I. Introduction

At the beginning of the 21st century, after the wide-scale collapse of centrally planned economies, the consensus perception prevails that prosperity and economic growth are generated by private enterprise and free markets. Nevertheless, government policy has maintained its role as a major factor, responsible for creating the necessary conditions for promoting enterprise and growth. In this context, monetary policy has emerged as an important means for achieving these goals1. The arguments for this statement are twofold, concerning both how quickly and how accurately the intervention takes effect on the market. In the first place, unlike fiscal policy, which often serves multiple (sometimes conflicting) goals and may be subject to political influences and lengthy legislative decision-making and approval procedures, monetary policy conducted by an independent central bank can be adjusted relatively quickly to respond to the latest macroeconomic developments. Furthermore, the impact of monetary impulses especially on the financial markets under a sufficient degree of central bank credibility takes place immediately. Sometimes the financial market response even precedes the actual central bank intervention, as market participants anticipate the envisaged measures and act accordingly in advance.

The last decades have witnessed major transformations pertaining to both monetary policy theory and practice. Since the Bretton Woods collapse central banks exposed not only to a higher degree of freedom, but also to the need to define clear monetary policy goals and communicate them to the public. In the last two decades, a growing number of central banks (such as the Bank of England, Bank of Canada, the Reserve Bank of New Zealand and the Swedish Riksbank) have opted for systematic policy behaviour by means of introducing inflation-targeting. On the theoretical side, major advances have been made in the last two decades. One facet of the new consensus on monetary policy is that low, stable inflation is crucial for market-driven growth and that the monetary policy stance in the medium to long run is the major determinant of inflation. After a long period of focusing on the impact of non-monetary factors on the business cycle, empirical studies since the late 1980s have argued that monetary policy significantly influences the short-term course of the economy. Another facet is the strengthened focus on monetary policy design and the interest for optimal rule-based monetary policy in particular. Recent macroeconomic research features nominal rigidities and output fluctuations and focuses on the stabilization role of monetary policy, by allowing the monetary authorities to choose from a

1 Or, as Bernanke et al. (1999) argue: “… of all the government’s tools for influencing the economy, monetary policy has proven to be the most flexible instrument for achieving medium-term stabilization objectives.”
variety of monetary policy rule specifications\(^2\) in terms of policy instruments, target variables and size of the response coefficients assigned to the target variables. Since the results obtained in the literature when assessing the different monetary policy rule specifications are to a large extent model-dependent, the choice of a macroeconomic framework based on sufficiently realistic assumptions is crucial for the analysis of the implications of different rule specifications.

Building on the arguments of the New Classical Critique\(^3\) in the 1970s, New Keynesian models that incorporate rational expectations, as well as microeconomic foundations, have been developed. The optimizing behaviour on the part of households and firms, as well as the intertemporal methodology of New Keynesian models with nominal rigidities enable detailed study of the monetary transmission mechanism and optimal monetary policy design. However, with respect to investment and capital, most of these models (e.g. Woodford (1995), Rotemberg and Woodford (1999) and McCallum and Nelson (1999b)) abstract from investment (constant-capital specification). One reason is that introducing endogenous capital and investment to a model with sticky prices may lead to multiple rational-expectations equilibria under certain monetary policy rule specifications\(^4\). Moreover, the exclusion of capital is often justified on the grounds that capital does not exhibit substantial volatility at business cycle frequencies (e.g. McCallum and Nelson, 1997). However, such an approach is clearly unsatisfactory, as it leaves out an important monetary transmission channel and shock propagation mechanism.

In the following chapters, the analysis is carried out within a New Keynesian framework with endogenous capital, sticky prices and wages and capital adjustment costs. The purpose of this study is to assess different interest rate rule specifications with respect to the degree of activeness (measured by the inflation response coefficient) and the target variables included, based on two criteria: (i) the existence of a determinate rational expectations equilibrium and (ii) the characteristics of the convergence path towards steady state after a shock occurs. In particular, policy rule specifications that yield determinacy of rational expectations equilibrium and in addition involve quantitatively smaller deviations and fast, monotonic convergence after a shock occurs would be preferred. The results obtained confirm that the introduction of endogenous capital and investment has important implications for the monetary policy outcomes. A stronger than one-on-one nominal interest rate response to inflation in the policy rule (i.e.

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\(^2\) The most famous example in recent years being the Taylor rule as in Taylor (1993).

\(^3\) The New Classical Critique focused on the use of conventional methods of econometric policy evaluation (Lucas (1976)) and of optimal control (Kydland and Prescott (1977)). In general, according to the real-business cycle theory, monetary policy has no relevance for economic welfare when rational expectations of economic agents are assumed.

\(^4\) E.g. forward-looking rules (see Huang and Meng (2007)).
adherence to the Taylor principle) does not *per se* guarantee the best outcomes in terms of equilibrium uniqueness and responses to shocks. Under endogenous capital and investment, the inclusion of an output target in the policy rule is crucial under both criteria.

The study is organised as follows. In Chapter II, I summarise the main issues in monetary policy theory and practice, including the possible rule specifications (Section 1). In Section 2, I give an overview of the criteria for assessing the performance of monetary policy rules. The focus is on determinacy of rational expectations equilibrium and the response to shocks, explicitly used for the analysis in Chapters III and IV. In the last subsection I present formally the Taylor principle, which since 1999 has been a benchmark for formulating rule-based policy and forms the basis for the distinction between “active” and “passive” policy rules made in the subsequent chapters. Section 3 provides a preliminary summary.

In Chapter III I derive the New Keynesian framework with sticky prices and wages, endogenous capital and investment and capital adjustment costs and study the system’s determinacy properties under different values assigned to the inflation and output gap response coefficients in the interest-rate rule. In particular, Section 1 provides an overview to the New Keynesian framework, while Section 2 presents the main approaches to modelling capital and investment in the literature. Then in Section 3, I concentrate the model with endogenous capital and adjustment costs, by examining the household optimisation problem and the resulting first-order conditions, deriving the “IS block” equations, the aggregate supply and real-wage relation and adding an interest rate rule to the system. As a next step, in Section 4 I complete the calibration of the model, so as to permit quantitative analysis of its properties. In addition, I provide some numerical analysis of the systems’ determinacy properties under different rule specifications.

The findings from Section 4 in Chapter III are then considered when assessing the shock impulse responses under different monetary policy specifications in Chapter IV. Active and passive rules in three possible specifications for each class are tested in this chapter: (i) rules with a sole inflation target; (ii) rules with an inflation and output target and (iii) rules with inflation and output gap target and interest-rate smoothing. Results are obtained for three types of shocks: (i) a monetary policy unit shock; (ii) a technology unit shock and (iii) a consumption preference shock. The results are summarised in Section 4. Chapter V summarises the main findings and concludes.