

# Flexible Rules cum Constrained Discretion: A New Consensus in Monetary Policy

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## ABSTRACT

*This paper demonstrates that recent influential contributions to monetary policy imply an emerging consensus whereby neither rigid rules nor complete discretion are found optimal. Instead, middle-ground monetary regimes based on rules (operative under 'normal' circumstances) to anchor inflation expectations over the long run, but designed with enough flexibility to mitigate the short-run effect of shocks (with communicated discretion in 'exceptional' circumstances temporarily overriding these rules), are gaining support in theoretical models and policy formulation and implementation. The opposition of 'rules versus discretion' has, thus, reappeared as the synthesis of 'rules cum discretion', in essence as inflation-forecast targeting. But such synthesis is not without major theoretical problems, as we argue in this contribution. Furthermore, the very recent real-world events have made it obvious that the inflation targeting strategy of monetary policy, which rests upon the new consensus paradigm in modern macroeconomics is at best a 'fair weather' model. In the turbulent economic climate of highly unstable inflation, deep financial crisis and world-wide, abrupt economic slowdown nowadays this approach needs serious rethinking to say the least, if not abandoning it altogether.*

## 1. INTRODUCTION

THE LITERATURE ON OPTIMAL MONETARY POLICY has made a tremendous leap forward since around the beginning of the new millennium, incorporating important theoretical advances along with richer applied sophistication. The analysis of optimal policy in aggregative but microfounded dynamic-stochastic general-equilibrium (DSGE) models or various game-theoretic and mechanism-design set-ups has now begun to allow for deeper heterogeneity, information imperfections, incomplete markets, bounded rationality and other realistic intricacies. The microfoundations of macroeconomic behaviour have

provided an appropriate metric for utility and, through some form of aggregation (still debatable), welfare and, hence, a solid basis for policy analysis 'derived' from 'first principles'. Increasing complexity, usually handled through numerical methods, has enhanced the realism of the new generation of economic and financial models without exposing them to the Lucas (1976) critique. It is from the latter critique that the ambitious but *ad-hoc* large-scale macroeconometric models of the early 1970s suffered. Both the logical coherence imposed by microfounded theories and the increased real-world relevance of these DSGE models have made them more credible, if not completely legitimate (due to inevitable simplifying assumptions). The summarised developments have resulted in what Clarida, Galí and Gertler (1999) labelled 'the science of monetary policy'.

Such profound changes in the way researchers and practitioners of economic policy formalise, measure and simulate economic realities and, therefore, in their advice to policymakers warrant a reexamination of what we know at present about *optimal monetary policy*. This issue is quite old, actually going back at least to Fisher (1896), and Wicksell (1898). In the present study we attempt to organise and assess the available arguments and evidence in the most recent theoretical and empirical literature, as well as central bank policy practice. In doing so, our main thesis is that an obvious convergence of opinion to the inflation-forecast targeting (IFT) framework as optimal monetary policy has taken place, at least given the global economic circumstances prevailing during the first half of the 2000s.<sup>2</sup> By 'most recent', we mean a relatively rich selection of influential contributions that have been published after the turn of the millennium, and more precisely following the treatise by Woodford (2003).<sup>3</sup> This type of work is not intended to, and cannot, be complete. Yet it is 'essentially exhaustive', in the sense of concisely presenting within the *perspective* of seminal earlier research the key novel ideas or problems (with possible solutions, where proposed or implemented) in terms of theory and practice of optimal monetary policy and the related degree of central bank independence.

Academic interest in monetary policy has been reignited, especially after the New Keynesian (Monetary) Policy Model was able to justify a role for monetary policy that is stronger than the limited (and not systematic, hence, undesirable) effects of money surprises in the neoclassical flexible-price representative-agent rational-expectations framework of Sargent and Wallace (1975, 1981), Kydland and Prescott (1977), and Barro and Gordon (1983a, 1983b). It is noteworthy that many leading journals have highlighted new advances in monetary economics topics in special issues very recently, that is, *post* the Walsh (2003) and Woodford (2003) systematisation of the New Keynesian or Neo-Wicksellian theory of modern monetary policy. Our selective, yet quite representative, analysis also draws on a few such authoritative discussions.

In this contribution we essentially argue that IFT appears to have alleviated the long-lasting tension in policy making between rules versus discretion, as well as the related debate on the appropriate degree of autonomy of the monetary authority. We bring together our pieces of evidence from the existing huge theoretical and empirical literature and structure them along two complementary dimensions, one focusing on institution design and another on monetary policy optimality under nominal rigidity. Not only is the approach extensive but also highly critical of these developments.

The paper is organised as follows. Section 2 outlines the fundamental characteristics of the optimal policy problem and its implications for central bank independence in the earlier neoclassical literature. Section 3 revisits the same topic from the perspective of the more recent New Keynesian contributions. Both these sections ultimately introduce inflation targeting as resolving, from a different angle in each, the highlighted trade-offs. Finally, section 4 summarises the main potential challenges to current forecast-targeting regimes of optimal monetary policy and concludes that although an essentially similar, but perhaps slightly more general, evolving, inclusive and encompassing ‘flexible rules cum constrained discretion’ approach prevails, this is not without its problems. We discuss these problems and conclude that they are serious enough to warrant changes, which are far reaching as demonstrated in this final section.

## 2. THE OPTIMAL POLICY PROBLEM IN EARLY SEMINAL WORK

*Optimal* monetary policy can be defined only with respect to a particular model of the economic environment and the economic agents interacting within it. More precisely, one could talk about optimal monetary policy only within the context of a particular *optimisation problem* for the monetary authority. This optimisation problem is constrained by the posited or inferred (‘revealed’) preferences, available technologies, assumed distributions for the stochastic processes and other ‘first principles’ in axiomatic microfounded macromodels. In the past, the objective function was specified on an *ad-hoc* basis: either as *maximising social welfare* (‘measured’ by an explicit *aggregate utility function*) or, because of the duality of the problem known from mathematical economics, as *minimising social loss*, again ‘identified’ explicitly by an *aggregate loss function*. Woodford (2003, chapter 6) has shown how the loss function could, in fact, be derived from first principles, that is, as a quadratic approximation to the assumed utility function, which the representative agent maximises. With no formal model of the economy, centred around a fully-articulated (dynamic-stochastic) optimal control problem to be ‘solved’ by a (not necessarily benevolent) monetary authority, with given (microfounded) economic environment and (enforceable) institutional framework, clearly, no optimality of policy can be established.

For this reason, it is difficult to interpret a given monetary policy, derived to be optimal in a particular economic set-up, as the unique and uni-

versal optimal monetary policy for all circumstances. Naturally, alternative optimal policies will be the outcomes of alternative models, and any optimal policy, because it has to be derived from an explicit optimisation problem, will be sensitive to the functional forms of the objective function(s) as well as to the specified constraint(s), the underlying choice of parameter values and other assumptions. It is not surprising, therefore, that a variety of optimal policies exist in the literature as outcomes of differently formalised aggregate optimisation problems solved by economic agents and public authorities. That is why so many debates and doubts have been associated with the question of what monetary policy is, after all, optimal.

Nevertheless, more and more common ground has been gained on the major aspects of what monetary policy *can* and *should* do. Woodford (2003) has notably argued that the optimal monetary policy consists in precommitment from a 'timeless' perspective.<sup>4</sup> Woodford's (*op cit*) theoretical results have often been interpreted as corresponding broadly in practice to the strategies of inflation targeting, recently adopted by a number of central banks around the world. The purpose of the present study is precisely to take stock of this approach and the related core economic advice concerning policy optimality and effectiveness. The converging views are on a subset of monetary policy issues, theoretical models, empirical techniques or implementation frameworks. To provide a background, we present and assess them next as embedded in the context of earlier seminal work.

Writing from the standpoint of the modern Neo-Wicksellian theory of monetary policy, Woodford (2007, p.4) identifies two 'antithetical conceptions' that have traditionally been assigned to 'good monetary policy': (i) to provide a monetary standard, that is, a stable value of the national currency over a long run; and (ii) to engage in stabilisation policy that facilitates adjustment of the real economy in response to varying economic conditions. He goes on to point out that these two objectives, perceived as conflicting, have in fact generated the long literature on 'rules versus discretion' in policymaking. His further analysis is very much in line with what we also argue here, although we frame our arguments in a somewhat different perspective: namely, that this 'antimony' has been reconciled by the theory and practice of inflation targeting, described as 'flexible rules' by Woodford (2003) or 'constrained discretion' by Bernanke and Mishkin (1997); or, in a broader sense, by any forecast-based monetary policy. Woodford (2007, p.23) concludes with the recommendation that the US move to implementing explicit IFT too, because of a number of advantages of this framework he enumerates, to some of which we briefly return later on.

Analysis of how monetary policy should be conducted evolved historically out of the necessity of practice. As a result, policymakers have created alternative frameworks to formulate and implement monetary policy. Their benefits and costs have been, at the same time, an issue for academic debates, often based on theoretical premises. Tinbergen (1952) seems to be the first

authoritative treatment of a theory of economic policy, and Theil (1961, 1964) considerably extended that work. With the advance of the methods of (deterministic) *dynamic programming* by Bellman (1957) and followers, and of (deterministic) *optimal control* by Pontryagin *et al* (1962), economists have found new, and better-suited, formal tools to address many old and unsolved policy problems. Muth's (1961) rational expectations formulation also contributed to the methodological rethinking and enrichment of earlier economic models and econometric approaches. It has taken, though, about a decade for these new concepts and methodologies to gain a firm grounding across the profession. Yet following work by Lucas (1972, 1976) and Sargent and Wallace (1975), applications of rational-expectations models to optimal policy problems in dynamic-stochastic partial or general equilibrium environments have generated a huge literature with many important results.

### 2.1 Early contributions: targets, instruments and uncertainty

Brainard (1967) is a classic exposition of a simple optimisation problem that a policymaker has to solve under *uncertainty of two types*: (i) the *impact* of the realisation of a shock on a single-variable target, i.e. *shock* (or *additive*) uncertainty; and (ii) the *response* parameter in the policy feedback model, i.e. *parameter* (or *multiplicative*) uncertainty. Two other types of uncertainty widely employed at present are: (iii) *model* uncertainty, when the researcher has more than one model of the economy and is not certain which one of them is the 'true' model; and (iv) *Knightean* uncertainty (Knight, 1921), synonymously referred to as *ambiguity*, when the researcher is not even able to assign subjective probabilities to *all* possible stochastic events, so that s/he does not know (completely) the set of possible outcomes of one or more shock processes. The earlier literature concerning decisions under uncertainty of type (i) above, i.e. such that has nothing to do with the actions of the policymaker, had commonly prescribed 'certainty-equivalence behaviour': to quote Brainard (1967), 'the policy maker should act on the basis of expected values as if he were certain they would actually occur' (p. 413).

However, the optimal policy would look very different when there is also uncertainty of other types. Brainard (*op. cit.*) illustrates this point lucidly in a very 'bare' set-up with one target and one instrument. His one-target one-instrument model condenses in a 'nutshell' the simplest procedure defining optimal policy under what is now called *parameter* uncertainty. In such a case, higher moments of the distribution of the target variable, not just its mean, would be affected. The subsequent literature progressively introduced into the modelling of monetary policy the realistic assumptions of model uncertainty (type iii as above) and ambiguity (type iv as above), up until the currently fashionable targeting regimes and robust optimal control.<sup>5</sup>

In a widely cited paper, Poole (1970) extended Brainard's (1967) work by complicating its 'structure' equation representing the economy in terms of

the Hicks (1937) IS-LM model. Moreover, Poole (1970) claimed to have solved the so-called ‘target problem’ (or, synonymously, ‘instrument problem’) in the earlier literature. The problem arises under uncertainty because the monetary authority may operate through *either* interest rate changes *or* money stock changes, but *not* through *both* independently. Poole (1970) has shown that each of two alternative monetary policies, one operating through the interest rate<sup>6</sup> and the other through the money stock,<sup>7</sup> can be superior to the other, depending on parameter constellations.

Poole also argued in favour of a ‘combination policy’, whereby the interest rate and the money stock are maintained in a certain *relationship* depending, again, on the chosen parameters (i.e. a result analogous to the ‘policy portfolio’ in the extended model of Brainard, 1967, involving two instruments and one target). Poole (1970) concludes that such policy is as good as, or superior to, either interest rate or money stock policies, i.e. it is *an* optimal policy; however, ‘the success of the combination policy depends on knowledge of the parameters of the model, and the combination policy depends on knowledge of more parameters than does a pure money stock or pure interest rate policy’ (p. 209). It follows that for practical purposes this analysis is difficult to exploit in a real-world situation.<sup>8</sup>

Sargent and Wallace (1975) pursue further the analysis of Brainard (1967) and Poole (1970). They introduce *rational* expectations in the analytical framework, but sacrifice *uncertainty*,<sup>9</sup> and work out alternative monetary policies in an *ad-hoc* macromodel centred around ‘surprise inflation’ and popular at the time. Recalling that in some of this earlier literature the problem of *optimal* policy was equivalently termed stabilisation policy, we summarise their two main results: (i) *indeterminacy* of the equilibrium price level arises under an *interest-rate instrument*;<sup>10</sup> and (ii) with a deterministic *money-supply* rule instead, any growth rate, hence, ‘an *X* per cent growth’ rule, is optimal in their model.

## 2.2 More recent contributions: rules, discretion and central bank independence

A principal dimension in the enrichment of the monetary policy literature by game-theoretic and incentive-contract approaches based on rational expectations since the mid-1970s relates to the problem of time inconsistency and to the implied degree of central bank independence. The debate on rules versus discretion is a defining attribute of optimal policy and institution design, and for that reason our focus shifts next to a summary of its main reversals. Table 1 proposes a chronology of this debate along with a brief outline of its key results.

Much work on optimal monetary policy extends Kydland and Prescott (1977), who established the dominance of *rules* over discretion because of the ‘time-inconsistency’ problem. Calvo (1978) pointed out that such dynamic inconsistency arises due to the ex-post incentives for a government to use ‘surprise inflation’ to reduce the real value of any outstanding fiat money.

**Table 1: A Chronology of the Debate on Rules versus Discretion in Optimal Policy**

<i>Paper</i>	<i>Main point introduced into the debate</i>
Kydland and Prescott (1977)	RULES rather than discretion due to TIME INCONSISTENCY
Calvo (1978)	RULES to mitigate incentives for SURPRISE INFLATION
Barro and Gordon (1983a; 1983b)	DISCRETION if REPUTATION solves INFLATIONARY BIAS
Taylor (1983)	RULES if NO PRIVATE INFORMATION about state of economy
Lucas and Stokey (1983)	INCONSISTENCY of Ramsey policy with DEBT RULE
Rogoff (1985)	DISCRETION if CONSERVATIVE CENTRAL BANK preferences
Canzoneri (1985)	DISCRETION if PRIVATE INFORMATION at central bank
Goodfriend (1986)	DISCRETION with MONETARY MYSTIQUE: empirics
Cukierman and Meltzer (1986)	DISCRETION if PRIVATE INFORMATION on policy shifts: SECRECY
Lohmann (1992)	central banking INSTITUTION plus government OVERRIDE clause
Debelle and Fischer (1994)	INSTRUMENT INDEPENDENCE with GOAL DEPENDENCE
Walsh (1995)	DISCRETION with CONTRACT between government and central bank
Bernanke and Mishkin (1997)	INFLATION TARGETING as CONSTRAINED DISCRETION
Svensson (1997a, 1997b)	OPTIMAL INFLATION FORECASTS
Faust and Svensson (2001)	TRANSPARENCY and CREDIBILITY if UNOBSERVABLE GOALS
Meyer (2002)	rules AND discretion PLUS COMMUNICATION
Stokey (2003)	reputation-building to DISCIPLINE discretion and WELL-DESIGNED rules
Woodford (2003)	MICROfounded optimal policy: TIMELESS PRECOMMITMENT
Bernanke and Woodford, eds (2005)	FLEXIBLE inflation targeting OPTIMAL and DEMOCRATIC
Athey, Atkeson and Kehoe (2005)	OPTIMAL DEGREE OF DISCRETION: inflation cap
Svensson (2006)	flexible inflation targeting as BEST central bank PRACTICE
Persson, Persson and Svensson (2006)	TIME CONSISTENCY with optimal Ramsey policy DEBT RULE
Friedman (2006)	DISCRETION rather than rules UNDER GREENSPAN
Svensson (2007)	flexible inflation targeting with central bank JUDGEMENT
Goodfriend (2007)	how the world achieved CONSENSUS on MONETARY POLICY
Woodford (2007)	FORECAST TARGETING as SYNTHESIS of rules and discretion
this article (2009)	FLEXIBLE rules CUM CONSTRAINED discretion

Barro and Gordon (1983a) termed this ‘inflationary bias’ under discretion; potentially, also under the influence of interfering politicians, i.e. the political business cycle. With repeated interaction, Barro and Gordon (1983b) proposed the build-up of *reputation* and, hence, *credibility* as one solution to the inflationary bias. Taylor (1983) argued in favour of rules when private information about the state of the economy was absent, but Lucas and Stokey (1983) found that under a debt rule the Ramsey (1927) policy is inconsistent. Canzoneri (1985), in turn, showed discretion to be optimal when the central bank can exploit private information, while Rogoff (1985) proposed the appointment of a central banker with ‘conservative’ preferences relative to the median voter as another solution to the inflationary bias under discretion. In an empirical paper, Goodfriend (1986) supported discretion complemented by ‘monetary mystique’, and Cukierman and Meltzer (1986) agreed on theoretical grounds that secrecy is essential if there exists private information regarding policy shifts.

The rules versus discretion debate continued throughout the 1990s, incorporating new aspects and moving into the direction of central bank independence and optimal institution design. As a consequence other, essentially institutional, solutions to inflation bias were further on suggested in the literature. The most prominent ones include Lohmann's (1992) conservative central banking *institution* with an *override* clause kept for the government to enact under extreme shocks, shown to be better than either rules or discretion, Walsh's (1995) contract-theory approach to appointing central bankers, and the still broader institution-design perspective launched perhaps by Lohmann (1992) but evolving into *targeting* rules as a particular modern type of a monetary regime. Ironically, such inflation(-forecast) targeting frameworks were adopted in the early 1990s by pragmatic government officials in New Zealand, Canada, Chile, Israel, the UK, Sweden, Australia, Finland and Spain even before theoretical justification for them was convincingly demonstrated.

The above theoretical arguments implied more central bank independence and were largely supported by a parallel empirical literature.<sup>11</sup> However, there were also theoretical and empirical claims against too much central bank independence: (i) leaving the central bank unaccountable is not democratic; (ii) the credibility problem of central banks may either not really exist, being merely a theoretical artefact, or, conversely, extend as well to consolidated government entities;<sup>12</sup> (iii) an autonomous monetary authority may totally ignore output and employment fluctuations, slipping into a ‘deflationary bias’ that disrupts the financial system and economic activity.

Interestingly, Fischer (1994) and Debelle and Fischer (1994) argued that *instrument independence* coupled with *goal dependence* was the socially optimal institutional arrangement to formulate and implement monetary policy in a democratic society. Svensson (1997a) and Herrendorf (1998) specified it as an *inflation targeting* framework,<sup>13</sup> whereby the government delegates the reference interest rate setting to the central bank (or a monetary policy com-



mittee), but retains the quantification of the numerical inflation goal for itself. This type of monetary regime was labelled by Bernanke and Mishkin (1997) as *constrained discretion*, again in an inflation-targeting context. The literature further emphasised, in particular Eijffinger and Hoeberichts (2002), that such a democratic approach to monetary policy would require augmented *responsibility* of the central bank for its actions as well as *accountability* to the government and/or the parliament. In such contexts, the *transparency* of actual policymaking is considered a major dimension of accountability, with a potential to solve the private information problem when central bank discretion was found optimal.<sup>14</sup>

### *2.3 Pragmatic approaches: inflation targeting as a solution to rules vs discretion*

It is fair to note that the (macro) economics profession during the 1970s and the 1980s, after the 1960s breakdown of the neoclassical synthesis, was left 'in a state of schizophrenia where most practitioners continue to resort to the neoclassical synthesis for forecasting and policy analysis while researchers have almost totally discarded it as a framework for conducting research' (Danthine, 1997, p.135; see also Mankiw's, 1990, 'quick refresher course'). Hence, monetary policy advice too was for a long period in disorder and dispute, even until very recently, when Woodford (2003) ultimately was able to propose coherent theoretical foundations for it. Economic pragmatism, then, was called upon to help in policy circles under the pressing needs of real-world problems, mostly related to reorganising the functioning and the management of the economy in a more efficient way. That is how the pragmatic approach to *inflation targeting* emerged, somewhat spontaneously, in the early 1990s, to be justified theoretically only with a certain lag, essentially in the context of the New Keynesian policy model or, perhaps better, the Neo-Wicksellian treatise of Woodford (2003).

In fact, to control the price level or its rate of change (that is, inflation), has ever been a major, if not always the prime, goal of central banks throughout the world, as early as since their creation by laws essentially entrusting them that function. Such a goal has at the same time been largely agreed upon and supported, together with a few others, in most of the theoretical and empirical academic literature (to which we return in section 3) for at least a century. Thus, inflation targeting, broadly based on forecasts of inflation conditional on all sorts of available information, prediction models and judgmental refinements (also discussed in the next section), has always been implicit in the business and politics of central banking.

In such a sense, the label of IFT must have first sounded a bit of a tautology, at least to practitioners of monetary policy, when it became more and more explicitly discussed as the 'new' strategy or framework for (optimal) mon-

etary policy around the mid-1990s after the earlier monetary targeting framework had lost total credibility. From such a central bankers' perspective, the explicit new framework must have seemed not that novel. Yet it then endorsed more formally the implicit traditional role of the monetary authority, by developing it theoretically as well as making it clearer in terms of procedure and implementation via interest rate changes, in effect raising IFT to the centre stage of policymaking by increased communication with the public.

Indeed, the desire for a considerable improvement in the steering of the macroeconomy by the government produced the inflation-targeting framework in New Zealand.<sup>15</sup> Neo-Wicksellian theorising then proclaimed, with a delay of roughly a decade, that the *flexible* variant of inflation targeting, i.e. when the central bank responds to an *output* gap measure in addition to the *inflation* gap relative to the inflation target, is the optimal monetary policy. Optimality was, of course, proven within explicit and relatively rich economic models of the New Keynesian or Neo-Wicksellian kind. Yet in plainer language, accessible to the wider public, it basically implied that *targeting* regimes were preferable mostly because they made the best use of all available relevant information. Forecast-based targeting also allows for judgment to 'adjust' the conclusions from a number of alternative models central bankers use in decision making. Svensson (1997a, 1997b), Bernanke and Mishkin (1997) and Bernanke and Woodford (1997) were among the first academics to embrace, theoretically justify, and popularise this new fashion in central banking.

The present section has thus argued that the IFT policy framework could be seen as an institutional solution to the 'rules *versus* discretion' debate, essentially converging to a middle ground of formulating and implementing 'flexible rules *cum* constrained discretion' under instrument independence with goal dependence. But this *institution-design* optimality of inflation targeting is just one of the attractive features of this monetary strategy. Another important dimension that makes IFT desirable from the viewpoint of *economic theory* is its justification as optimal monetary policy under nominal rigidities. This latter dimension is outlined in more detail in the next section.

### 3. THE OPTIMAL POLICY PROBLEM IN RECENT NEW KEYNESIAN MODELS

The so-called New Keynesian (Monetary) Policy Model (NK(M)PM), also termed New Neoclassical Synthesis (NNS), after Goodfriend and King (1997), or Neo-Wicksellian model, after Woodford (2003), appears currently to be the mainstream paradigm in both the theory and practice of central banking. The NK/NNS/Neo-Wicksellian paradigm is exposed in sophisticated detail in Walsh (2003, chapters 8, 9, 10 and 11) and throughout the treatise of Woodford (2003). We summarise these approaches and their latest extensions in what follows.

#### 3.1 Theoretical findings: price-level stabilisation optimal

An earlier important contribution within the NNS framework was King and Wolman (1999), who posed the question 'What should the monetary authori-

ty do when prices are sticky?', and gave the simple answer: 'Stabilise the price level'. This question and this answer state concisely the key theoretical results and the corresponding policy recommendations<sup>16</sup> of that research.

A next theoretical question that logically follows, 'What measures of inflation should central banks target?', was asked and tentatively answered by Mankiw and Reis (2003). Based on a calibration of US data, they found that an inflation targeting central bank 'that wants to achieve maximum stability of economic activity should use a price index that gives a substantial weight to the level of nominal wages' (p.1058).

In an ambitious study along the same NNS paradigm, but which attempts to synthesise as well previous main findings in the field, Khan, King and Wolman (2003) distinguish three intellectual traditions that are relevant to the analysis of optimal monetary policy. To each of these traditions, they assign a policy prescription as to the appropriate regulation of the nominal interest rate by the monetary authority:

(1) arguing that the business cycle was caused by swings in the dollar, the *Fisherian* prescription (Fisher, 1896, 1911, 1923, 1930) calls for stabilisation of the price level, and implies that the nominal interest rate would, therefore, fluctuate with variations in real activity;

(2) focusing on the inefficient output level generated in the short run by market forces under rigid wages and prices, the *Keynesian* prescription (Keynes, 1936) calls for stabilisation of real economic activity by fiscal and monetary authorities, implying substantial variation in the nominal interest rate when shocks (to aggregate demand) hit the economy;

(3) analysing monetary policy through a long-run perspective whereby prices are fully flexible, and applying the microeconomic principle of policy analysis according to which social and private cost should be equated, the *Friedman* prescription (Friedman, 1969) consists of what became known as Friedman's rule, i.e. that the nominal interest rate should be approximately zero, implying deflation on average.

Following the approach of Ramsey (1927) and Lucas and Stokey (1983), Khan, King and Wolman (2003) then assume full commitment under a benevolent social planner and sticky prices as in Calvo (1983). They find support for the Friedman prescription of deflation, but with a low *positive* nominal interest rate, because of the price rigidity in their model; as well as for the Fisherian prescription interpreted by them as eliminating price-level surprises, but again with some tendency for interest rate smoothing because of the pricing friction. However, they do not find much support for the Keynesian prescription to stabilise real activity. Similarly to the earlier paper by King and Wolman (1999) and within the same broad context of the NNS model, they conclude that optimal monetary policy when prices are sticky reduces to stabilising the price level, i.e. imitating (or replicating), in a sense, the allocations

that would emerge under fully flexible prices. This is, in essence, the conclusion on monetary policy optimality that is reproduced in most New Keynesian models with nominal rigidities.

### 3.2 Empirical evidence: estimated monetary policy reaction functions

The NK/NNS theory summarised in the preceding subsection provides a rationale for, and is complemented by, empirical estimation, tests and applications. A huge number of papers have explored such applied avenues.<sup>17</sup>

Just a single equation, out of the three- or four-equation system commonly appearing in various versions of the NKPM, has often been estimated in econometric work. Two equations have usually been preferred for such separate estimation as a single equation, and in different specifications. These are the forward-looking (NK) Phillips curve, which also plays the role of an aggregate supply (AS) schedule in the model, and the Taylor (1993) rule, which is the monetary policy reaction function in the NKPM. Taylor-type rule estimation has been perhaps the most exploited empirical approach in applied monetary policy in the last decade or so. The reason is that the original rule is simple, intuitive and provides a good proxy and a relatively objective measure of the actual policy stance of real-world central banks. However, more recently this equation has been criticised on a number of accounts. At the worst extreme, it has been called ‘spurious regression’ (Österholm, 2005). At best, it has been found ‘suboptimal’ (e.g. in Woodford, 2001, 2003) in more sophisticated NK/NNS models, i.e. inferior to what has been termed a *targeting rule* by Svensson (1999, 2003), a *targeting regime* by Walsh (2003), or still *forecast targeting* by Svensson (2006). The best-known example of a targeting regime in actual policy making is the IFT framework for monetary policy formulation and implementation, now adopted in more than 20 countries. More recently it has been criticised in terms of the long-run real equilibrium rate of interest, in that there is a great deal of uncertainty in view of its imprecise empirical value. Weber *et al* (2008) provide a wide ranging discussion on the serious problems with the estimation of this rate, knowledge of which is paramount in the conduct of monetary policy.

### 3.3 Policy advice: optimal inflation targets plus central bank judgement

This leads us naturally to the implications of the NK(M)PM for practical central banking. Neo-Wicksellian theory (for example, Woodford, 2003) and the econometrics behind the NK/NNS model augmented with an optimising central bank assigned an inflation target, but also the task to lower the variance of the output gap and of the change in the interest rate (for example, Söderström *et al*, 2005) have combined to, in essence, support intellectually and empirically the popular inflation-targeting regimes. Moreover, NK/NNS/Neo-Wicksellian theory has recently shown that *flexible* inflation targeting, potentially incorporating central bank *judgement* and *model* uncertainty, and, perhaps, being more *transparent* and explicit about operational

objectives, forecasts and *communication* is the *optimal* monetary policy in relatively rich and realistic microfounded economic environments (Svensson, 2007; Svensson and Woodford, 2005; and Woodford, 2007). On the empirical side, the high informational and computational requirements involved in the perpetual re-estimation, re-forecasting, re-optimising and re-communication inherent in targeting regimes has imposed the need for solid econometric work at central banks. Many academics and policy makers now argue that flexible inflation targeting seems to be the *best practice* in central banking, in addition to having been found the optimal monetary strategy (see, for instance, Svensson, 2007; Woodford, 2007).<sup>18</sup>

Inflation is, of course, not the sole objective of monetary policy; nor is the natural rate doctrine, underlying the NNS paradigm, the only possible one. Yet some form of an implicit, if not explicit, inflation target appears to be the dominant long-term, or still baseline, goal in both (mainstream) theory and policy making at present. The central bank would follow it until an extreme or exceptional 'shock' emerges or a huge 'risk' threatens to materialise, sometimes qualified as 'exotic event', which is 'both unforeseeable and unquantifiable' (Athey *et al*, 2005, p.1462). In such 'non-standard' situations (i.e. out of the 'baseline' scenario) the central bank would, logically, react in a discretionary manner, even under no explicit IFT strategy but still under what Bernanke (2004) qualifies as forecast-based monetary policy as in the US.<sup>19</sup> Meanwhile, along with the primary long-term objective of low inflation, conducive also to long-run growth (via anchored inflation expectations and, hence, low real interest rate variability), the central bank would do as much as it can to keep the economy going and to maintain financial stability.

When one adds transparency and accountability in communicating the target and the policy measures to achieve it, we have the fully-fledged inflation-targeting strategy. Current inflation-targeting central banks do not appear to ignore completely other objectives, despite the fact that they put the emphasis exclusively on inflation.<sup>20</sup> So it is rather a matter of interpretation insofar as there is a difference of opinion between implicit and explicit strategies of central banks on what inflation targeting really means. It is clear that inflation targeting has both advantages and disadvantages relative to other monetary strategies, and Mishkin (2006a) is not silent about the disadvantages even in his introductory textbook. Moreover, the success/failure of inflation targeting may also be country-specific: it may work (better) in developed economies and not (that much) in developing/transition ones.<sup>21</sup> We would agree, though, with Angeriz and Arestis (2007, 2008) that although inflation targeting countries may appear to have been able to tame inflation, this does not necessarily mean success of the policy. For it is the case that countries that have not adopted this particular monetary policy have also been as successful. It appears that other explanations should be sought. One could very well be globalisation, which may be a better explanation of the price stability over the decade before the current financial crisis that began in August 2007.

Yet, at present, theoretical results appear to predominantly support IFT practices; this is summarized by Athey *et al* (2005):

One interpretation of our work is that we solve for the optimal inflation targets. As such, our work is related to the burgeoning literature on inflation targeting. (See the works of Cukierman and Meltzer (1986), Bernanke and Woodford (1997), and Faust and Svensson (2001), among many others.) In terms of the practical application of inflation targets, Bernanke and Mishkin (1997) discuss how inflation targets often take the form of ranges or limits on acceptable inflation rates similar to the ranges we derive. Indeed, our work here provides one theoretical rationale for the type of constrained discretion advocated by Bernanke and Mishkin (p.1433).

Inflation targeting has, moreover, largely incorporated, or has the potential to incorporate, most of the innovative approaches in optimal monetary policy analysis currently on the research agenda.<sup>22</sup> Looking back at the latest decade of our chronology of the ‘rules versus discretion’ debate in Table 1, one could see that the opposition is gradually moving toward a synthesis, embodied by the dominance of (various forms of) policy frameworks combining well-designed rules and constrained discretion. Such are, in essence, the main conclusions and interpretations in Stokey (2003) and Woodford (2003). Faust and Svensson (2001) further claim that when goals are unobservable, transparency and credibility, typical for IFT regimes, are optimal. Meyer (2002) agrees, from the practitioner's point of view, in stating that rules *and* discretion with communication of policy to the public appears to be the best monetary policy practice. Bernanke and Woodford (2005) find flexible inflation targeting optimal and democratic; Svensson (2007) adds to this central bank judgment, readily allowed within IFT frameworks; and Svensson (2006) proclaims flexible IFT with judgment the best central bank practice.

Moreover, Persson *et al* (2006) are able to prove a result that has turned out to be tricky and evasive for a long time: they show consistency of the optimal Ramsey policy under a debt rule, thus updating the earlier work of Lucas and Stokey (1983) as well as of their own (Persson *et al*, 1987). Friedman (2006) remarks that the Greenspan period was one of discretion rather than of a rule, yet this also fits into an IFT framework in an implicit sense, as we noted earlier. Similarly to our arguments here, Woodford (2007) interprets forecast targeting as the ‘synthesis’ of rules and discretion and insists that the time has come for the US to actually shift to explicit IFT, and Goodfriend (2007) presents his own account on how the world reached consensus on monetary policy.

To conclude in terms of Table 1, we could sum-up or update this famous debate on optimal monetary policy and central bank independence as progressing from (rigid) rules *versus* (full) discretion to (flexible) rules *cum* (constrained) discretion. While section 2 has viewed the resolution of the

debate by IFT mostly from an institution-design perspective, section 3 has complemented our arguments by focusing on IFT's optimality under nominal rigidity. But we would conclude, in section 4, that desirable optimal policy should be understood in a broader context than merely as an IFT framework. That is, while optimal policy institution design perhaps still falls into the general characterisation of 'flexible/long-run/baseline rules *plus* constrained/short-run/communicated discretion', as IFT also does, optimal monetary policy can well move beyond IFT as its specific (and not always quite appropriate) implementation under particular conditions. In essence, IFT should be more flexible and responsive with respect to changing global circumstances and more encompassing and inclusive with respect to insights from alternative theories and practices of monetary policy (to avoid the trap of becoming a 'dogma'). In other words, whereas the past opposition of 'rules *versus* discretion' has at present almost consensually reappeared as the synthesis of 'rules *cum* discretion'; or, more precisely, as 'flexible rules *cum* constrained discretion', the narrow interpretation of this synthesis only as IFT is problematic; it certainly requires serious reappraisal in the face of the evolving realities and theories, much enrichment and refinement, or even potential abandonment and replacement.

#### 4. POTENTIAL CHALLENGES AND CONCLUDING REMARKS

This paper has provided a synthetic perspective on the fundamental issue of optimal monetary policy as explored by two dominant strands of earlier literature, both converging to the same essential conclusions on the rules versus discretion debate that arose in the context of neoclassical macroeconomics and the nominal rigidity arguments that were put forward by the New Keynesian school. In particular, we have reexamined the evolution of these old controversies in the light of the modern theoretical and empirical literature generated since Goodfriend and King (1997) proclaimed the methodology of the New Neoclassical Synthesis.<sup>23</sup> As is widely accepted now, this new consensus was the successful outcome of the mutual enrichment in the last couple of decades between the neoclassical and New Keynesian research paradigms. The NNS has shown flexibility, being able to encompass several New Keynesian analyses of nominal rigidities and the expectations-augmented or inertial Phillips curve, as well as the neoclassical natural rate hypothesis and the rational expectation hypothesis (see, for example, Arestis, 2007; Woodford, 2009). More importantly, the recent convergence to a basic methodological consensus in macroeconomics on the modelling, evaluation and implementation of optimal monetary policy is consistent with the procedures and behaviour of most central banks around the world,<sup>24</sup> arguably made more autonomous and more responsible to society through increased transparency, accountability and communication. A compact statement of the current approach to formulating, validating and improving (such DSGE) policy models by refining them through calibration and simulation, confronting them with

the data, and complementing them with expert judgment, is provided by Woodford (2009):

Policy decisions must constantly be made, despite policymakers' uncertainty about the precise effects of alternative choices; even if one restricts the aims of policy — say, to a concern purely with inflation stabilization — difficult decisions must be made as to how to employ the available instruments of policy in the service of that goal. One cannot but base policy advice on provisional models, unless one is willing to allow policy to be made on even more ill-informed grounds. Of course, honest advice will be open about the places where there are obvious grounds for uncertainty about the provisional conclusions obtained from currently available models; and prudent policy decisions will seek to be robust to possible errors resulting from reliance on a faulty model (p. 273).

It is natural to admit, however, that the recent convergence to a methodological 'common ground' in our understanding of how to study and implement optimal monetary policy cannot be complete or ultimate, by definition. Insofar the global economic environment in which our modern society is embedded evolves — gradually or abruptly — potential challenges to the consensual views in macroeconomics and central banking dominant at present will always remain. It is not merely the environment that changes, revealing some of the hidden ambiguity yet keeping also much of it in store for future generations of scholars and policymakers. It is also our learning how to adapt or react to an ever-lasting social evolution that advances and retreats, by larger or smaller increments. It is thus in two aspects, or dimensions, that we could think of the potential challenges — nowadays as well as, especially, in the decades ahead — to optimal monetary policy, in general, and inflation-forecast targeting, in particular.

The first line of attack, which has been around for some time, on the common body of the broad consensus as outlined above, has come along with certain disagreements, of a lesser or more essential nature, regarding the appropriate models, validation procedures, and even policy objectives. In fact, the roots of these disagreements can be traced back to the Keynesian versus neoclassical debates of the 1970s, mostly on the grounds that the economy is an open-ended and evolving system. As such it should not be reduced to solvable, closed-form models of a few mathematical equations at the cost of misleading ('heroic') assumptions and renouncing the realism of a more encompassing, albeit partly *ad hoc* approach.

More recent criticisms in a similar spirit have been voiced in the last couple of decades, namely that modern DSGE models suffer from a variety of problems (see, for example, Fontana and Palacio Vera, 2004, and Fontana 2006, 2007), including the lack of a proper analysis of the credit and financial markets (the transversality condition excludes *de facto* the failure of banks



and financial institutions), of the labour market (workers are always on the labour supply curve), and the goods markets (the desired markup of price over marginal — rather than fixed — costs is assumed to be constant). Furthermore, the NNS model is built upon the still controversial axiom of neutrality of money and monetary policy in the long run (see, for example, Fontana and Palacio Vera, 2007), and the contentious theory of the natural real rate of interest (see, for example, Crespo Cuaresma and Gnan, 2007; Weber *et al*, 2008) and of the natural rate of unemployment (see e.g. Storm and Naastepad, 2007).

Furthermore the second, and complementary line of attack has only very recently called into question — and in a quite dramatic and urgent way indeed — the credibility of the type of DSGE models widely used in academia and central banks today (see e.g. Goodhart, 2008). It came along with the real-world events and developments since August 2007, featuring the subprime mortgage market debt problems that led to the worst post-war financial crisis seen in most major economies. As mentioned above, some of the weaknesses of DSGE models, in a narrower sense, and of the NNS paradigm, in a broader context, had already been identified by the profession, both in research of a (more) mainstream as well as of a non- (or less) mainstream orientation.<sup>25</sup> But there is no doubt that with the advent of what we would dare to call here the Great Depression of the 21st century,<sup>26</sup> these and other vulnerabilities and potential challenges have come out in a much sharper contrast.

An obvious and immediate research agenda for monetary policy scholars and practitioners would thus be to address in a profound way the causes and consequences of the global asset price bubble as well as what policy could have done in precipitating, preventing or coping *ex post* with the chain of interrelated credit crunches across the world economy. And should monetary policy, instead of claiming victory over inflation and even over the business cycle (just recall the ambitious and perhaps premature assertions at meetings and conferences throughout the world as well as in published articles in scientific journals about the ‘great moderation’), not have allowed some more inflation; and/or variation in inflation during the recent decade or so, for example, by giving more prominence to asset prices in its ‘objective function’ or other appropriate measures? Would have this implied bursting the asset price bubble at an earlier stage by corresponding increases of policy rates to somewhat higher levels than those recently observed in major economies?<sup>27</sup> And to what extent might IFT itself have contributed to the ‘great moderation’ and to ‘inflating’ the asset price bubble in the first place, by delaying for long a new world-wide recession?

How ‘transitory’ and how ‘constrained’ must monetary policy be in its use of discretion under ‘extreme’ circumstances such as needed, for instance, to put down financial ‘fires’ of the scale of the deepening global depression? Indeed, how much of its long-run credibility, based on a ‘flexible’ rule as a commitment device, should be thus sacrificed in the future for the sake of the

present? Such questions must be answered now for they challenge our current understanding and knowledge of what has been happening over the last few years. They point directly to the fact that the new consensus monetary policy model, i.e. the Neo-Wicksellian approach, needs serious rethinking to say the least, if not abandoning it altogether. For while it is true that IFT appears to have been successful in controlling inflation there are good reasons, as argued above, that other explanations are more relevant and other policy priorities would have been more urgent and appropriate.

As very recent real-world events have demonstrated, the IFT strategy of monetary policy resting upon the NNS paradigm in modern macroeconomics is at best a 'fair weather' model. While it may have remained largely and mostly adequate in a 'baseline scenario' of a relatively favourable global dynamics with no dramatic changes, i.e., during the low and stable inflation environment of the 'great moderation', the IFT/NNS framework, in a narrower context, is increasingly seen as much less pertinent in the turbulent economic climate of highly unstable inflation, deep financial crisis and world-wide, serious economic slowdown nowadays. Inflation targeting rose to prominence under the pressure of real-world economic problems in the late 1980s, and may similarly leave the centre stage of policymaking because of global challenges of a novel nature in the late 2000s. A further enrichment and refinement of the 'flexible rules cum constrained discretion' synthesis of optimal monetary policy we outlined here, in a broader sense, also appears necessary as well as urgent. Replacing it with a more Keynesian type of approach, though, is a great deal more and long overdue.

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#### ENDNOTES

1. Cambridge Centre for Economic and Public Policy, Department of Land Economy, University of Cambridge, 19 Silver Street, Cambridge, CB3 9EP, UK. E-mail: pa267@cam.ac.uk; Economic Analysis Research Group, School of Economics, Henley Business School, University of Reading, Whiteknights, Reading, RG6 6AA, UK. E-mail: a.mihailov@henley.reading.ac.uk. This article is a revised version of Economic Analysis Research Group Working Paper 2007-013 (October 2007), also simultaneously circulated as Economics & Management Discussion Paper 2007-053 (October 2007), at the Business School of the University of Reading. We are grateful to two anonymous referees and the Associate Editors, Rob Ackrill and Bruce Philp, for useful feedback on an earlier version. We also thank the audience at the Workshop on Central Banking in the Twentieth Century organised by the Centre for Institutional Performance at the University of Reading (24 April 2009), in particular Mark Casson, James Forder, Ben Norman and John Singleton, for sharing their views on the issues we discuss in the article. The usual disclaimer applies.

2. Even in major world economies such as the US, where inflation targeting has never been an explicit and formally announced monetary strategy, IFT can be considered implicit in the actual behaviour of the Fed. Claims in this sense have been voiced, among others, by scholars with the highest academic credentials who have also served as highest-level monetary policymakers (see e.g. Bernanke, 2004, and Mishkin, 2006b), and have by now widely been accepted.

3. In fact, the first coherent microfounded theory of monetary policy.

4. For a formal and precise definition, see Woodford, 2003, pp.538-539 and 542-543; on a more intuitive level, this is roughly a time-invariant optimal policy rule ensuring unique bounded equilibrium.

5. Note that in modern optimal control terminology what is termed here the instrument(s) is synonymous with the control (or choice, or decision) variable(s) in a policy optimisation problem, upon which the decision maker acts directly to affect the target(s), or the state variable(s).

6. And, thus, similar to an interest-rate rule, but not necessarily the same since the instrument may be adjusted under discretion.

7. Thus similar to, but not necessarily the same as, a money-supply rule.

8. Several other criticisms have been addressed to the Poole's (1970) approach (see, for example, Fontana and Palacio Vera, 2004).

9. Knightian uncertainty has reappeared only very recently in optimal monetary policy analysis. See, for instance, Nocetti (2007), although ambiguity has frequently infiltrated theoretical economics.

10. This result has been refined and, essentially, refuted by Woodford (1995).

11. Beginning with Parkin and Bade (1978), Alesina (1988), Grilli, Masciandaro and Tabellini (1991), Cukierman (1992), and Alesina and Summers (1993), to mention only the earliest studies.

12. See, for example, McCallum (1997), who argues that: (i) it is inappropriate to presume that central banks will, in the absence of any tangible precommitment technology, inevitably behave in a 'discretionary' fashion that implies an inflationary bias, and sees no necessary trade-off between 'flexibility and commitment'; (ii) to the extent that the absence of any precommitment technology is nevertheless a problem, it will apply to a consolidated central bank-plus-government entity as well, and thus contracts between governments and central banks, e.g. of the type suggested by Walsh (1995), do not overcome the motivation for dynamic inconsistency.

13. Haldane, ed. (1995), Leiderman and Svensson, eds. (1995), Svensson (1997b), Bernanke and Mishkin (1997), Bernanke and Woodford (1997), Vickers (1998), and Bernanke, Laubach, Mishkin and Posen (1999) constitute the earliest other work that concentrates explicitly on inflation targets.

14. Several authors have, however, critically assessed the theoretical and empirical support for central bank independence — see, for example, Forder (1998, 2001); Angeriz, Arestis and McCombie (2008).

15. The first explicit IFT strategy was introduced in New Zealand by law adopted in 1989, and has been implemented there successfully since then (see, for instance, Archer, 1997).

16. Reminiscent also of Friedman's (1968) conclusions on what monetary policy can and should do.

17. Two review issues on this empirical literature are worth mentioning. One is in the *Oxford Bulletin of Economics and Statistics* (see Henry and Pagan, 2004, for an introduction), entitled 'The Econometrics of the NKPM'. The second is in the *Journal of Monetary Economics* (see King and Plosser, 2005) under the theme 'The Econometrics of the New Keynesian Price Equation' — the titles are quite indicative.

18. Arestis and Sawyer (2003, 2004), among others, are sceptical about the success of inflation targeting and the underlying model, which they label the 'new consensus' in monetary economics and suggest that it is rather limited in its analysis. They claim, furthermore, that when the analysis is broadened out to embrace empirical issues and evidence, monetary policy is relatively impotent. They also argue that, by contrast, fiscal policy remains a powerful tool for macroeconomic policy, which they find particularly apt under the economic conditions that prevailed when writing the two papers just quoted.

19. Recent examples of such behaviour of the monetary authority are the Asian crisis of 1997-1998, the terrorist attack on the US in September 2001, and — most pertinently at present — the ongoing subprime mortgage market crisis and its profound and devastating financial repercussions throughout the world. We return to a further discussion of these very recent developments as well as of the key related criticisms to IFT in our concluding section.

20. See, for example, Mihailov (2005, 2006), who employs OLS, TSLS and GMM estimation of alternative policy reaction functions, to suggest that on empirical grounds such has been the case in the UK.

21. This is a main worry in the literature overview by Arestis and Sawyer (2003) or the empirical study by Angeriz and Arestis (2006), among others. On the other hand, King (2005) has claimed that the introduction of IFT in the UK has resulted in greater stability of both real activity and inflation; and Vega and Winkelried (2005) present evidence from propensity score matching that IFT has helped in reducing the level and volatility of inflation in all countries that have adopted it. Similarly, employing a stochastic volatility model, Arestis *et al* (2002) find that the adoption of inflation targets might have resulted in a more favourable monetary policy trade-off in most countries in their sample.

22. See, among others, Piger and Thornton, eds. (2004) or Bernanke and Woodford, eds. (2005), as well as the major criticisms to the NNS paradigm briefly reviewed in our concluding section. A structured summary of the main active areas of research in monetary economics through the perspective of its established fields and methods is provided in Arestis and Mihailov (2008).

23. Also sometimes termed New Consensus Macroeconomics (NCM) - see, for example, Arestis (2007); or simply New Synthesis — see, for example, Woodford (2009).

24. Yet Mankiw (2006), among others, is rather sceptical as to the extent accumulated new knowledge in scientific macroeconomics has been of relevance and use for solving problems of pragmatic nature, of the type policymakers really face; and Goodhart (2008), among others, has similarly cast doubt on the ability of monetary theory to face facts and help practical needs on the eve and in the wake of the ongoing global financial crisis.

25. Several authors have suggested alternative monetary policy strategies, which at least in part respond to some of the critical issues discussed. For example, the role of (flexible — long run) rules and (constrained - short run) discretion, as well as the coordination of fiscal and monetary policies (Lavoie and Seccareccia, 2005).

26. How could one refer otherwise to a situation where the Bank of England announced in early January 2009 a historic low of its base interest rate at 1.5 per cent per annum, a measure without precedent since the Bank's very foundation in 1694? And how could one refer otherwise to another so far unprecedented event, although having occurred over a much shorter lapse of time, where an inflation-forecast targeting regime has been *de facto* invalidated at least temporarily by the collapse of the Icelandic banking system in the autumn of 2008, although not (yet?) exited *de jure*?

27. Simulating simple interest rate rules in a sticky-price model with endogenous investment and adjustment costs, Alexandre and Baçao (2006), for instance, find welfare gains from central bank reaction to asset prices; in this exercise, the origin of the shock also matters in the decision whether to react or not. Yet they identify for future research the issue of whether the central bank should react asymmetrically to asset price movements as well as to the trade-off implied by a small interest rate increase. The latter may not be sufficient to stabilise asset prices and a large increase may be necessary, which could cause an unnecessary recession.

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