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Optimal monetary policy in a New Keynesian model with habits in consumption ☆

Campbell Leith [a], Ioana Moldovan [a,*], Raffaele Rossi [b]

[a] University of Glasgow, Department of Economics, Adam Smith Building, Glasgow G12 8RT, UK
[b] Università di Milano-Bicocca, Italy

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ABSTRACT

In this paper we consider the implications of habits for optimal monetary policy, when those habits either exist at the level of the aggregate basket of consumption goods ('superficial' habits) or at the level of individual goods ('deep' habits: see Ravn et al., 2006). External habits generate an additional distortion in the economy and create new trade-offs for optimal policy, as the policy maker does not respond as aggressively to technology shocks in order to avoid exacerbating the habits externality. This can dramatically affect both the parameterization of optimal simple rules, as well as their determinacy properties. These effects are particularly strong when habits are of the deep kind.

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1. Introduction

Within the benchmark New Keynesian analysis of monetary policy (see, for example, Woodford, 2003), monetary policy typically influences the economy through the impact of interest rates on a representative household's intertemporal consumption decision. It has often been felt that the purely forward-looking consumption dynamics that such basic intertemporal consumption decisions imply, are unable to capture the hump-shaped output response to changes in monetary policy one typically finds in the data. As a means of accounting for such patterns, some authors have augmented the benchmark model with various forms of habits effects in consumption. The habits effects can either be internal (see for example, Fuhrer, 2000; Christiano et al., 2005; Leith and Malley, 2005) or external (see, for example, Smets and Wouters, 2007), the latter reflecting a catching up with the Joneses effect whereby households fail to internalize the externality their own consumption causes on the utility of other households. Both forms of habits behavior can help the New Keynesian monetary policy model capture the persistence found in the data (see, for example Kozicki and Tinsley, 2002), although the policy implications are likely to be different. More recently, Ravn et al. (2006) offer an alternative form of habits behavior, which they label 'deep'. Deep habits occur at the level of individual goods rather than at the level of an aggregate consumption basket ('superficial' habits). While this distinction does not affect the dynamic description of aggregate consumption behavior relative to the case of superficial habits, it does render the individual firms' pricing decisions intertemporal and, in the flexible price

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* Corresponding author.
E-mail addresses: campbell.leith@glasgow.ac.uk (C. Leith), ioana.moldovan@glasgow.ac.uk (I. Moldovan), raffaele.rossi1@unimb.it (R. Rossi).

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economy considered by Ravn et al. (2006), can produce a counter-cyclical mark-up which significantly affects the responses of key aggregates to shocks. Ravn et al. (2010) then extend the analysis of deep habits to a sticky-price environment and find that such a model is able to explain, with moderate degrees of price stickiness and plausible policy rules, the prices puzzle and inflation persistence.[1]

While the focus of the papers listed above is on the dynamic response of economies which feature some form of habits, they do not consider the implications for optimal policy of such an extension. In contrast, Amato and Laubach (2004) consider optimal monetary policy in a sticky-price New Keynesian economy which has been augmented to include internal (but superficial) habits. Since the form of habits is internal (households care about their consumption relative to their own past consumption, rather than the consumption of other households), there is no additional externality associated with consumption habits themselves, and, given an efficient steady state, the flexible price equilibrium in the neighborhood of that steady state remains efficient. Accordingly, as in the benchmark New Keynesian model, there is no trade-off between output gap and inflation stabilization in the face of technology shocks and interesting policy trade-offs require the introduction of additional inefficiencies (such as mark-up shocks or a desire for interest rate smoothing, perhaps due to worries over the zero lower bound in nominal interest rates).

In this paper, we extend the benchmark sticky-price New Keynesian economy to include *external* habits in consumption, where these habits can be either superficial or deep.[2] The focus on external habits implies that there is an externality associated with fluctuations in consumption and that the flexible price equilibrium will not usually be efficient, thereby creating an additional trade-off for optimal policy. Essentially, policy makers do not respond to technology shocks as aggressively as they would in the absence of a habits externality, as they wish to avoid exacerbating that externality. This is particularly so in the case of deep habits, where monetary policy affects the firms' discounted profits and thereby their optimal intertemporal mark-up. In the face of a positive technology shock, the typical monetary policy response of cutting real interest rates induces the firms producing the goods over which consumers form deep habits to cut mark-ups and encourage consumers to consume more than is socially desirable. The loose monetary policy will then be more muted. When we lower the inflation target, we find that the policy maker's concern over the zero lower bound for nominal interests will further reduce the monetary policy response to the same shock. There are also stabilization biases associated with the time-consistent discretionary policy, which not only fails to achieve the price level control observed under commitment, but also fails to mitigate the formation of socially undesirable habits to the same extent as optimal commitment policy.

In addition to examining optimal policy, we also consider how the presence of habits affects the conduct of policy through simple rules. We find that the introduction of deep habits can induce problems of indeterminacy, as the tightening of monetary policy can induce inflation through variations in mark-up behavior, such that an interest rate rule which satisfies the Taylor principle (where nominal interest rates rise more than one for one with increases in inflation above target) may not be sufficient to ensure determinacy of the local equilibrium. We also find that optimal simple rules can come close to mimicking the commitment solution, even if we constrain the rule parameters to lie in a plausible range and avoid the zero lower bound for nominal interest rates. Moreover, as the extent of habits are increased, the optimal rule focuses less on stabilizing inflation and more on eliminating the habits externality and this trade-off is reflected in the optimized rule parameters.

The plan of the paper is as follows: in the next section we outline our model with deep and superficial habits. In Section 3, we consider optimal policy under both commitment and discretion, where the policy maker's objective function is derived from a second order approximation to households' utility. In Section 4, we turn to our analysis of simple rules, considering both their determinacy properties and, for rules which can ensure determinacy, their ability to mimic optimal policy. Section 5 summarizes the welfare results, and Section 6 concludes.

2. The model

The economy is comprised of households, a monopolistically competitive production sector, and the government. There is a continuum of goods that enter the households' consumption basket. Households can either form external consumption habits at the level of each individual good in their basket, Ravn et al. (2006) call this type of habits 'deep', or they can form habits at the level of the consumption basket as a whole-'superficial' habits. Throughout the paper, we use the same terminology. Furthermore, we assume the economy is subject to price inertia. We shall derive a general model, and note when assuming superficial or deep habits alters the behavioral equations. In Section 3, we also outline the key features of an economy with internal habits in consumption.

2.1. Households

The economy is populated by a continuum of households, indexed by k and of measure 1. Households derive utility from consumption of a composite good and disutility from hours spent working.

[1] It should be noted that Ravn et al. (2010) do not consider the optimal policy or determinacy issues that are the focus of this paper.

[2] Throughout the paper, we also contrast external habits with internal habits, although the latter requires additional distortions to make the policy problem interesting.

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