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A Note on Structural Uncertainty, Flexibility and Monetary Policy Credibility: An Inflation Targeting Approach for the Post-Covid Period

Abstract: Since the Covid-19 pandemic, many economic policy protocols have come under scrutiny regarding their ability to handle unforeseen events and systemic effects. In particular, inflation targeting regimes have been questioned due to significant inflationary deviations resulting from a substantial rise in firms' operating costs and, simultaneously, the necessary accommodation of shocks by central banks through a reduction in real interest rates to address the recessionary impacts of the pandemic. This brief article explores institutional channels and builds an original optimization analysis of the trade-off between flexibility and credibility as attributes of monetary policy, thereby highlighting aspects that make inflation targeting regimes a resilient framework for dealing with the structural uncertainty surrounding central bank decisions in the post-Covid era.

Key words: uncertainty, flexibility, credibility, monetary policy, inflation targets.

JEL Code: D81, E52, E58.

1. Introduction

The Covid-19 pandemic imposed various disruptions in the economic policy protocols on a global scale. Central banks that were in the midst of disinflation processes

through restrictive interest rates in 2019 and early 2020 had to reverse their monetary policy decisions rapidly, reducing real interest rates to mitigate the substantial output and employment losses resulting from the pandemic waves and the subsequent need for lockdowns. On the other hand, countries that were seeking, until early 2020, to rebalance their public finances had to abandon fiscal rules, dramatically expanding deficits and increasing the levels of the public debt-to-GDP ratio.

Amid the post-pandemic scenario, many questions have arisen regarding the need to maintain conventional frameworks of monetary policy (as well as fiscal policy). In particular, this brief article will consider issues related to the inflation targeting regime, which also came into question due to the need to suspend traditional models and rules for adjusting short-term interest rates, such as the Taylor rule (Taylor, 1993). Indeed, in the US, such a theme was originally highlighted by the post-subprime crisis period, in which the FED started a phase of near zero interest rate policy, from 2008 to 2015.

The fact is that the international economic crisis that emerged in 2020 has once again brought up the idea that economic authorities have much less predictive and risk control capabilities than are assumed by the authorities themselves, analysts, and the market. Structural uncertainty is not only reflected in the imprecision of estimates of fundamental parameters under normal conditions but primarily in the possibility of events with systemic and structural effects that are beyond policymakers' predictions or scenario analyses (and those of market analysts). The term "black swan" is often associated with these long-tail events, or those with impacts above one or two standard deviations.

However, does this mean that the cornerstone rules of economic policy lose their value in this new horizon for the 21st century? In particular, with regard to monetary policy, should inflation targeting regimes be abandoned? Do they have the necessary degree of flexibility to deal with such systemic events, such as the Subprime crisis and Covid-19?

Throughout this brief article, the arguments contribute to form the hypothesis that, indeed, there are institutional and operating elements that provide policymakers with the attributes necessary to reconcile the required flexibility in the face of shocks with the desirable credibility of inflation targets and, thus, to deal with uncertainty in a way that mitigates the social losses resulting from real interest rate reactions.

This framework of flexibility and constrained discretion for central banks was built on a specific literature that had its main exponents in the 1990s (Ball, 1999a;

1999b; Svensson, 1997; Bernanke & Mishkin, 1997; Clarida, Galí & Gertler, 1999, among others) and 2000s (Svensson, 2000; Mishkin & Schmidt-Hebbel, 2001; Rudebusch, 2001, 2006; Woodford, 2003; Svensson & Woodford, 2003), but keep developing in recent years (Kuttner & Posen, 2012; Gillitzer & Simon, 2015; Balls, Howat & Stansbury, 2018, among others), generating different frames of contributions to the discussion on the enhancement of monetary policy. One implication of the arguments in this article is that the proper and well-calibrated maintenance of a flexible and credible inflation targeting regime contributes to greater resilience of central banks and their respective countries in the face of events with systemic impacts.

For instance, relevant *inflation-targeters countries* and emerging markets, such as Poland, the Czech Republic, Hungary, Chile, Brazil, Turkey[1], among others, experienced elevated inflation peaks from 2022-2023, as a consequence of expressive supply and commodities shocks over the post-Covid period, but with a consistent disinflation trend thereafter, with few exceptions, signalling the effectiveness of monetary policy in successfully anchoring expectations and reversing the observed inflation deviations.

In other words, while inflation targeting regimes do not neutralize the probability of significant inflation deviations in the face of shocks, as was observed in most inflation-targeters countries in the Post-Covid era, the fact is that the reversal of these deviations and the underlying disinflation become more reliable as the attributes of flexibility and credibility of monetary policy are consistently managed over time.

The structure of the article is as follows: the section 2 brings an analysis of the flexibility of the inflation targeting regime in dealing with the structural uncertainty surrounding monetary policy and how specific escape clauses (i.e. institutional mechanisms) can serve as instruments for this purpose; in turn, section 3 makes a description of the institutional channels by which transparency can be gradually translated into monetary policy effectiveness; in section 4, the article presents an original optimization analysis of the trade-off between credibility and flexibility as attributes of the monetary policy. Furthermore, a final remarks section has especial focus on the antagonism between a proper idea of inflation targeting regime as a constrained discretion approach and the fallacy of such a regime as a type of blind rule.

[1] According to the most recent criterion of the MSCI Emerging Markets Index.

2. Structural Uncertainty, Escape Clauses and Flexibility

One of the debates concerning the inflation targeting system pertains to the possible mechanisms for its flexibility in the face of supply shocks. So-called 'escape clauses,' though difficult to specify, are means to grant greater flexibility to monetary policy when there are inflationary pressures whose origin is beyond the direct control of monetary policy (Mishkin & Schmidt-Hebbel, 2001). The presence of supply shocks is one of the obstacles to the exclusive use of optimal instrument rules under the inflation targeting regime. When the economy experiences supply shocks, and society places some weight on output stability, some degree of flexibility in the inflation targeting regime is desirable, and the strict use of optimal instrument rules becomes inefficient (Ball, 1999a; 1999b).

In practice, escape clauses provide flexibility to the monetary authority when, for reasons beyond the control of policy – supply-side factors –, current inflation diverges from the pre-established target. Factors beyond the immediate control of the authority and that can cause inflation to deviate from the target include, among others: a) deviations in the prices of raw materials, energy, and commodities; b) significant fluctuations in the exchange rate unrelated to domestic monetary policy; c) large variations in agricultural production; d) natural disasters affecting prices; e) variations in regulated prices affecting the prices index by more than 1-1.5 percentage points; f) changes in indirect taxes (Ferreira & Petrassi, 2002). Additionally and more recently g) value and supply chains disruptions caused by citizens' limited mobility due to health policies dealing with pandemic effects.

The need to develop flexibility mechanisms for monetary policy, within the framework of inflation targeting, arises from the fact that the Central Bank (CB) does not have certainty about how the economy really works and that there are constraints imposed by the real world that are not considered in the model used for monetary policy guidance.

First, the CB does not have certainty about the values or distribution of values for the structural model parameters. Faced with this structural uncertainty, an optimal instrument rule derived from solving an optimization problem does not represent a unique and stable instrument for monetary policy. With structural changes, the instrument rule must be modified (Svensson, 1997). However, when there is uncertainty about the new prevailing structural parameters, the authority must rely on additional information and knowledge when making instrument decisions.

Second, optimizing monetary policy under the strict regime may underestimate specific social preferences, such as employment stability, financial stability, and exchange rate stability. By seeking a minimum condition for a given social loss function, the CB may only be aiming at inflation stability. In technical terms, the optimal instrument rule is derived by the minimum condition for the social loss function in terms of an optimal inflation rate, 'all else being equal'. The problem with this method is precisely that, by making inflation converge to the optimal rate, there is no practical 'all else being equal.' And since society places some weight on output stability, interest rate stability, exchange rate stability, among other variables, the adjustment of the inflation rate to the optimal rate (or target) may create social losses expressed through volatility in other variables that are explanatory factors in the social loss function.

This would be a possible interpretation of Ball's seminal ideas (1999a; 1999b), which argue for the need to implement a 'flexible' regime, as Svensson (op. cit.) suggests. The flexible regime is indeed an expansion of the strict regime within a context where the optimal rule is no longer efficient precisely because there are social preferences beyond mere inflation stabilization, and certain events create trade-offs - as in the case of supply shocks - between inflation stability and other variables.

The 'strict' regime is nothing more than a particular situation in which society does not assign any weight to the stability of variables other than inflation, and the structural model gives full scope to what happens in the real world. In this case, the optimal instrument rule would represent a sufficient basis for monetary policy-making, as it is derived considering the achievement of an inflation target, 'all else being equal.' On the other hand, the flexible regime can be interpreted as the general case of analysis, in which the structural model used by the CB has some degree of uncertainty, and there are social preferences, in practice, that are beyond the scope of the structural model and the solution to the problem of optimizing monetary policy.

These considerations are in line with what Bernanke & Mishkin (1997) suggest, that in practice, the inflation targeting system does not present itself as a strict rule. They observe that it should be understood as an 'instrument' of monetary policy, which would provide greater transparency and consistency to monetary policy and in which there is room for flexibility, and even a certain degree of discretion. According to these authors, the widespread view that the inflation target 'ties the hands' of the CB, forcing it to act rigidly, is a misconception. The inflation targeting regime, in this sense, appears as an 'instrument' of monetary policy that allows the authority 'limited discretion' rather than 'locking it' under

an inflexible rule. Such a view is consistent with that of Balls et al. (2018) and de Haan, Bodea, Hicks & Eijffinger (2018).

In fact, a 'strict rule' would only be efficient if it could minimize the social losses resulting from monetary policy in any state or situation of the economy. Since the optimal instrument rule is derived from a theoretical model that does not perfectly represent the real world and there are social preferences beyond mere short-term inflation stability, the inflation targeting regime requires additional mechanisms for monetary policy-making.

Escape clauses – e.g. target intervals instead of an unique central target level, the adoption of core inflation measures instead of headline inflation ones, targets for intertemporal averages instead of targets for short-term or calendar inflation – are examples of such mechanisms that give the authority greater flexibility or discretion in achieving an inflation target. Practice dictates that, in certain cases, it is efficient to deviate from the inflation target.

Let us consider both social loss functions:

$$L_t = (\pi_t - \pi_0)^2 + \lambda {y_t}^2 \quad (1)$$

$$L_t = (\pi_t - \pi_0)^2 \quad (2)$$

The loss function 1 assigns some weight to output stability when $\lambda > 0$. The loss function 2, on the other hand, can be considered a special case of 1 when $\lambda = 0$. However, satisfying a minimum condition for 1 and 2 yields the same optimal instrument rule when derived in terms of π ('all else being equal'), regardless of the configurations of the IS and CP (Phillips Curve) equations. The difference is that using this optimal rule produces different results for I and II when there are supply shocks. As long as λ is greater than zero, the trade-off between inflation and output variability imposed by supply shocks renders the optimal rule inefficient, or rather, the optimal rule ceases to be optimal. This is just one of the possible cases in which the central bank should not base monetary policy on the exclusive use of optimal rules.

In an open economy, the social loss function may include, in addition to the arguments in a closed economy, the stabilization of interest rates, exchange rates, consumer inflation, which is directly affected by exchange rate variations, and so on. Svensson (2000) presents the following loss function:

$$L_t = \mu_\pi^c (\pi_t^c)^2 + \mu_\pi (\pi_t)^2 + \lambda (y_t)^2 + \nu (i_t - i_{t-1})^2 \quad (3)$$

The social loss function 3 is explained by the squared deviations of consumer inflation (π_t^c), domestic inflation (π_t), output (y_t), and interest rate changes ($i_t - i_{t-1}$). A strict regime of consumer inflation targets considers μ_π^c as positive and all other parameters equal to zero. In turn, a pure domestic inflation targeting regime considers μ_π positive and all others equal to zero. However, flexible regimes consider all parameters positive. In particular, the goal of stabilizing interest rates gains greater relevance in open economies due to their impact on the exchange rate, which amplifies the effects of the former on output (Svensson, 2000; Ball, 1999b). Furthermore, instead of $\nu(i_t - i_{t-1})$, it would be possible to adopt $\nu(q_t - q_{t-1})$, where $q_t - q_{t-1}$ would be the deviation of the exchange rate from its lagged level.

In fact, the loss function should express social choices in terms of what is intended to be stabilized. Therefore, the inflation targeting regime (in its flexible version) is perfectly compatible with the idea of a democratic society whose objectives are met by the proper execution of monetary policy. Different configurations of inflation targeting regimes correspond to different specifications of the social loss function (Svensson, 2000).

However, one can also argue that the same specification of the social loss function can correspond to different configurations of inflation targeting regimes, provided there is a change in the degree of confidence in the structural model underlying the derivation of the optimal monetary policy rule. With great confidence in the structural model and its parametric values, the central bank will make instrument adjustments primarily based on the information contained in the optimal rule. On the other hand, as confidence in the structural model and its parameters decreases, the central bank will make instrument adjustments based on ad hoc mechanisms and additional information, meaning a reduced reliance on the optimal rule for monetary policy.

It can be argued that the greater the structural uncertainty, the less useful the optimal rule, and thus, the greater the reliance of monetary policy on ad hoc mechanisms. Consider the following formalization:

$$U_{op} = f(\sigma_m), with\ f' < 0 \tag{4}$$

$$U_{ad} = f(\sigma_m), with\ f' > 0 \tag{5}$$

$$i = \left[\frac{U_{op}}{(U_{op}+U_{ad})}\right] i_{op} + \left[\frac{U_{ad}}{(U_{op}+U_{ad})}\right] i_{ad} \tag{6}$$

Where U_{op} stands for the utility of the optimal rule, U_{ad} is the utility of the set of ad hoc mechanisms and information (*ad hoc* rule), σ_m is an index of volatility

of the structural parameters of the model used for the derivation of the optimal rule, i is the effective rule of the central bank, i_{op} is the optimal rule, and i_{ad} is the ad hoc rule. The utility of the optimal rule decreases with an increase in σ_m (4), whereas the utility of the ad hoc rule increases with an increase in σ_m (5). Therefore, the effective rule can be expressed as a weighted average of the optimal and discretionary rules (6), with the weights depending on the relative size of their respective utilities, which, in turn, depend on the level of σ_m. Thus, the transition from a strict regime to a flexible regime can be motivated by the simple increase in structural uncertainty by the central bank, measured by the increase in σp, even if the central bank has not changed the specification of the social loss function. The higher σ_m is, the less participation i_{op} has in the effective rule, and the more participation i_{ad} has.

3. Institutional channels for monetary policy: from transparency to effectiveness

Models like Ball (1999a) and Svensson (1999) assume the absence of perfect credibility of the monetary policy, where the expectations of economic agents are formed adaptively, and the Phillips curve is characterized by inflation inertia. In this case, the persistence of inflation resulting from a shock leads to the need for more aggressive monetary policy, and the economy experiences a higher sacrifice ratio (Clarida et al., 1999).

The basic model used by Clarida et al. (1999), which has a forward-looking nature, can be further generalized, according to the authors, to additionally incorporate elements of output and inflation inertia, approaching Svensson-Ball models. However, Clarida et al. (op. cit.) aim to show that the new results are not fundamentally different from those that prevail under the basic configuration. The point of divergence, however, pertains to the speed of adjustment or convergence of inflation to the target. Since inflation has inertia, any accommodation of inflation today will be reproduced in the future. As a result, there is a need to reduce output in the future. The central bank must adjust interest rates and impact output not only in response to changes in current inflation but also in response to the expected inflation trajectory. The greater the degree of inflation inertia, the more aggressive the central bank's response to inflation deviations should be.

The optimal policy depends on the persistence of inflation and output. The persistence of these variables is of great relevance, as it affects the size of the trade-off faced by the central bank. In principle, the greater the persistence, the larger the trade-off, and the more the monetary policy must respond to demand shocks

to achieve the desired inflation reduction. In this context of high inflation and output persistence, the central bank needs to gain credibility, which comes at the cost of losing flexibility in monetary policy. The central bank must reduce inflation volatility by increasing output volatility.

The policy choice can be defined as the choice of a time path for the policy instrument (interest rate) that creates a time path for the target variables (inflation and output) that is consistent with the minimization of the social loss function, subject to the behavioural constraints imposed by the IS and Phillips curves. This follows the tradition of the problem of targets and instruments (Tinbergen, 1952; Theil, 1957; Brainard, 1967). In general, as in these classic authors, the optimal feedback rule is a function of the state of the economy. The main difference in Clarida et al. (1999) compared to the classic problem is that the target variables depend not only on current policy but also on expectations of future policy: the output gap depends on the expected path of interest rates, and inflation depends on the current output gap as well as expected future gaps.

As Kydland & Prescott (1977) emphasized, in such a context, the credibility of future economic policy becomes of utmost importance. For example, a central bank that can credibly signal a commitment to lower future inflation can reap the benefits of controlling current inflation in exchange for a smaller output loss compared to a situation where credibility is lacking. For instance, Güler (2021) obtained empirical results for emerging economies that have demonstrated credibility as a relevant attribute of monetary policy in order to reduce inflation expectations under a context of inflation targets.

The gain of credibility in the inflation targeting regime allows inflation expectations to be anchored to the target announced by the central bank. This eliminates a source of inflation disturbance when the economy experiences shocks, reducing the required response of interest rates to inflation deviations.

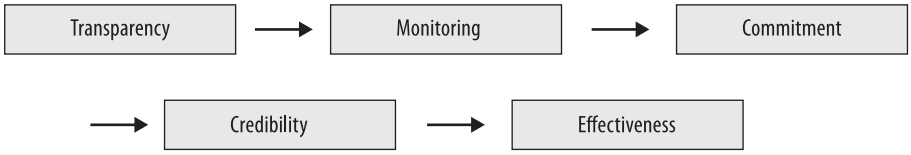
According to Mishkin (1999; 2004), one of the advantages of the inflation targeting regime is to reduce the chances of the time inconsistency problem of monetary policy. By limiting the public debate around what the central bank can truly achieve in the long-run - controlling inflation - the inflation targeting regime restrains political pressures for increasing output through inflationary expansion. The inflation targeting regime, by imposing a long-term responsibility on the central bank, leads policy decisions to be guided primarily by long-term considerations, at the expense of short-term considerations or pressures.

Instead of considering only the current economic and inflation conditions or just the behaviour of a specific variable, the inflation targeting regime takes into account all available information so that the central bank's short-term decisions are not inconsistent with the achievement of its long-term objectives. Since long-term objectives, expressed in announced inflation targets, and the assessment of their attainment are made clear to the public, and any deviation from the targets must be justified by the central bank, which also needs to announce the measures to be taken to eliminate this deviation, the likelihood of time inconsistency is reduced under the inflation targeting regime.

The higher the credibility of monetary policy with the public, the easier it will be to control inflation, meaning lower social costs. However, for the public to consider monetary policy credible, it is necessary for them to have access to information that allows them to monitor, analyse, and judge the performance of monetary policy. In the absence of sufficient information and/or under inability to make a proper assessment of the central bank's performance, the construction of credibility and reputation with the public is hindered, leading to higher social costs for inflation control.

Hence, the need for transparency in conducting monetary policy arises (see Figure 1). The central bank must disclose its objectives and the system by which its policy decisions are made. Then, the public proceeds to evaluate both the objectives and the decision-making system, assessing: i) whether the objectives are consistent with the minimization of social costs, according to a social loss function, whose parameters and variables should reflect social preferences; ii) whether the central bank's decision-making system is consistent with the achievement of the announced objectives.

Figure 1: Institutional channel for monetary policy credibility and effectiveness



Source: Author`s elaboration

The greater the central bank's transparency in providing such information, the more effective the process of *monitoring* and evaluating of monetary policy performance by the public. Another fundamental element is that the central bank should be accountable for its decisions and policy outcomes, meaning there

should be mechanisms for penalization in case of unjustifiable deviations. In this case, transparency leads to a higher commitment from the central bank to satisfy the conditions (i) and (ii) described above, as non-compliance with them implies some form of cost for monetary policymakers. This proposition is in line with the idea developed in Masciandaro and Romelli (2015), Balls et al. (2018) and de Haan et al. (2018).

In turn, the greater the central bank's commitment to meeting those conditions, the greater the chances that the central bank will perform well, gradually building credibility. Along with the increase in central bank credibility and reputation, there is an increase in the effectiveness of monetary policy through the adjustment or control of inflation expectations. It is noteworthy the existence of a specific literature about the measurement and the potential effects of monetary policy's transparency. Although it is not our current goal to offer a detailed description of such a stream of the literature, one recent effort was provided by Aftab and Mehmood (2023). These authors obtained empirical results for Asian emerging markets showing that an increase in central bank transparency has a stabilizing effect on exchange rate volatility, and this effect remains even after controlling for various internal and external factors. We can assume that such a stabilizing effect on exchange rate volatility is concomitant to the entire institutional channel for monetary policy credibility and effectiveness as shown in Figure 1.

4. The Trade-Off between Flexibility and Credibility: an Optimization Analysis

An important advantage that comes with credibility is the fact that monetary policy gains room for greater flexibility in the face of inflationary shocks. When there is no credibility, inflation expectations become very volatile and sensitive to changes in observed inflation rates. Faced with an inflationary shock and the resulting increase in inflation, expectations tend to undergo a significant increase, the size of which depends on the credibility of monetary policy. In the absence of credibility, there will be a significant rise in inflation expectations, proportionate to the observed shocks. This reduces the ability of monetary policy to be flexible, meaning that the central bank has less room to accommodate inflation shocks and stabilize output in the short-term. If inflation expectations grow substantially due to the shock, it triggers an inflationary dynamics through the inertia component of inflation in the Phillips Curve. Therefore, the central bank does not have much room to accommodate the shock, given the risks of inflation spiralling out of control triggered by these expectations. The adjustment of the

policy instrument has to be very aggressive in such cases. Thus, controlling inflation imposes greater output and employment losses.

On the other hand, if there is high credibility, the inflationary shock does not strongly impact inflation expectations. Expectations become more stable. Due to the central bank's commitment past path, expectations are anchored to long-term price stabilization objectives. Therefore, the inflation shock does not create second-order inflation dynamics, as it does not affect the expectations channel. As a result, the central bank can accommodate a larger part of the inflation shock, avoiding greater output and employment losses. This greater accommodation of the shock implies higher short-term inflation, but it does not compromise price stability since inflation expectations are consistent with the desired long-term inflation targets. The higher the credibility, the stronger the anchoring of expectations, and the greater the flexibility of monetary policy in the face of shocks. In other words, the sacrifice ratio for controlling inflation is lower because policy adjustments are smoother.

According to King (1996), in general, central banks that still need to establish their credibility and face high inflation rates cannot afford to accommodate large portions of inflation shocks, as would be the case if the economy had already entered a context of credibility and inflation stability. There is a trade-off between credibility and flexibility, but this trade-off is limited to the transition periods toward price stability (King, op. cit.). Furthermore, as there is still no data to justify credibility for a commitment to price stability in the transition period, the accommodation of shocks may be mistaken by the public as an inflationary bias resulting from an alleged pursuit by the central bank for a higher output than the actual output.

In periods when the central bank (CB) faces a relative lack of credibility, the weight of the backward-looking component in the Phillips curve increases because agents form their inflation expectations by looking at current and past inflation. The volatility of inflation or the persistence of significant inflation deviations can undermine the credibility of the monetary authority, resulting in greater volatility of inflation expectations and a higher cost of disinflation. On the other hand, once relative credibility is achieved, the Phillips curve will have a greater forward-looking component because inflation expectations will be anchored near the inflation target, even if there are occasional transient and moderate inflation deviations. This is a context in which inflation expectations become less sensitive to observed deviations due to the central bank's high credibility in recent target achievement. The trade-off between credibility and flexibility arises in the transition from a low-credibility regime to a higher-credibility regime.

It can be said that gaining one unit of credibility implies the loss of a certain amount of flexibility. Once monetary policy has little credibility, it is willing to give up a larger amount of flexibility to gain an additional unit of credibility.

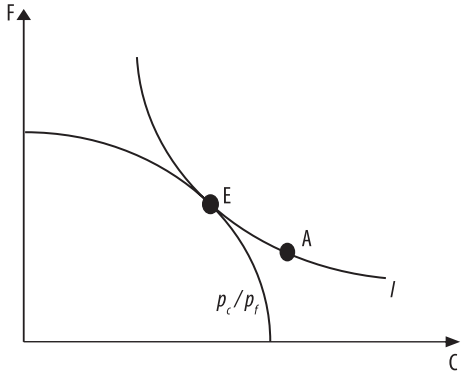
When the trajectory of expectations depends on the observed inflation rate, the central bank may have incentives to reduce the degree of flexibility in monetary policy, especially in the context of a recent regime transition where policy credibility has not yet been consolidated. In order to consolidate credibility, the central bank can adopt a faster adjustment of the inflation target, as well as the policy instrument in response to shocks, to converge the observed inflation rate as quickly as possible to price stability levels, which would also lead expectations to stable values. This is a mechanism of "learning by doing". Once credibility is established, the degree of flexibility in monetary policy could be increased, as expectations would already be anchored to the price stability inflation target, and the costs of disinflation would be lower in the face of inflation deviations.

Once credibility is consolidated, the marginal utility of flexibility is higher than the marginal utility of credibility, so the central bank has incentives to accommodate a larger portion of inflation shocks, giving more weight to stabilizing output. The trade-off between flexibility and credibility, which exists during the transition between different regimes, can be analysed formally and graphically.

In Graph 1, an original optimization analysis is built on and inspired by the main arguments of King (1996). The vertical axis represents the quantity of flexibility, and the horizontal axis stands for the quantity of credibility. The convex curve I shows an indifference relationship between any combination of F and C along the curve. Let U'_F be the marginal utility of flexibility, and U'_C be the marginal utility of credibility. Hence, $MRS_{F,C}$ represents the *marginal rate of substitution* between the attributes of flexibility and credibility. In turn, the slope of I is given by the U'_C/U'_F ratio.

The marginal disutility of inflation variance is the "price" of an additional unit of flexibility (p_f), and the marginal disutility of output variance is the "price" of an additional unit of credibility (p_c). Therefore, flexibility and credibility are two desirable attributes in monetary policy. However, there is a price to be paid for each of these attributes, and there is a trade-off between them. The central bank can only acquire more credibility by reducing flexibility, paying the price of greater disutility of output variance. Conversely, it can only acquire more flexibility by reducing credibility, paying the price of greater disutility of inflation variance.

Graph 1: Flexibility, credibility and optimal choice



Source: Own elaboration

A given combination of flexibility and credibility results in a specific disutility of inflation and output variance. It can be argued that the central bank is seeking a policy that minimizes this disutility. In other words, it is looking for an optimal combination of flexibility and credibility.

The concave curve in Graph 1, with a slope of p_c/p_f, can be called the *efficient frontier*. It represents all the possible optimal combinations of F and C, given the p_c/p_f relationship. It is noteworthy that the slope of the efficient frontier increases as C increases. This is because, as credibility increases and flexibility decreases, the marginal disutility of output variance becomes higher, and the marginal disutility of inflation variance becomes lower. This relationship is expressed by an increase in the p_c/p_f ratio as the quantity of credibility increases.

Rational trade-offs between the attributes occur as follows: when the marginal utility of flexibility is higher than the marginal disutility of inflation variance, the central bank trades credibility for more flexibility; conversely, when the marginal utility of credibility is higher than the marginal disutility of output variance, the central bank trades flexibility for more credibility. Equilibrium, or the optimal combination of both attributes, is reached when there are no more incentives for trades (which indeed occur only with time lags). This equilibrium condition is satisfied when $U'_F = p_f$ and $U'_C = p_c$. This equilibrium is represented by point E, where $\frac{U'_C}{U'_F} = \frac{p_c}{p_f}$.

Contexts such as the post-Covid stagflationary period impose a deviation from E point to A. Specifically, the combination between flexibility and credibility at A does not satisfy the efficient frontier. The marginal disutility of output variance (i.e. the "price" of an additional unit of credibility, p_c) is higher than U'_C, that is $U'_C < p_c$. In turn, at A the marginal disutility of inflation variance (i.e. the "price" of an additional unit of flexibility, p_F) is lower than U'_F, or $U'_F > p_f$. Therefore, there is an optimal choice for replacing C by additional units of F over the I curve, until the Central Bank returns to E point.

On the contrary, situations of persistent and expressive inflationary deviations, maybe putting countries at risk of hyperinflation, would be described by the inverse dynamics, with a deviation from E with points over I but above the equilibrium point. In these scenarios, central banks are stimulated to replace F by C through more rigid and aggressive monetary policy reactions (in other words, giving more weight to optimal and strict monetary policy rules and so less weight to *ad hoc* instrument rules).

In sum, there exist three possible situations from this optimization analysis:

$$\frac{U'_C}{U'_F} = \frac{p_c}{p_f}, \tag{7}$$

representing the equilibrium and the absence of any stimulus for change;

$$\frac{U'_C}{U'_F} < \frac{p_c}{p_f}, \tag{8}$$

which stands for a situation of opportunity for a rise in flexibility (e.g. expressive supply shocks);

$$\frac{U'_C}{U'_F} > \frac{p_c}{p_f}, \tag{9}$$

which means a situation of opportunity for an increase in credibility (e.g. high and persistent inflation episodes).

5. Final remarks: Blind Rules or Constrained Discretion?

The inflation targeting regime is often misconstrued as a rigid monetary policy rule. This association that is commonly made between inflation targeting and strict rules contributes to a poor understanding of the potential and true limitations of the regime. However, in practice, central banks that are under inflation targeting typically implement mechanisms or escape clauses that provide a certain degree of flexibility in conducting their monetary policy and achieving the inflation target. In this context, criticisms of the supposed rigidity imposed by the regime lose relevance because there are no central banks under inflation targeting that strictly adhere to rigid or optimal rules (Svensson, 1997; Mishkin, 1999).

Hence, it is necessary to make a distinction between what the inflation targeting regime represents in the theoretical field, based on conventional models, such as the Ball-Svensson models, and the adjustments and accommodations that the regime undergoes when performed in the countries. Furthermore, it can be theo-

retically justified from the inflation targeting theory itself that there is a need for expansions or flexibilization of the regime. The transition from a "strict regime" to a "flexible regime", using Ball's terminology (1999a; 1999b), can be interpreted as a necessary response to constraints or uncertainties imposed by the real world. One of the key ideas developed in this article is that the validity and efficiency of a strict inflation targeting regime and its corresponding optimal instrument rule are observed only in a particular case of the economy: when there is no social preferences for stabilizing variables beyond inflation, and the structural model of the central bank perfectly represents the modus operandi of the economy.

However, modern societies have goals beyond just inflation stability, such as stabilizing employment, interest rates, exchange rates, etc. Besides, the central bank's structural model exhibits some weakness of explanatory power – due to structural uncertainty. Thus, a flexibilization of the regime becomes necessary. In this sense, central banks cannot rely solely on the use of an "optimal policy rule". The abandonment of strict or optimal rules can be theoretic and empirically justified but it does not mean an abandonment of the inflation targeting regime as a whole.

It is crucial to understand that such considerations are consistent with the institutionalization of higher levels of autonomy and independence for central banks in recent decades, without necessarily compromising the democratic character and well-being of modern societies (Masciandaro and Romelli, 2015; Balls et al., 2018; de Haan et al., 2018; Machado and Moreira, 2024; Elgin and Öztunalı, 2024).

This highlights that many of the criticisms directed to inflation targeting regimes appear to miss the mark. It can be asserted that the operation of the regime on a day-to-day basis already results from a flexibilization or the adoption of "escape clauses", as well as a certain degree of discretion granted to policymakers. However, the theoretical question persists of how to make the inflation targeting regime more efficient given the constraints and uncertainties faced by monetary authorities in the modern world, and the consequent need for its flexibilization or modification, in relation to the strict regime idealized by conventional theory.

The inflation targeting regime does not consist of a blind or rigid rule for the monetary authority. It is an institutional and operating framework that, with its main goal being the achievement of a credible and announced inflation target, can receive different configurations and rules for adjusting policy instruments based on the specificities and social preferences of a particular national economy, resulting in a variety of possible degrees of flexibility or discretion as shown in the previous section.

Finally, this work was an effort to contribute to the debate on the nature of the inflation targeting regime, seeking to demonstrate that it can increase its degree of flexibility in achieving price stability and addressing structural uncertainty surrounding monetary policy decisions, thereby minimizing the costs associated with output and employment losses over time, particularly in a context where there are supply shocks and non-negligible preferences for stabilizing exchange rates and interest rates.

This flexible approach suggests greater relevance in contemporary times, especially in the post-Covid era, as the global economy experienced a period of recurrent inflationary pressures due to ruptures in value and supply chains, as well as surging volatility in commodity markets, which are not under immediate control of any specific domestic monetary policy.

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