welfare	Medium-term	Yes	Range; HCPI	G and CB
Brazil, Jun. 1999	Price stability	Yearly target	Yes	P + T; HCPI	G and CB
Canada, Feb. 1991	Economic and financial welfare	Renewed for five years until the end of 2021	Yes	P + T; HCPI	G and CB
Chile, Sep. 1999	Currency stability and normal functioning of domestic and foreign payments	Around two years	Yes	P + T; HCPI	CB
Colombia, Oct. 1999	Maintaining currency purchasing power	Medium-term	Yes	Range; HCPI	CB
Czech Republic, Dec. 1997	Price stability and support economic policies to sustainable economic growth	Medium-term, 12-18 months	Yes	P + T; HCPI	CB
Ghana, informally 2002, formally May 2007	Price stability, economic growth and effective operation of banking and credit systems	Medium-term	Yes	P + T; HCPI	G and CB
Guatemala, 2005	Price stability	End of year	Yes	P + T; HCPI	CB
Hungary, Jun. 2001	Price stability	Medium-term	Yes	Point; HCPI	CB
Iceland, Mar. 2001	Price stability and support government's main economic policy	On average	Yes	Point; HCPI	G and CB
Indonesia, Jul. 2005	The stability of the rupiah value	Medium-term	Yes	P + T; HCPI	G and CB
Israel, informally 1992, formally 1997	Price stability and support government's economic policy	Two years	Yes	Range; HCPI	G and CB
Mexico, 2001	The purchasing power of the Mexican currency	Medium-term	Yes	P + T; HCPI	CB
New Zeeland, Dec. 1989	Price stability	Medium-term	Yes	Range; HCPI	G and CB
Norway, Mar. 2001	Low and stable inflation, output and employment	Medium-term	Yes	Point; HCPI	G
Peru, Jan. 2002	Preserve monetary stability	At all times	Yes	P + T; HCPI	CB
Philippines, Jan. 2002	Price stability, balanced and sustainable growth	Medium-term	Yes	P + T; HCPI	G and CB
Poland, 1998	Price stability and support government economic policies	Medium-term	Yes	P + T; HCPI	CB

Romania, Aug. 2005	Price stability and support the general economic policy	Medium-term	Yes	P + T; HCPI	G and CB
Serbia, informally Sep. 2006, formally Jan. 2009	Price stability, financial stability and support economic policy	Medium-term	Yes	P + T; HCPI	G and CB
South Africa, Feb. 2000	Protect the value of the currency and sustainable economic growth	On a continuous basis	Yes	Range; HCPI	G
South Korea, 1998	Price stability	Three years	Yes	P + T; HCPI	CB (with G)
Sweden, announced Jan. 1993, applied 1995	Price stability, economic growth and employment	Two years	Yes	Point; HCPI	CB
Thailand, May 2000	Promote monetary stability and formulate monetary policies	Eight quarters	Yes	P + T; HCPI	G and CB
Turkey, Jan. 2006	Price stability	Multi years (3 years)	Yes	P + T; HCPI	G and CB
United Kingdom, Oct. 1992	Price stability, economic growth and employment	At all time	Yes	Point; HCPI	G

Source: Own elaboration based on Hammond (2012) and National Central Banks.

THIS PAGE INTENTIONALLY LEFT BLANK