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Uncertainties, monetary policy and financial stability: challenges on inflation targeting

GABRIEL CALDAS MONTES*

This work aims at presenting the challenges that inflation targeting central banks may face since uncertainties represent a harmful element for the effectiveness of monetary policy, and since financial instabilities may disturb the transmission mechanisms – in particular, the expectation channel – and thus the economic stability. Financial stability must not be considered as a simple goal of monetary policy, but a precondition for central banks operate their policies and reach the goals of inflation and output stability. The work identifies different sources of uncertainties that surround central banks' decisions; and approaches the role that inflation targeting central banks should play according to some basic principles that can serve as useful guides for central banks to help them achieve successful outcomes in their conduct of monetary policy.

Keywords: uncertainties; inflation targeting; monetary policy; financial stability.
JEL Classification: E52; E58; E61.

INTRODUCTION

Since the 1980s when central banks of the major industrial countries have been successful at bringing inflation down to low and stable levels, policymakers around the world have committed themselves more explicitly with the objective of keeping inflation under control. Nevertheless, while inflation stability has long been suggested as a primary objective for monetary policy, questions like how central banks should implement their policies have arisen, proposing practical obstacles.[1]

* Professor da Faculdade de Economia da Universidade Federal Fluminense. E-mail: gabrielmontesuff@yahoo.com.br. Submetido: Março 2008; Aprovado: Outubro 2008.

[1] These practical obstacles were approached by both New Classical (old mainstream) and New Keynesians (new mainstream) theoreticians. For example, through the works of Kydland and Prescott, 1977;

Recently, a number of countries have adopted explicit inflation targets as a guide for monetary policies since a numerical target is attractive for anchoring inflation expectations, with favorable effects on financial markets and then on the economy. This strategy requires commitment, transparency, clear communication and accountability from central banks – which represent essential elements for reducing uncertainties.

The work aims at presenting the challenges that inflation targeting central banks may face since uncertainties represent a harmful element for the effectiveness of monetary policy, and since financial instabilities may disturb the transmission mechanisms and then the economic stability (the works of Bean, 2003, 2004; Disyatat, 2005; Akram and Eitrheim, 2006; Akram, Bardsen and Lindquist, 2007 aim at presenting the relation between inflation targeting and financial stability). The work identifies different sources of uncertainties that surround central banks' decisions; and approaches the role of inflation targeting central banks according to some "basic principles that can serve as useful guides for central banks to help them achieve successful outcomes in their conduct of monetary policy" (Mishkin, 2000, p. 1). It is suggested that the *Flexible Inflation Forecast Targeting* strategy follows these principles and represents a realistic strategy to reduce these uncertainties, to improve the effectiveness of monetary policy and to deal with possible financial and liquidity crises.

Besides this introduction the paper presents four more sections: the second section describes different sources of uncertainties that potentially affect monetary policy decisions; the third section presents the inflation targeting framework as a strategy for central banks aiming at stabilizing the economy and reducing uncertainties; the fouth section approaches some challenges inflation targeting central banks are supposed to face; the fifth section presents the final considerations.

UNCERTAINTY

Uncertainty is a characteristic of the real world that affects the decision-making process of all economic agents (including central banks' decisions and the consequences of their policies). Both academics and policymakers agree that monetary policy is made in an environment of substantial uncertainty regarding current and future economic conditions as well as the functioning of the economy. In this sense, several researches have begun to analyze the implications of uncertainties for monetary policy (Brainard 1967; Friedman, 1968; Poole, 1970; Batini, Martin and

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Barro and Gordon, 1983a, 1983b; Rogoff, 1985; Barro, 1986; Lohmann, 1992; Persson and Tabellini, 1993; Taylor, 1993; Walsh, 1995; Bernanke and Mishkin, 1997; Blinder, 1998; Clarida, Gali and Gertler, 1999; Svensson, 1999a, 1999b; Mishkin, 2000; Woodford, 2007. New Keynesians are the theoreticians of Inflation Targeting – which is partly against the New Classical mainstream. The first articles of the note belong to the old mainstream: the credibility literature of the New Classical economics. This literature is now dominated by a new mainstream coming from New Keynesian.

Salmon, 1999; Goodhart, 1999; Dequech, 1999a, 1999b; Issing, 1999; ECB, 2001; Dow, 2004).[2]

In order to improve the effectiveness of monetary policies, central banks should know what types of uncertainties they face; otherwise their policy reactions based solely on the forecasts produced under the certainty assumption would be too costly for the economy. Hence, three general broad forms of uncertainties can be identified: (i) the *state of the economy uncertainty*, (ii) the *model or parameter uncertainty* and, (iii) the *strategic uncertainty*.

State of the economy uncertainty

Uncertainties regarding the prevailing state of the economy arise at two levels: **1**) information about the data is imperfect – there are problems of availability and quality of the data, since some data present delays, different methodologies and errors; **2**) the lack of data concerning some variables and the use of other economic indicators as *proxies* for these unobservable measures may lead to false conclusions about the state of the economy.

Central banks often face the challenge of assessing accurately the prevailing economic conditions. Such an assessment supports monetary policy decisions that will be taken aiming at reaching predetermined goals. Concerning data and information uncertainty, Orphanides (2001) and Orphanides and Williams (2002) present important results on the literature on this kind of uncertainty.

In order to interpret the current state of the economy and then taking the correct decisions, it is crucial that central banks analyze the available and observable data and indicators to better understand and identify the nature and persistence of shocks at the economy. It is important, for example, to identify whether the observed shocks originate from the demand or the supply side, whether they originate from domestic or foreign sources, and whether they are supposed to be transitory or long-lasting, because each of these will affect the economy in a different way requiring the appropriate monetary policy response.

Model or parameter uncertainty

there is no consensus among economists about the real or the best representative model of the economy. As pointed by Dow (2004, p. 539): "dissatisfaction with large models has brought to the surface in policy-making circles the issue of how far economic models reflect the 'true' structure of the economy and the transmission of monetary policy, that is, their explanatory power."

The *model/parameter uncertainty* problem can be understood as the uncer-

[2] While problems of risks are well covered by economic literature, it is, in fact, the problem of uncertainty that turns the lives of central bankers and other policymakers more difficult. For the difference between risk and uncertainty, see for example the definition presented by Knight (1921).

tainty regarding the best model to use as a representation of the functioning of the economy in a specific context, which ends up generating an uncertainty about the precise economic policy to be implemented which aims at improving the performance of the economy. While several models have contributed with different ideas and deeper understanding of the economy, none has yet provided a fully satisfactory, unified and uncontroversial description of the economy and its transmissions processes as a whole. Therefore, there is a basic uncertainty about which models provide suitable descriptions of the structural relationships in the economy.

Since each model per se constitutes a simplification of the economy which abstracts from relevant aspects of reality, policymakers will face the problem of deciding which model or sort of model is convenient to use. However, as pointed by Dow (2004, p. 541), "the nature of the economic system is not such as to yield a single, deterministic model". Actions of economic policy themselves require a range of models.

Even if there were a consensus on a suitable model, considerable uncertainty would remain concerning the structural relationships within that particular model. Policymakers may be unsure about how changes in one variable will affect another variable, that is, may be unsure about the parameters in the transmission mechanism. This sort of uncertainty appears when policymakers do not know the values of the parameters that enter the model. Influential analyses regarding "parameter uncertainty" were provided by Brainard (1967) and Poole (1970). Both gave attention to uncertainties' implications upon optimal monetary policy, considering the consequences of additive[3] and multiplicative uncertainties. The work of Söderström (2002) represents a recent contribution on the Brainard's result.[4] Recently, the literature on monetary policy and uncertainty performed wide evolution as perceived through the contributions of Giannoni (2002), Kimura and Kurozumi (2003), Svensson (2003b), Walsh (2004, 2005), Onatski and Williams (2003) and Dennis (2007).

A successful monetary policy response cannot ignore the uncertainty about the parameters in the transmission of monetary policy, in other words, central banks must take into account not only shocks that affect the economy but also how monetary policies are transmitted to the economy, taken seriously multiplicative uncertainty. [5] Central banks cannot also ignore the uncertainty about the length of time

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[3] The additive uncertainty problem represents the uncertainties about omitted variables or shocks that affect the economy.

[4] Söderström (2002) showed that – in contrast to the received wisdom presented by Brainard – uncertainty about the parameters in a dynamic macroeconomic model may lead to more aggressive monetary policy. In particular, when there is uncertainty about the persistence of inflation, it may be optimal for the central bank to respond to shocks more aggressively in order to reduce uncertainty about the future development of inflation.

[5] The uncertainty about the coefficient of a variable in the transmission mechanism is referred to as *multiplicative uncertainty* and can be intrinsic to the economy or due to econometric estimation.

it takes for one variable to affect another (called *lag uncertainty*), for instance, the time that a monetary policy action takes to affect inflation or output.[6]

Another fundamental problem regarding "model/parameter uncertainty" relates to the critique of Lucas (1976): parameters may vary over time as a result of structural change in the economy, that is, "whatever the corrected model was before policy action, that action would itself change the structure of the economy, raising the possibility of uncertainty about the transmission mechanism" (Dow, 2004, p. 544). Thus, the transmission mechanism from monetary policy to prices or any other variable is highly uncertain because shocks come from many different sources – including monetary policy itself – and knowledge concerning the influence of lags is inaccurate.

Strategic uncertainty

This sort of uncertainty arises from the interaction among different economic agents (for instance, from the interaction between central banks and private agents). Regarding the implementation of monetary policies and actual central banks interventions through inflation targeting, it relates to the role of transparency and communication and how these may affect the expectation transmission mechanism as well as the effectiveness of monetary policy.[7] Central banks face some degree of uncertainty concerning the reaction of both economic agents and financial markets to their own policy decisions, as well as economic agents and financial markets may be unsure about central banks' announcements, actions and motivations.

Aiming at reducing this sort of uncertainty and then turning central banks' tasks easier, both economic agents and central banks should act through stable, reliable and widely transparent patterns of behavior. The announcement of objectives and goals to be followed and a strategy to guide and explain policy choices are crucial elements to reduce strategic uncertainty and to improve the effectiveness of monetary policy.

The commitment to achieve the established goals must not be reneged by central banks if they want to enhance their own credibility and the credibility of their policies. Since monetary policy affects the economic performance through expectations, a key concern for almost all central banks has been the maintenance of a high level of credibility with respect to their ability to achieve their goals.[8]

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[6] "Lag uncertainty" introduces volatility in the effects of a variable; however its distinctive feature is that it shifts the effects of the variable between periods.

[7] For more details regarding the influence of central banks' reputation, credibility and transparency upon agents' expectations see Montes and Feijó (2007).

[8] Monetary policies affect the economy through different transmission channels, such as: 1) the interest rate channel, 2) the exchange rate channel, 3) the broad credit channel, 4) the asset prices channel and, 5) the expectations channel. The present article calls attention for the expectation channel since it represents an important transmission mechanism for inflation targeting central banks. For more details see, for example, Mishkin (1995), Berk (1998), Mendonça (2001) and Kuttner and Mosser (2002).

Other sort of uncertainty that has attracted recent attention is the uncertainty about the weights central banks put in their objectives, representing a mix of *parameter uncertainty* and *strategic uncertainty*. Hence, an important task of central banks is to reduce uncertainties on the markets by trying to influence them, through expectations, about their objectives, strategies and commitment.

IMPLEMENTING MONETARY POLICY UNDER UNCERTAINTY

Since uncertainties surround almost all economic decisions and these economic decisions affect the performance of the economy, how should central banks deal with uncertainty in setting monetary policy? Woodford (2003, p. 14) establishes that "there is good reason for a central bank to commit itself to a systematic approach to policy that not only provides an explicit framework for decisionmaking within the bank, but that is also used to explain the bank's decisions to the public". The commitment to a policy strategy or to an objective or to both may facilitate public understanding about the policy implemented and hence improve the economic performance since it tends to reduce strategic uncertainty. As the effectiveness of monetary policy depends on the public's expectations about actual and future policy actions, commitment with clear objectives and tactical actions are able to shape public expectations. Thus, the ability of central banks to affect the actual and future economic performances through public decisions depends on their ability to influence private sector expectations regarding not only the future path of the interest rate and the future state of the economy but also the manner in which they implement actual and future policies, make their announcements and account to the public.[9] As argued by Sellon Jr. (2004, p. 32): "Financial markets are likely to be heavily guided by central banks statements about the state of the economy and the likely course of future policy in judging the degree of persistence of the current stance of policy."[10]

One of the most intriguing puzzles faced by policymakers and central banks is how should they deal with uncertainties concerning the nature and the length of a shock, and in which principles should they base their actions?

Mishkin (2000) presented some basic principles that must serve as useful guides for central banks avoid the creation of uncertainties as well as conduct their policies and better reach their goals.[11] These principles are: **1**) price stability provides sub-

[9] Although the uncertainties previously mentioned have the potential of affecting the ability of central banks reaching their goals, such as low and stable inflation with low output variability, they do not limit the ability of central banks to avoid a high and rising level of inflation and/or a deep recession. Uncertainty is a relevant difficulty put forward by central banks managers for the definition and the transmission of the monetary policy; however it must not be an excuse for allowing an undesirable economic performance.

[10] For a deeper explanation regarding the expectations transmission channel as well as the influence of central banks' policies upon agents' expectations see Montes (2007).

[11] See also Goodfriend (2007).

stantial benefits; **2**) fiscal policy should be aligned with monetary policy; **3**) time-inconsistency is a problem to be avoided; **4**) monetary policy should be forward-looking; **5**) accountability is a basic principle of democracy; **6**) monetary policy should be concerned about output as well as price fluctuations, and; **7**) the most serious economic downturns are associated with financial instability. Another relevant principle should be added to that list: in modern economies, expectations play a decisive role as a transmission mechanism of monetary policies.

Besides these principles, Mishkin (2000, p. 3) also suggests some features that central banks should present, the role they should play and some criteria they should follow, such as: (**i**) price stability should be the overriding, long-run goal of monetary policy; (**ii**) an explicit nominal anchor should be adopted; (**iii**) a central bank should be goal dependent; (**iv**) a central bank should be instrument independent; (**v**) a central bank should be accountable; (**vi**) a central bank should stress transparency and communication, and; (**vii**) a central bank should also have the goal of financial stability. It is argued that the inflation targeting framework follows all these principles and presents the elements mentioned above. Hence, it emerged and developed as a consistent framework according to the principles and features that a strategy might present and according to the role central banks should play.

The inflation targeting framework has reduced uncertainty about the goals and instruments of monetary policy without precluding policy activism, and provided a strategy that allows for "the pursuit of objectives other than price stability in a more disciplined and consistent manner" (Bernanke et al., 1999, p. 21). Besides, the framework helps to reduce uncertainty about the future course of inflation and to influence and guide expectations since (i) it provides monetary policy with a nominal anchor, and (ii) the announcement of inflation targets communicates the central banks' intentions to the public and to the financial markets. Modern central banks, in fact, when adopt the inflation targeting strategy, establish that "the objective is not to affect the real conditions of the economy but rather to directly influence the expectations of private agents, which are judged self-fulfilling" (Le Heron, 2003, p. 21).[12]

Inflation Targeting

> After initial adoption by New Zealand in 1990, a number of countries[13] have opted for this strategy or some variant in order to establish an institutional commitment to price stability as the primary long-run

[12] A new communication strategy is emerging in terms of expectations management: interest rate expectations. This new strategy is an attempt of central banks to reduce uncertainty regarding the link between the short term and long term interest rates. It is thus related to the theory of the term structure, especially the expectations theory of the term structure.

[13] Such as Canada, England, Sweden, Australia, Chile, Brazil, Israel, Korea, Mexico, South Africa, the Philippines and Thailand.

> goal of monetary policy. Inflation targeting is a framework characterized by the public announcement of an official quantitative inflation target (or target ranges) which presents wide and explicit acknowledgement that price stability – meaning low and stable inflation – represents central banks' primary long-term goal. An explicit numerical target for inflation is published, either as a point or a range, and a time horizon for reaching the inflation target – and in which the target will be valid – is defined. This strategic framework seeks to improve communication between private agents and policymakers, and to provide discipline, credibility, accountability, transparency and flexibility in central banks' actions.[14] In this sense, the framework may help reducing *strategic uncertainty* since improves communication, transparency and the way central banks are going to act.

The framework makes clear that even if monetary policy presents an explicit focus on inflation it still can also be flexible, that is, it does not intend to tie central banks' hands through a mechanical rule that considers only one type of functioning model for the economy – which does not deal with unusual and unforeseen circumstances.

The inflation targeting framework does not consider a specific functioning model for the economy, actually, as Bernanke et al. (1999, p. 22) presented,

> inflation targeting requires the central bank to use structural and judgmental models of the economy, in conjunction with whatever information it deems relevant, to pursue its price-stability objective. In other words, inflation targeting is very much a "look at everything" strategy, albeit one with a focused goal.

Therefore, the framework, in fact, aims at providing a discipline-enhancing nominal anchor for monetary policy. Inflation targeting is not a framework that will directly solve the *model uncertainty* problem. One could say that solving the *model uncertainty* problem is a matter of choosing the right (or the best) model to represent the functioning of the economy, however, since (i) there is a lot of disagreement about which model better represent the functioning of the economy, and (ii) the structure of the economy may change over time, that central banks should not blindly follow only one sort of model. Hence, in the real world this choice does not really matter, as Blinder (1998, p. 7) revealed: "no central bank that I know of, and certainly not the Federal Reserve, is wed to a single econometric model of its economy."[15] So, *model uncertainty* does not represent the sort of uncertainty that

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[14] Since monetary policy affects the economy through expectations, it must be emphasized "that the words Transparency, Communication and Credibility, arise from the central banks' willingness to 'manipulate' the expectations of the private sector" (Le Heron, 2003, p. 21).

[15] As an influential central banker, Blinder (1998, p. 12) presented the following statement concerning

the inflation targeting framework attempts to directly eliminate, actually the framework concerns much more on *strategic uncertainty* and its implications over the process of expectations formation and decision-making.

Since monetary policies affect the economy through expectations of the public, most inflation targeting central banks have found that transparency, accountability and effective communication policies are a useful way of making financial markets and the private sector partners in the policymaking process. When central banks communicate clearly their strategies in order to explain their goals as well as how they plan to reach them, promoting a better public understanding, *strategic uncertainty* is reduced.[16]

Macroeconomic theory is moving toward a "new consensus" regarding the role of monetary policy and how central banks should act[17] considering a world surrounded by uncertainties. Since the contributions of Friedman (1968), Kydland and Prescott (1977) and Barro and Gordon (1983a), central banks attempt to act through rule-based policies in order to avoid the problems of time inconsistency and loss of credibility as well as to reduce uncertainties. However, as suggested by Bernanke et al. (1999) and Bernanke (2003), in practice, inflation targeting does not represent a blindly mechanical rule-based strategy; it may be labeled as a policy framework of "constrained discretion" and a communication strategy which aims at focusing on expectations and explaining policy strategies to the public in order to anchor inflation expectations and then promote price stability together with output and employment stability.

As inflation targeting is in the world for almost two decades, it offers lessons on (i) the design and implementation of inflation targeting regimes, (ii) country performance under this strategy and (iii) the conduct of monetary policy (see, for example, the analyzes made by Bernanke et al., 1999). After all these years of experience, one could state that full-fledged inflation targeting is based on the following pillars: 1) an institutional commitment to price stability, 2) absence of other nominal anchors, 3) policy instrument independence, 4) policy transparency and

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uncertainties and the selection of models through a practical guideline: "My approach to this problem while on the Federal Reserve Board was relatively simple: Use a wide variety of models and don't trust any of them too much. So, for example, when the Federal Reserve staff explored policy alternatives, I always insisted on seeing results from (a) our own quarterly econometric model, (b) several alternative econometric models, and (c) a variety of vector autoregressions (VARs) that I developed for this purpose."

[16] Mishkin (2000, p. 7) presents other benefits for transparency, communication and accountability: "Increasing transparency and accountability not only helps to align central banks with democratic principles, and is thus worthy of its own right, but it also has benefits for the ability of central banks to conduct monetary policy successfully."

[17] This recent literature on macroeconomics, uncertainty, inflation targeting and financial stability is rapidly evolving, adding crucial elements on the models, such as: robust control, targeting rule and expectations management. See, for example: Goodfriend and King (1997), Svensson, (2003), Woodford (2003), and Goodfriend (2007).

accountability, 5) absence of fiscal dominance and 6) a forward-looking monetary policy strategy.[18]

Moreover, the framework enforces central banks to develop and to strength their credibility and reputation in order to better affect the expectations of the public. It is suggested that credible inflation targets strengthen forward-looking expectations on inflation and thus weaken the weight of past inflation; reinforcing and legitimating the self-fulfilling feature belonged to expectations. Policy signals from credible monetary authorities – with strong and well defined reputations – will be better understood and generally accepted by market participants and the public, resulting in a more effective monetary transmission mechanism (through expectations) and a lower cost of disinflation whenever a policy of this sort might be implemented. As credibility and reputation are built along the time, inflation targeting will not reduce inflation expectations quickly, but rather it will do so gradually over time. This gradualism is also due to the fact that most central banks do not adopt a *Strict Inflation Targeting*[19] framework.

In practice, inflation targeting is better described as *Flexible Inflation Forecast Targeting*.[20] This kind of strategy is characterized by a more gradualist policy where central banks carefully set their instruments, lengthen their horizons and aim at reaching the inflation target further in the future. The gradualism adopted and/or the flexibility implicit may be explained by central banks' concerns about output stability, exchange rate volatility, interest rate smoothing and *model/parameter uncertainties*.

Hence, the *Flexible Inflation Forecast Targeting* strategy establishes that both output fluctuations and price stability represent important central banks' objectives. It is important and pertinent to clarify that (i) inflation targeting does not involve a mechanical rule-based policymaking, it means that inflation targeting does not represent a strict rule, but a policy framework, and (ii) since the public cares about inflation as well as output and employment stabilization, the flexible strategy does not focus exclusively on inflation and ignores other objectives, such as output, employment, financial stability and exchange rate volatility.

Flexible Inflation Forecast Targeting may be understood as a framework which

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[18] However, many countries – such as Chile, Israel, England, Colombia, Mexico, Peru, Korea and South Africa – adopted inflation targeting without satisfying one or more of the above conditions.

[19] Under this framework, central banks are only concerned with achieving the inflation target. Therefore, if both inflation and inflation expectations have deviated from the target, central banks attempt to bring inflation back to the target as quickly as possible. This kind of attitude may require aggressive instrument movements which may lead to output and/or real exchange rates volatility.

[20] The term "Forecast" is due to the fact that monetary policy influences inflation with a lag, hence, keeping inflation under control may require the central bank to anticipate future movements in inflation. In this sense, constrained discretion is an inherently forward-looking policy approach. As Svensson (1999b, p. 14) stressed: "current monetary policy actions can only affect the future levels of inflation and the output gap, in practice with substantial lags and with the total effects spread out over several quarters. This makes forecasts of the target variables crucial in monetary policy."

combines commitment and flexibility, that is, a scheme of *constrained discretion*. In the words of Bernanke (2003):

> Under constrained discretion, the central bank is free to do its best to stabilize output and employment in the face of short-run disturbances, with the appropriate caution born of our imperfect knowledge of the economy and of the effects of policy (this is the "discretion" part of constrained discretion). However, a crucial proviso is that, in conducting stabilization policy, the central bank must also maintain a strong commitment to keeping inflation – and, hence, public expectations of inflation – firmly under control (the "constrained" part of constrained discretion).

Interpreting inflation targeting as a type of monetary policy rule[21] is a mischaracterization of this approach as it is actually practiced by contemporary central banks. Under *Flexible Inflation Forecast Targeting* central banks do not follow simple and mechanical operational instructions. Rather, the approach provides central banks to use their structural and judgmental models of the economy with all relevant information, to determine the best policy action to achieve the inflation target and to reduce the output gap volatility. If new significant information has arrived, the forecasts and the instrument path are updated. As Bernanke et al. (1999, p. 6) stressed: "By imposing a conceptual structure and its inherent discipline on the central bank, but without eliminating all flexibility, inflation targeting combines some of the advantages traditionally ascribed to rules with those ascribed to discretion."

In order to reduce *strategic uncertainty* and better influence financial markets and public's expectations, policymakers make use of nominal anchors. One of the strongest arguments for the adoption of inflation targeting is that it can help to provide monetary policy with a nominal anchor. Since monetary policy is most effective in the presence of a nominal anchor – and the more understandable that anchor is to the public the better – and acknowledging that all monetary policy regimes are in fact discretionary – being discretion a matter of degree – that inflation targeting represents a strategic option according to modern principles on monetary policy.

Although central banks ought to direct their attentions to the inflation process and how inflation expectations are evolving in order to keep inflation low and stable and to reduce the uncertainties resulted from these aspects, they cannot forget that their policies may both assuage (or even save) as well as unchain financial crises. It is observed that financial crises and their subsequent liquidity banking crises have become world-wide phenomena in recent years. Not only have financial

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[21] Following Bernanke et al. (1999, p. 5): "*Rules* are monetary policies that are essentially automatic requiring little or nothing in the way of macroeconomic analysis or value judgments by the monetary authorities;" and complement saying that "critics, however, have argued that any discipline created by rules comes at a high cost, since a rule rigorously followed deprives the central bank of its ability to deal with unusual or unforeseen circumstances, let alone with fundamental changes in the economy."

and liquidity banking crises occurred in developed countries such as the United States (which presented the dotcom bubble and the recent subprime mortgage crisis[22]), Japan, and some European countries, but they have been a feature of the recent economic scene in developing countries as well – like Mexico, Taiwan, Singapore, Hong Kong, South Korea, Russia, Brazil and Argentina.

Hence, an important puzzle that must be solved concerning inflation targeting – which represents a challenge for policymakers – is how central banks should act in order to avoid or assuage financial and liquidity banking crises, since these crises can shift dramatically economic growth, inflation and inflation expectations paths. Besides, another matter of great concern is how monetary policy should be implemented in order to become more flexible, nevertheless without compromising the goal of price stability.

CHALLENGES ON INFLATION TARGETING

Central banks that opted for adopting inflation targeting not necessarily did it the same way.[23] Hence, some challenges that central banks usually face when inflation targeting is adopted will be briefly presented and attention will be given for the role that inflation targeting central banks should play in such a way that the goal (or the precondition) of financial stability is achieved.

Designing and implementing inflation targeting: operational issues

the way policymakers design and implement the inflation targeting strategy has an important meaning and a strong effect on how well transparency, accountability,

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[22] The subprime mortgage crisis was a sharp rise in home foreclosures which started in the US during the year of 2006 and became a global financial crisis during 2007 and 2008. The crisis began with the bursting of the housing bubble in the US and high default rates on "subprime", adjustable rate, "Alt-A", and other mortgage loans made to higher-risk borrowers with lower income or less credit history than "prime" borrowers. Some economists argue that government policy actually encouraged the development of the subprime debacle through legislation like the Community Reinvestment Act, which they say forces banks to lend to otherwise uncreditworthy consumers. Besides, credit rating agencies were put under scrutiny for giving investment-grade ratings to securitization transactions based on subprime mortgage loans. Higher ratings were justified by various credit enhancements including overcollateralization, credit default insurance, and equity investors willing to bear the first losses. Critics argue that conflicts of interest were involved, as rating agencies are paid by the firms that organize and sell the debt to investors, such as investment banks. The Fed and other central banks around the world, has taken several steps to address the crisis. The Fed's response has basically followed two tracks: (i) efforts to support market liquidity and functioning (through open market operations and lowers interest rates charged to member banks) and, (ii) the pursuit of macroeconomic objectives through monetary policy.

[23] As Mishkin and Schmidt-Hebbel (2002, p. 175) mentioned: "inflation targeters vary widely with regard to implementation features, including the target price index, target width, target horizon, escape clauses, accountability of target misses, goal independence, and overall transparency and accountability of the conduct of policy."

communication and flexibility affect the monetary policy effectiveness. Since inflation targeting is a framework for "constrained discretion", the definition of some operational issues will not tend to the design of a framework which is similar to a mechanical rule. Among the operational issues that arise in the implementation of inflation targeting, policymakers shall discuss and emphasize the following matters:

*The definition of the target as well as the choice of the numerical values for the tar*gets. It must be decided which measure of inflation will be used – that is, the price index whose rate of change is to be targeted – and what numerical value the target point and/or the target range should have.[24] Defining the price index as well as the target point and the target range represent strategic choices which will bring impact over monetary policy conduction in terms of being stricter or more flexible;[25]

The time horizon over which the target is relevant. The definition of the time horizon will bring implications to the magnitudes in which the monetary policy instrument (interest rate) will be manipulated. This subject must be very well analyzed before decided since monetary policy affects the economy with long lags.[26] One of the best ways to deal with the problems of controllability and instrument instability is by lengthening the target horizon to correspond more closely to the lags in the effect of monetary policy on inflation. Too short horizons (less than one year) must be avoided since targets can be missed and thus credibility reduced; too long horizons should also be avoided since they can represent a low commitment with the price stability goal;[27]

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[24] Regarding the relation among transparency, accountability and data legitimacy, the data should be compiled by an agency that is independent of the monetary authority in order to assure the public that the central bank is not manipulating the data; data should not be compiled by monetary authorities.

[25] When central banks announce a narrow target range they aim at communicating greater commitment with the inflation goal than does a broader range; however, a narrower range reduces central banks' ability to react to unexpected (or unforeseen) events and rises the likelihood of breaching the target range. As a consequence, the breach of the inflation target range may result in a strong loss of credibility for the central bank. Moreover, missing an entire range may be perceived by the public as a more serious failure of policy than missing a target point. Hence, the establishment of a target range have to guarantee both flexibility to the monetary policy and commitment to the price stability goal, as well as conveys to the public the message that control of inflation is imperfect.

[26] Countries aiming at reducing high inflation through the adoption of inflation targeting should not combine too short a horizon with both a very low target point and a narrow target range because this strategy can lead to instrument instability problem, creating more uncertainties in the economy. Since wide excessive swings in the monetary instrument occur when central banks try to hit the inflation target, more uncertainties are created in the economy. Thus, the time horizon (over which the central bank is expected to achieve its inflation target) cannot be shorter than the control horizon (over which the policy is expected to affect the target variable) and cannot be too long since it may confuse the public about the central bank's intentions and may represent a loss of commitment.

[27] Regarding the definition and/or the modification of the time horizon, these choices might be associated with the context of the economy as well as with the environment of financial stability.

(i) *The conditions under which the target (or the framework) should be modified*. This subject is very polemical and controversial since changing the target means changing the tolerance to inflation. Sometimes the target point or the target range must be adjusted – upward or downward – for many and different reasons.[28] Changes in the target may not be perceived by the public as an artifice used by policymakers to justify their errors or incompetence. Rather, "so long as variations in the target path are announced far enough in advance that they do not appear to be merely an *ex post* rationalization of actual inflation outcomes, changes in the target path are generally perceived by the public to be a reasonable way of adapting to economic conditions. [...] with adequate explanation from the central bank, the public seems able to distinguish a one-time, temporary shock to inflation [...] from a change in trend inflation" (Bernanke et al., 1999, pp. 292-293).

(ii) *How to go about hitting the target as well as how to handle unintentional target misses*. Inflation targeting central banks make use of all useful information available to the forecasting of inflation and then to set their main instrument (the interest rate) at each date so that the forecast of inflation and the observed inflation equal their target levels. Although inflation targeting was criticized as being non-operational since it does not emphasize and make use of directly observed intermediate targets (such as the money stock), the regime do use an intermediate target. This intermediate target is an inferred quantity – the current forecast of inflation at the target horizon. Inflation targeting central banks are often attempting to influence inflation expectations – through interest rates settings – since "self-fulfilling prophecies" represent a phenomenon that must not be neglected; besides, they are often concerned on establishing credibility for their tactics and policies in order to better influence inflation expectations and improve monetary policy effectiveness. Regarding target misses, sometimes they are accidental, but other times they are the result of bad policies.[29]

It is unequivocal that when transparency, communication and accountability concerning all these issues are high, strategic uncertainty leans to become lower. Nevertheless, some important subjects regarding the interactions among financial stability, strategic uncertainty and the role of inflation targeting central banks facing financial crises are still opened for being better explored under the inflation

[28] For example, supply shocks, financial crises, disinflation procedures and political instability.

[29] Hence, it is important to establish 1) when it is legitimate to miss a target (formal escape clauses), 2) whether the central banker will be punished for missing the target and the punishment he/she will suffer, and 3) whether the targets (point and/or range) should be re-set prior to the end of the announced time horizon and/or whether the time horizon should be re-set. Central banks must be able to explain that sometimes the misses are a result of unexpected events which are out of their control.

targeting approach and, in fact, to be developed in order to improve monetary policy effectiveness.

Financial instability and the role of central banks

in practice, although inflation targeting central banks are primarily concerned with managing the rate of inflation, they do also attempt to avoid recessions (or output fluctuations) as well as financial instability crises. When a financial crisis happens, bringing liquidity banking crisis, central banks are often called to act as lenders of last resort to ensure liquidity to the system. Hence, a narrow focus on inflation might not impede central banks from paying appropriate attention to financial system stability.

Financial stability might not be considered a secondary goal for central banks. Economic downturns and undesirable fluctuations are usually associated with financial instability which, in last instance, is also responsible for creating uncertainties and then for disturbing the decision-making process of both private agents and central banks. Thus, both financial stability and a healthy and well-developed financial system are necessary preconditions for monetary policies succeed under inflation targeting. Both preconditions represent a tremendous advantage in the execution of any monetary policy. For instance, if the financial and the banking systems are fragile or unsound,

> financial institutions have to turn frequently and on a large scale to the central bank for liquidity injections, and the institutions are likely to be so weak that their borrowers and their balance sheets cannot withstand the increases in interest rates that would be associated with the central bank mopping up in the market the liquidity that has been provided at the discount window [...] in such circumstances, the central bank will find it difficult to achieve its inflation objective, and its credibility will be undermined (Truman, 2003, p. 52).

The ideal situation would be central banks responding to dangerous asset price movements in order to stop bubbles from getting too far out of hand. However, it is not a simple task knowing whether a bubble is actually in progress. In fact, it is very difficult to identify whether a financial crisis is about to happen, representing an uncertainty concerning the real state of the economy. Though, if central banks are going to act in advance, they must be prudent when manipulating their policy instruments in order to avoid the strengthening of the uncertainties and the increase of output, inflation and inflation expectations volatility.

Central banks have generally chosen to react after such bubbles burst to minimize collateral impacts on the economy, rather than trying to avoid the bubble itself. However, since changes in asset prices have important effects on economic forecasts and then on inflation and output, these economic forecasts are crucial to central banks decisions, because together with asset price and influenced by asset

price movements they represent important transmission mechanisms for monetary policy.[30] Hence, even under inflation targeting, central banks cannot neglect the appearance of bubbles and the possibility of financial crises occur; they must be constantly alert, monitoring and supervising financial markets attempting to avoid the burst of these bubbles and the occurrence of such crises and/or minimizing their impacts when already occurred.[31]

The *Flexible Inflation Forecast Targeting* strategy provides a framework for conducting monetary policy in normal and stable contexts as well as for preventing the effects of financial crises. The framework induces central banks to automatically adjust interest rates in a stabilizing direction when asset price instability or other financial instabilities occur. The logic is straightforward; since asset price increases stimulate aggregate demand and asset price declines reduce it, inflation targeting central banks in order to stabilize aggregate demand will act raising interest rates as asset prices rise and reducing them when they fall.[32]

Severe episodes of financial instability are often related to asset price crashes, making monetary policy less effective in bringing the economy back to health. Since it is difficult to know whether a bubble is in progress, becoming its bursting an inevitable event, the problem fall on the policies that will follow the bursting. Some important lessons can be learned from the US (dotcom and "subprime" crises) and Japan (debt-deflation crisis with banking and financial crisis) experiences and must be incorporated within the inflation targeting framework in order to avoid the creation of uncertainties and to guarantee the monetary policy effectiveness whenever financial crises occur: (i) central banks do not make a serious mistake in failing to stop a bubble, but rather in not responding fast enough after a bubble bursts, (ii) if a bubble bursting harms the balance sheets of the financial sector, central banks need to take immediate steps to restore the health of the financial system. Hence, central banks must be ready to react as fast as possible to an asset collapse if it occurs.

Attempting to avoid the emergence of possible bubbles and aiming at establishing a "ready to react quickly" strategy to soften negative impacts of financial crises, inflation targeting central banks can issue "*Financial Stability Reports*"[33] and con-

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[30] Regarding the effects of asset price movements on the economy through the "balance sheet channel", see Bernanke and Gertler (2000).

[31] Bernanke and Gertler (2000) suggest that, under inflation targeting, central banks should not respond to changes in asset prices, except insofar as they signal changes in expected inflation. For more details regarding the relation between inflation targeting and asset prices, inflation targeting and financial stability, or financial stability, see Goodhart (2001), Cecchetti, Genberg and Wadwhani (2002), Dillen and Sellin (2003), Levieuge (2002), Bean (2003, 2004), Disyatat (2005), Akram and Eitrheim (2006), Akram, Bärdsen and Linquist (2007), Cecchetti (2007).

[32] However, this type of solution to asset prices disturbances or financial fragility in the real world does not seem so automatic. If we take the example of the Fed with the subprimes crises, the solution is not simply to reduce interest rates. Indeed, it is clear that this strategy is an insurance policy that does not care at all about the inflation rate: it could jump and the Fed would continue to decrease its rate. It suggests that financial stability becomes a more important objective than the inflation target.

[33] As argued by Mishkin (2007, p. 531): "In these reports, the central bank can evaluate whether rises

duct simulations[34] in order to establish how they should respond to a financial collapse. Both measures do not hurt inflation targeting premises; actually, they improve commitment with the goals of financial and price stability as well as ameliorate communication, transparency and accountability.

When crises or unexpected shocks happen, the monetary policy effectiveness may be affected and inflation targets may be missed. When it occurs, it does not mean that the entire inflation targeting strategy should be abandoned. Since *Flexible Inflation Forecast Targeting* is a strategy of "constrained discretion", concerned about macroeconomic performance as a whole, sometimes it is accountable reconsidering and/or changing some operational elements of the framework. These possible reconsiderations and changes cannot reflect loss of commitment, transparency and accountability; rather they ought to represent advances on the framework that will improve monetary policy effectiveness without creating uncertainties.

Countries living with frequent macroeconomic shocks may conclude that deviations from an inflation target are sometimes unavoidable. When such shocks happen, it may be expected that inflation will remain away from target for a relatively prolonged period, especially in the presence of an unhealthy banking sector. Even though temporary target misses are unavoidable and need not be harmful, very frequent and large misses can clearly undermine the credibility of central banks and their monetary policies. Thus, for countries that adopted the inflation targeting framework and are often susceptible to shocks, financial fluctuations (for example, through asset price bubbles and exchange rates volatility) and adverse economic performances as a whole, the monetary authority will be challenged to make difficult judgments in the context of their inflation targeting framework in order to adjust the strategy. Hence the following aspects may be revisited:

(i) **The measure of inflation that is going to be used**: whether keeping the adoption of the headline CPI or changing for a measure that excludes certain volatile components in order to focus on *core inflation* represents an important decision that policymakers have to take. Since some inflation shocks cannot be directly treated through monetary policies – in particular, through interest rate manipulations – and since central banks actually also aim at reducing the output gap volatility, central banks should adopt a strategy of reacting only against deviations of the price index which excludes such shocks. Hence, in order to avoid the instrument instability problem, which is strongly responsible for creating uncertainties in the economy, and thus the output gap volatility problem, central banks can target *core*

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in asset prices might be leading to excessive risk-taking on the part of financial institutions. If this is what appears to be happening, the central bank can put pressure on the prudential regulators and supervisors of these institutions to rein in excessive risk-taking by financial institutions."

[34] Mishkin (2007) establishes an analogy to describe the importance of such simulations: "The strategy of conducting simulations is similar to the training exercise and war games that militaries conduct to prepare their troops for combat. They train them to respond to different scenarios so they can react quickly and with confidence. […] By conducting similar exercises, the central bank can minimize the negative impacts of a collapse of an asset price bubble without having to predict that a bubble is taking place or that it will burst in the near future" (Mishkin, 2007, p. 531).

inflation rather than headline CPI inflation.[35] When a strategy of *core inflation* is adopted, the items that are going to be excluded from the construction of the inflation measure must be decided, informed and explained *ex ante*; if the definition of the measure is well-explained by the authorities, transparency will not necessarily be lost, uncertainties will not be created and monetary policy will acquire the possibility of acting more flexible in some cases. Such strategy must not be interpreted as loss of commitment with the price stability goal, but the recognition that central banks cannot control all kinds of inflation pressures.[36]

(ii) **Use of escape clauses, the numerical values of the target point/range and of the time horizon**: although a numerical target have to be determined, informed and must be in accordance with the established concept of "price stability"[37] – meaning low and stable inflation – the concerns now are 1) when deviations from the target should be allowed and 2) whether the decision about changing the target point or the target range and/or the time horizon represent valid options. Hence, the incorporation of escape clauses represents an alternative that allows for misses of the inflation target without harming central banks' credibility. Escape clauses might be elaborated to deal with target misses from exogenous shocks and events that are out of central banks direct control. These escape clauses must be clearly established and communicated *ex ante* through public communication. It means that, when the framework is about to be implemented as well as before the occurrence of any unexpected or adverse event, which lead to misses of the target, these escape clauses must be known by the public.[38] Regarding the possibility of changing the target point or the target range and/or the time horizon, these represent valid options when target misses become frequent and are followed by controllabil-

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[35] As Bernanke et al. (1999, p. 27) presented, "For maximum flexibility, the index should exclude price changes in narrowly defined sectors and one-time price jumps that are unlikely to affect trend or 'core' inflation."

[36] Actually, through tight monetary policies, central banks are able to reduce the inflation rate as a whole; however, this result may be followed by the damage of sectors that have nothing to do with the inflation problem.

[37] As Mishkin (2000, p. 4) suggested: "Typical definitions of price stability have many elements in common with the commonly used legal definition of pornography in the United States – you know it when you see it. Thus, constraints on fiscal policy and discretionary monetary policy to avoid inflation might end up being quite weak because not everyone will agree on what price stability means in practice, providing both monetary policymakers and politicians a loophole to avoid making tough decisions to keep inflation under control. A solution to this problem, which supports the first three guiding principles, is to adopt an explicit nominal anchor that ties down exactly what the commitment to price stability means." Greenspan (1996) suggests that, "price stability obtains when economic agents no longer take account of the prospective change in the general price level in their economic decisionmaking". Blinder (1995) presents similar definition: "The definition I've long used for price stability is a situation where ordinary people in their ordinary course of business are not thinking and worrying about inflation." Meltzer (1997) defines a situation of price stability as follows: "an inflation rate so close to zero that it ceases to be a significant factor in long-term planning."

[38] Hence, deviations from the target will be allowed when these are clearly specified and previously communicated to the public through escape clauses.

ity and instrument volatility problems, and when output volatility as well as inflation expectations volatility increase, which create and strength *strategic*, *state of the economy* and *model/parameter uncertainties*.

Changes on the operational design of the framework must follow the principles of transparency, communication and accountability as well as all the other principles that serve as guides for central banks conduct their policies, in order to avoid strategic uncertainties or any other uncertainty that may emerge.

Besides, aiming at dealing with inflation pressures – which arise from both supply and demand shocks – through monetary policy, central banks must consider financial stability as a necessary condition. Without financial stability, central banks will not be able to implement their policies since they operate through financial market. Hence, financial stability must not be considered as a simple goal of monetary policy, but a precondition for central banks operate their policies and reach the goals of inflation and output stability.

FINAL CONSIDERATIONS

The paper attempted to approach and to suggest how inflation targeting central banks should conduct their interventions considering (i) some principles that serve as useful guides for their actions, (ii) the possibility of economic downturns associated with financial instability and, (iii) different types of uncertainties that exist and may affect the effectiveness of their policies.

It was suggested that the *Flexible Inflation Forecast Targeting* framework represents a strategy that is able to deal with strategic uncertainty, since through transparency, accountability and communication the strategy clears that monetary policy is concerned about both output and price fluctuations. However, whether central banks will succeed and monetary policy will be effective, it will primordially depend on the operational design of the framework and on how healthy financial and monetary systems are.

Hence, financial stability might not be considered as a simple "goal" for central banks, but a precondition for monetary policy succeeds in reaching their goals, because financial instability creates uncertainties, damages the transmission mechanisms and harms the effectiveness of monetary policies. Thus, central banks should consider financial stability and price stability as highly complementary objectives to be pursued since price instability as well as booms and busts in asset markets have important effects on the real economy.

In this sense, the choice of implementing inflation targeting as a strategy aiming at reducing uncertainties and driving monetary policy decisions towards the quest for macroeconomic stability – since it acts as a nominal anchor for the process of inflation expectations formation and also allows degrees of discretion for the conduction of monetary policy – will be a correct option only if some preconditions were considered. For countries presenting high inflation rates or following crises (such as institutional, financial and/or political) the environment is too chaotic and

the uncertainties concerning the real state of the economy are also too high which make the definition of the targets a difficult task and harms the implementation of monetary policy under inflation targeting. Besides, before choosing for inflation targeting as a strategy to be followed, certain institutional preconditions must be satisfied since the lack of adequate skills (such as independence goal, transparency, accountability and others) may jeopardize the success of the strategy, that is, institutions must present the capacity to implement inflation targeting and the authorities cannot lack the credibility needed – though credibility as well as reputation are conquered along the time.

The financial stability requirement represents an institutional and a technical precondition to make inflation targeting feasible, useful and successful. Thus, once a country has adopted inflation targeting, financial, political and macroeconomic stabilities must be kept, even so operational changes become necessary. According to the economic context or the political environment, sometimes operational and institutional improvements will be demanded. Therein, the transparency, communication and accountability elements of the framework can assist in this process since the central bank's credibility shall not be lost, the commitment with the price stability and output fluctuations goals shall be preserved and the creation of uncertainties shall be avoided.

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