New Macroeconomics and Credibility Analysis

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Abstract

This paper gives a general view of the new macroeconomics: the new Keynesian macroeconomics, the real business cycle models and the analysis of credibility of monetary policy. An outline of the chief technical features that distinguish the new Keynesian and the real business cycle formulations is provided, highlighting the specific characteristics that have been reconciled by the recent literature on credibility analysis. The point to be illustrated is that the combination of new Keynesian market failures and the new classical general equilibrium approach to macroeconomics leads to better microeconomic foundation for the credibility analyses of monetary policy that follow the Barro-Gordon notion of inflation bias of discretionary monetary policy.

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Resumo

O artigo fornece uma visão geral de três importantes ramos de pesquisa na moderna macroeconomia: os modelos novo keynesianos, a teoria dos ciclos reais e a análise de credibilidade de política monetária. De um lado, a mola propulsora da macroeconomia novo keynesiana foi a necessidade de fornecer fundamentos microeconômicos para as hipóteses ad hoc *de rigidez nominal, nas quais se baseava a macroeconomia keynesiana. De outro lado, a vulnerabilidade teórica dos modelos de credibilidade do tipo Barro-Gordon estava na arbitrariedade das hipóteses sobre comportamento do governo num contexto da curva de Phillips e na decorrente falta de significado microeconômico da noção de viés inflacionário da política monetária discricionária. Esse artigo fornece um breve apanhado das principais características técnicas que diferenciam as abordagens novo keynesiana e novo clássica, enfatizando aquelas que, ao se fundirem, possibilitam uma melhor fundamentação para os modelos de credibilidade de política monetária do tipo Barro-Gordon. O ponto a ser ilustrado é que uma melhor microfundamentação dos modelos de credibilidade somente se torna possível com fusão da macroeconomia novo clássica e novo keynesiana, com modelos de equilíbrio geral pleno, do tipo dos novos clássicos, mas com características tipicamente keynesianas, como contratos de trabalho e rigidez de preços/salários nominais.*

1 Introduction

Throughout the 1980s macroeconomic analysis was characterised by enthusiastic developments in the new Keynesian and new classical macroeconomics. The adjective "new" is added because both approaches are reformulations of the traditional Keynesian and classical views by taking notice of the rational expectation revolution and the Lucas critique, launched by Lucas (1972) and then Sargent and Wallace (1975, 1976). Besides academic and ideological convictions, the initial debate between new Keynesian and new classical streams of

thought is relevant to the extent that it leads to the adoption of alternative methods of macroeconomic analysis. While the new Keynesian approach resorts to an examination of the microeconomic theory of imperfect competition and market distortions, the new classical macroeconomics maintains the Walrasian paradigm. The concern with the microeconomic foundations, nonetheless, has induced the new Keynesian and new classical techniques to become more alike, converging to the new macroeconomics (as termed, for example by Dixon and Rankin (1995)), which assimilates insights and techniques of both these approaches.

On more specific grounds, a fresh approach to analysis of economic policy took off by the mid 1980s, applying the idea of time inconsistency of optimal choices, launched by Kydland and Prescott (1977) and modelling economic policy as the interplay of policymakers and private agents. The policymaker is treated as an optimiser agent, who faces political and economic constraints and responds to incentives. One of the main results of these formulations, derived firstly by Barro and Gordon (1983a), is that discretionary monetary policy delivers equilibrium with a higher rate of inflation than the equilibrium with a monetary rule.

This paper aims to point out how and why the integration of new Keynesian and new classical techniques enables theorists to provide better foundation for the positive analyses of monetary policy that follows the influential model of Barro and Gordon (1983a). We take the view that the positive models of inflation and related game-theoretic approach to economic policy were developed during the 1980s and early 1990s as a specific branch of research. The main criticism to this literature addresses the lack of microeconomic underpinnings for the welfare functions, which are defined over aggregate variables, such as output and price level. In this paper, we make the case for arguing that this theoretical vulnerability is reduced as the new macroeconomics develops general equilibrium frameworks with Keynesian market imperfections that cause nominal rigidity.

To this aim, sections 2 and 3 outline the new Keynesian and new clas-

sical macroeconomics. The comparison is conducted in terms of an important methodological difference between these streams of thought: the new Keynesian models are built on sketchily described aggregate demand, while the new classical models adopt the aggregate, intertemporal competitive model of a unique representative agent, with full description of aggregate demand dynamics. This methodological feature is relevant for our purposes since a detailed specification of the aggregate demand dynamics clarifies the welfare costs of unexpected inflation associated with the demand for money.

Then, section 4, presents the basic structure of the game-theoretic frameworks, specifically the Barro-Gordon type models. Excessive discretionary inflation results when discretionary monetary policy is conducted in a context of the market imperfections that lead to sub-optimal equilibrium level output and this market result can be improved through surprise inflation. However, inflation entails also some welfare cost. Thus, frameworks that specify not only the nature of market imperfections arising from the supply side of the economy, but also the costs of inflation associated with preferences and budget constraints, give more internal consistency for the positive models of discretionary inflation.

The argument that the notion of excessive discretionary inflation becomes less arbitrary as new Keynesian and new classical techniques are integrated is squarely in two controversial aspects of the modern macroeconomics: the requirement of microeconomic foundations for macroeconomic analysis and adoption of the average representative agent formulation in macro models.

Although the desirability of microeconomic foundation is not an absolute consensus among economists (for example, Rothschild (1988) and Hoover (2001) discuss this issue), it is arguably true that great part of the macroeconomic theorists, in accepting the rational expectations hypothesis, are seriously concerned with the fundamentals of the macroeconomic equilibrium concepts. As acknowledged by Lucas (1981), this is, indeed, the motivation that has shortened distance between new Keynesian and new classical methodologies.

Once one accepts that the microeconomic bases of policy analysis should be provided, a rather controversial issue is that of whether or not a representative agent formulation of general equilibrium actually gives solid microeconomic foundation for welfare analysis. The argument that the merging of new classical and new Keynesian macroeconomics offers better micro foundation for the Barro-Gordon model is in line with the position that representative agent formulations are viable ways of avoiding the main difficulties of deriving macroeconomic equilibrium from microeconomic principles, namely the problem of aggregation and multiplicity of possible equilibrium results.

However, many theorists, especially those who deal with Walrasian welfare analysis, protest against the claim that representative agent settings are valid general equilibrium formulations. Indeed, neoclassical theorists address viable criticism to general equilibrium formulations of the representative agent by pointing out that the Sonnenschein-Mantel-Debreu Theorem indicates a clear disjuncture between microeconomic behaviour and macroeconomic results. With this respect, Kirman (1992) and Hartley et al. (1998), for example, give a perspective on the ways the representative agent model can be misleading.

Further objections may still arise on a less technical front, as the representative agent formulations downplay the role of different preferences and production constraints that determine the macroeconomic equilibrium (a discussion is offered by Rothschild (1995)). Nevertheless, Obstfeld and Rogoff (1996, chapter 1) observe that there are good reasons for taking the representative agent device as a starting point. First, there are important cases where the use of the representative consumer to describe macroeconomic behaviour can rigorously be justified (a discussion is offered by Deaton and Muellbauer, 1980, chap. 6). Moreover, many good insights into the macroeconomy are independent of the household's different preferences.

In the models of discretionary inflation and credibility analysis, the existence of a finite level of equilibrium inflation rate requires that inflation entails not only a social benefit, but also a social cost. Thus,

it is arguably the case that pinpointing the costs and benefits of unexpected inflation in terms of an aggregate intertemporal model of a unique average representative agent is a less arbitrary procedure than postulating an *ad hoc* macro welfare function. Also, it is widely acknowledged among macroeconomists that judging alternative policy actions by taking into account the variety of individual preferences may become analytically intractable. In this way, one must keep in mind that providing better microeconomic foundation for the positive models of discretionary inflation within a new macroeconomic framework should be taken as a reasonable starting point for further research on internal consistency of the macro models of positive monetary policy.

The next section gives a broad idea of new Keynesian macroeconomics. Then, section 3 compares the new Keynesian and new classical macroeconomics. Section 4 points out the basic structure of the models of credibility analysis and excessive discretionary inflation. Section 5 gives some insights on the reasons why the new Keynesian macroeconomics alone cannot provide microeconomic foundations for the models of credibility analysis and excessive discretionary inflation. Section 6 summarises the conclusions. Finally, the references are listed.

2 New Keynesian Macroeconomics

Although fixed prices is an essential assumption supporting the Keynesian macroeconomics formalised by the IS-LM model, there is not an explicit microeconomic theory of prices and wages beneath the IS-LM framework. In this sense, the Keynesian paradigm is completely detached from the basic microeconomic notion that economic decisions result from individual optimisation. For this reason, the Keynesian paradigm was fiercely criticised by the new classical economists in the late 70s.

The viable objections to the *ad hoc* hypotheses about nominal rigidity seriously compromise the Keynesian view of short run fluctuations, since these are based on price/wage stickiness. The Keynesian response to this criticism yields the new Keynesian approach, which is a switch of focus from the role and effectiveness of economic policy to the provision of a microeconomic foundation for nominal rigidity.

The term new Keynesian macroeconomics was first employed by Parkin (1986) and then popularised by Gordon (1990) and Mankiw and Romer (1991, Introduction). Two distinguish characteristics can arguably identify the new Keynesian literature. One of them is that the research agenda is conditioned by the search for microeconomic foundations for the hypothesis of nominal rigidity of prices and wages.

The second one is that such foundations are taken from the microeconomic theory of imperfect competition and market distortions. In this sense, the assumptions of monopolistic competition and menu costs are the base of the new Keynesian macroeconomics. Also, the assumption of monopolistic competition in the strong form allows for modelling the economy in terms of representative agent.

The formulation of the assumption of monopolistic competition consists of considering a *continuum* of firms/producers (or workers, if it refers to the labour market). Each producer produces a differentiated good. More important, each individual is small enough to have no influence on the aggregate variables, especially the aggregate price level. In such a context, the process of decision on prices can be defined according to the Nash assumption that each producer determines his price by taking others' prices as given. This corresponds to the assumption of monopolistic competition in the strong form (Nishimura, 1995; Introduction).

The assumption of monopolistic competition has two important characteristics: first, it leads to aggregate demand externalities or interdependence of individual decisions. Second, it does not imply price rigidity. This means that another market imperfection must be added in order to obtain price rigidity. Therefore, Blanchard and Kiyotaki

(1987) add the assumption of menu costs to monopolistic competition.

Menu costs correspond to those of changing tags and therefore, are very small costs. Mankiw (1985) uses the formulation of near rationality, due to Akerlof and Yellen (1985) to show that such small costs can produce price rigidity. The basic insight is that, like any other economic decision, adjusting prices is an action based on a rational comparison between cost and benefit.

The formal argument is that, at the position of maximum utility/profit, the agents are indifferent to a further increase/decrease in the value of their utility/profit. In this case, if moving position along the utility function entails any cost, it is rational (ie, near rational) to stay at the initial position, which is close to, but not exactly the point of maximum utility, as long as the cost of moving is higher than the utility/profit gain.

Therefore, Akerlof and Yellen (1985) use the fact that the profit functions are flat at the top to derive the result that the benefit from not reoptimising and setting prices optimally after a nominal shock can be quite small. The rationale for the argument is as follows. When prices are set optimally, the firms are at the maximum point of the profit function, and in this region of the curve the value of the profit function is nearly insensitive to small deviations of the price from its optimal value. This implies that the profit loss associated with non-reoptimisation after a demand shock is indeed very small, provided that the shock is also small.

Such a simple formulation provides rationality for price rigidity following a nominal shock. However, if changing prices is a strategy that depends also on the others' decision, which is the case in a context of monopolistic competition, the costs of not changing price, ie not moving along the profit function, increases as the others do change theirs. In this case, changing prices are complement strategies.

Therefore, interdependence of price decisions, or aggregate demand

externality, combined with the formulation of menu costs leads to the result of multiple equilibria. This is the most important characteristic of the macroeconomic model of monopolistic competition: menu costs with strategic complementarity leads to the possibility of either flexible or rigid prices being an outcome. The fact that a Pareto inferior equilibrium may be attained characterises a coordination failure.

3   Supply-side Versus New Keynesian Macroeconomics

Among the characteristics associated with the Keynesian view of the behaviour of the economy, the most significant is the refusal of the assumptions of universal markets clearing and perfect competition. This leads the new Keynesian models to abandon the Walrasian auctioneer at least in one market and, from a technical viewpoint, the decisions on production, wages and prices are derived from strategic behaviour. This is the case because the particular aim is to rationalise nominal rigidity and, consequently, the essential task is to justify demand-determined output.

On the other hand, the new classical approach follows the Walrasian paradigm and explains the business cycle by shifts in technology, which correspond to real shocks to the supply side of the economy. Because the real business cycle approach assumes that the fluctuations in aggregate output result from technology shocks, the demand side of the economy needs to be well specified in order to describe the reaction of aggregate demand to such shocks.

Therefore, the real business cycle approach tends to be built on full general equilibrium frameworks in which aggregate demand is obtained from optimisation principles. Seminal papers are Kydland and Prescott (1982) and Long and Plosser (1983). The term "real" business cycle follows the terminology used by Long and Plosser (1983) and refers to the fact that the monetary side of the economy is abstracted away by such models. This makes sense, since the classical

dichotomy is accepted, and so, money is assumed to be neutral by the new classical macroeconomists.

Keynesians, on the other hand, reject the classical dichotomy and contend that money does affect real variables, at least in the short run. Thus, the business cycle could result from the sluggish response of nominal variables to monetary shocks. This means that nominal rigidity is the key factor to explain the business cycle. Since the new Keynesian approach concentrates on the behaviour of firms and workers, it emphasises the supply side of the economy. Thus, the characterisation of aggregate demand is simplified as much as possible. In this sense, although new Keynesian models of nominal rigidity do consider the monetary side of the economy, for most of them (for example, Ball (1994)) this is not modelled from first principles of optimisation. Exceptions to this are approaches to menu cost that introduce money into the economy by assuming a cash-in-advance constraint like the model of menu costs in Ball and Romer (1991).

While the causes of movements in the money supply are not central, and the debate over the control of aggregate demand is not associated with the new Keynesian approaches to the aggregate supply, the control of aggregate demand is an important aspect of real business cycle approaches. This is so because such models assume that the aggregate supply curve is always vertical and real output is unaffected by movements of aggregate demand. Correspondingly, the behaviour of aggregate demand accounts for the short run variations of nominal variables.

In new Keynesian models, on the other hand, the aggregate price level usually exhibits some sort of stickiness and the movements in the nominal variables must affect the real output, no matter what the causes of such movements are. This suggests that the effectiveness of monetary policy depends essentially on the behaviour of the price level, which is determined by frictions in price setting at the microeconomic level. Consequently, these differences in methodologies between the new Keynesian and new classical approaches have some implications for the development of models of economic policy, in the

sense that a more consistent theory of economic policy requires full rationalisation of the objectives of economic policy and, therefore, some characteristics of the new Keynesian and real business cycle approaches have been combined.

4   The New Theory of Economic Policy

While the new Keynesian macroeconomics concentrates effort on deriving the desired Keynesian features from optimisation principles, the theory of economic policy applies such principles also to political decisions. However, the weakness of this theory is that the objective functions are *ad hoc* specifications of the policymaker's preferences.

In a sense, this theory of economic policy is built up on the grounds of the neoclassical economics for it is based on the specification of objectives and constraints that give rise to equilibrium outcomes. Also, prices are assumed to be perfectly flexible (Buiter (1980), was the first to introduce price stickiness into a new classical framework). In this regard, the early analyses of credibility of economic policy are a straight application of the Lucas critique, which brings the notion that the effectiveness of economic policy depends on how private agents incorporate that policy in their objective functions and on how they react to such a policy. The agents' decision rules do not necessarily remain invariant to shifts in policy. This also implies that a specific macroeconomic basis is necessary to understand how the agents' decision rules may react to major changes in economic policy.

On the other hand, the theory of economic policy also has a strong Keynesian flavour in which the existence of market distortions in a short-run Phillips curve are essential for the result of excessive discretionary inflation. Indeed, the starting point of this theory is that the monetary authority is tempted to cause surprise inflation, since this induces the economy to attain temporary equilibrium at a higher level of output. The motivation for the monetary authority to

do so lies in the assumption that, due to market distortions, such as taxation or imperfect competition, the full employment equilibrium level of output is below the socially efficient level.

The behaviour of the aggregate demand is extremely important for the analysis of monetary policy for this latter depends on the existence of a short run expectational Phillips curve. Despite that, the microeconomic foundations for the demand for money are not modelled by the early approaches of credibility, for example, Backus and Driffill (1985a,b) and Andersen (1989). Such arbitrariness has always been criticised, since it compromises the welfare conclusions of the models of credibility. Person and Tabellini (1990) and Blackburn and Christensen (1989) survey the main branches of this literature.

To state the context in which the monetary authority may have a problem of credibility, four basic characteristics of the standard formulations can be identified: (i) policy decisions are made in a context of a game between private agents and the policy authority; (ii) output is determined by a short-run expectational Phillips curve; (iii) the existence of some market distortion causes the full employment level of output to be suboptimum; (iv) unanticipated inflation is costly.

Assumption (i) is an extension to the Lucas critique, while assumptions (ii) and (iii) are essentially Keynesian features. Assumption (iv) is probably correct, but the way it enters these formulations makes it a disputable claim.

When the private agents make a decision before the monetary authority or if they can be misled when forming expectations about inflation, the monetary authority can influence the short run real output by setting actual inflation higher than expected. Such conditions create the incentives for the policymaker to depart from the announced rate of inflation, usually assumed to be zero, once the full employment level of output is below the efficient level (assumption iii). More specifically, in a discretionary policy regime the monetary authority can reoptimise at each period, and therefore it is able to change the policy in a second round of measures.

If, for example, an announced zero inflation policy is believed, the policymaker who is more concerned with the employment level than price stabilisation may find it optimal to deviate from the announced policy and cause surprise inflation. However, in a context of rational expectations equilibrium, the private agents anticipate incentives for surprise inflation.

With full information, the agents know the preferences of the policymaker and are aware of the temptation to abandon the announced policy targets. As a result, the policy game yields equilibrium aggregate output at the natural level and a positive rate of inflation. Therefore, a discretionary regime with rational expectations yields an inefficient outcome, since positive inflation is assumed to be socially inefficient. In such a situation, a credible equilibrium policy rule can be derived only by imposing a credibility constraint on the policymaker's problem: the monetary authority must have no incentive to deviate from the equilibrium policy rule.

In a regime of pre-commitment, on the other hand, the monetary authority cannot deviate from the announced policy. Things happen as if both actual and expected inflation are predetermined, there can be no surprises, so that the credibility constraint does not bind the policymaker's problem. This gives rise to the terminology "excessive inflation", which refers to the fact that, under discretion, the equilibrium inflation rate is higher than the one obtained when the policymaker is able to make pre-commitments.

Assumption (iv) is essential in models of credibility. It introduces inflation into the government's cost function so that the monetary authority cares not only about the employment level but also price stabilisation. More important, this assumption is also a technical requirement for the existence of a finite level of inflation that fulfils both government's and private agents' optimisation conditions. At the same time, it is an *ad hoc* assumption, since there is no fundamentals for the aggregate demand that leads to the explicit costs of unexpected (or expected) inflation. Nonetheless, there are good reasons for advocating that inflation is costly.

The lack of microeconomic foundations for the welfare analysis implies that models of credibility and excessive inflation implicitly assume that inflation is costly and that zero inflation is the most efficient result (for example, Barro and Gordon (1983a,b), Backus and Driffill (1985a,b)). In this sense, while the new Keynesian approach can be coupled with the models of credibility to give a microeconomic foundation for the incentives for the monetary authority to cause surprise inflation, the real business cycle methodology, with dynamic general equilibrium frameworks, allows for making the costs of unanticipated inflation explicit.

This can promptly be observed, for example, in Neiss (1999) and Bonini (2001, chap.5), which model excessive discretionary inflation in a representative agent general equilibrium framework with one period labour contracts. In Neiss (1999) and Bonini (2001, chap.5), the costs and benefits of unexpected inflation derive directly from the underlying structure of technology, preferences and budget constraint, so that the time consistent rate of inflation is obtained from the policymakers optimisation problem. Moreover, the distortions causing equilibrium output to be lower than the socially optimum are distorting taxation and monopolistic competition in the output market.

As in Barro and Gordon (1983a), the equilibrium discretionary rate of inflation is biased upwards and such a bias is a function of the distortions. More important, the costs of surprise inflation in terms of deterioration of the real money balances can be pinpointed and measured. Also, the adopted formulation of the consumer's preferences suggests that the type of budget constraint and aggregate demand are extremely important to determine equilibrium inflation in a Barro-Gordon approach to discretionary monetary policy. Such an analysis of costs and benefits of surprise inflation can only be performed in a full general equilibrium model of the type of the new classical ones with Keynesian features such as wage contracts and monopolistic competition.

5   Discussion

The approaches to monopolistic competition and menu costs, described in section 2, are the core of the new Keynesian literature because they succeed in producing the result of price/wage rigidity from the principles of individual rationality (or at least near rationality). Moreover, as the macroeconomic theory progresses to a synthesis, such formulations have been widely employed by general equilibrium models of the type of the new classical ones, with staggering of wages/prices being also incorporated to some models. A the same time, the "old" Keynesian formulations of wage contracts based on Gray (1976) has had to be reconciled in order to turn to the analysis of economic policy, since the search for an ever more precise microeconomic foundation for nominal rigidity, like, for example, the derivation of staggering from optimisation conditions, becomes an enterprise detached from the primary motivation of Keynesian macroeconomics, which is the analysis of economic policy.

Apart from the debate over rules versus discretion underpinning the development of the literature on credibility, a relevant point emphasised in section 4 is that, in order to develop a proper analysis of credibility, the incentives for causing surprise inflation must be described in terms of the policymaker's objective function. Such incentives are, at first glance, associated with the possibility of increasing output by delivering surprise inflation. With this respect, a more fundamental issue concerns the policymaker's choice of optimal inflation: it is the fact that such an opportunity is not available in a new Keynesian context of monopolistic competition in the product market and absence of microeconomic specifications for the aggregate demand. That is the case of the model of monopolistic competition and menu costs due to Blanchard and Kiyotaki (1987), which is the core of new Keynesian macroeconomics. Bonini (2001), for example, show that, in this model, the credibility issue should be associated with the determination of money growth rate by the policymaker in a context of multiple equilibria.

Similarly, models of staggered wages can hardly provide settings for a proper credibility analysis. For example, Ball and Cecchetti (1991) derive the time consistent rate of inflation in discretionary equilibrium with staggered wages. Although the costs and benefits of unexpected inflation can be identified (respectively with an increase in wage dispersion and a decrease of unemployment), the costs of inflation due to its impact on the real money balances are left aside in their model. The reason is that, following the new Keynesian way of modelling macroeconomics, especially the approaches of wage indexation and staggered wages, their aggregate demand is predetermined.

Yet, some recent formulations, like Neiss (1999), for example, derive excessive discretionary inflation in general equilibrium contexts and can pinpoint the costs of unexpected inflation in terms of the fundamentals of the demand for money, while the benefits of inflation arise from the existence of market imperfections, such as the existence of labour contract. One needs still to keep in mind, however, that developments in this line are representative agent formulations of general equilibrium. As such, they may be taken as a starting point of the research on microeconomic foundation for the policy analysis of excessive discretionary inflation.

6   Conclusion

The main purpose of this paper has been to point out how the formulations of excessive discretionary inflation become less arbitrary as the macroeconomic theory progresses to a synthesis. To this aim, in section 2 we described the main features of the new Keynesian macroeconomics as basically a theory of the supply side of the economy. Then, we compared the new Keynesian macroeconomics with the new classical macroeconomics, which concentrates on the description of aggregate demand and consider that the business cycle is explained by real shocks to elements of aggregate supply.

In section 4 we identified the main elements of the theory of economic policy based on credibility analysis, reaching the conclusion that a full development of the theory of economic policy based on credibility analysis has required a consistent description of both the supply side and the demand side of the economy. Given the methodology of the new Keynesian and new classical macroeconomics described in sections 2 and 3, it is arguably the case that the reconciliation of new Keynesian and new classical techniques permitted the new theory of economic policy, especially the Barro-Gordon model of excessive discretionary inflation, to be grounded.

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