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Loss aversion and the asymmetric transmission of monetary policy

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ABSTRACT

There is widespread evidence that monetary policy exerts asymmetric effects on output over contractions and expansions in economic activity, while price responses display no sizeable asymmetry. To rationalize these facts we develop a dynamic general equilibrium model where households' utility depends on consumption deviations from a reference level below which loss aversion is displayed. State-dependent degrees of real rigidity and elasticity of intertemporal substitution in consumption generate competing effects on output and inflation. Contractions face the Central Bank with higher responsiveness of output to interest rate changes, as well as a flatter aggregate supply schedule.

1. Introduction

Since the seminal work by Mitchell (1927), considerable effort has been devoted to examine non-linearities in macroeconomic time series. Graham (1930), Keynes (1936) and Friedman and Schwartz (1963) have then stimulated a vast debate on the asymmetric effects of monetary policy. Widespread empirical evidence has been produced in support of the view that monetary policy exerts asymmetric effects on output and prices with respect to the economic conditions as well as the direction and size of the policy action. Such effects have important implications not only for the way we think about the macroeconomy, but also for the conduct of economic policy.

Lo and Piger (2005) account for different forms of asymmetry in the monetary transmission mechanism. According to their empirical analysis, the most pervasive form of non-linearity is represented by the asymmetric transmission of monetary policy over contractions and expansions in the business cycle. In this respect, the econometric evidence available to date has mostly focused on the state-dependent responsiveness of output and inflation, reporting two coexisting regularities (see also Weise, 1999 and Peersman and Smets, 2005). On one hand, monetary policy innovations have greater impact on output during contractions. On the other hand, changes in the monetary policy stance do not induce statistically different responses of prices during different cyclical phases. Our objective is to provide a parsimonious explanation of these facts. To that effect, we first document some asymmetries in the cyclical behavior of key macroeconomic variables, as well as their responses to monetary policy shocks. We then present a tractable macroeconomic model in which households display reference-dependent preferences of the type popularized by Kahneman and Tversky (1979) as 'prospect theory'. The

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modeling strategy consists of assuming that households' utility partly depends on the deviation of their consumption from a habit-based reference level of consumption below which loss aversion is displayed. In line with the key tenet of prospect theory, losses in consumption utility resonate more than gains.

The behavioral mechanism underlying loss-averse preferences has found wide empirical and experimental support in the literature (Thaler et al., 1997). Benartzi and Thaler (1995) and Barberis et al. (2001) show that prospect theory may help to explain the behavior of asset returns and resolve a number of quantitative asset pricing puzzles. Koszegi and Rabin (2006, 2009) assume that households care about gains and losses in consumption, a hypothesis that finds empirical support in Yogo (2008) and Rosenblatt-Wisch (2008). However, none of these approaches takes the analysis to a general equilibrium perspective.[1] The novelty of this paper is to embed prospect theory in a dynamic general equilibrium framework and focus on the transmission of monetary policy to output and inflation. In this respect, two key mechanisms are characterized. First, during contractions changes in the real rate of interest exert stronger impact on output through an increased elasticity of intertemporal substitution between current and future consumption. This feature has been extensively examined in the literature on asset pricing (Yogo, 2008). Second, embedding loss-averse preferences in a general equilibrium setting implies a state-dependent marginal rate of substitution between consumption and leisure that can be related to firms' real marginal cost, so as to impose the labor market equilibrium. The labor supply schedule retains the key property of being flatter below the reference point, so that real wages feature downward stickiness in contractions. Both features of the model are compatible with output being more adversely affected by monetary policy innovations during contractions. Concurrently, inflation responses are attenuated through an increased degree of real rigidity in the labor market. As a result, no difference can be appreciated between inflation responses over different cyclical phases. State-dependent degrees of intertemporal substitutability in consumption and intratemporal substitutability between consumption and leisure induce relevant non-linearities with respect to the economic conditions as well as the direction of the policy action. The model predicts stronger output responses when monetary policy is restrictive, as compared with expansive policy actions, while inflation displays nearly symmetric responses to monetary shocks with opposite signs.[2] In addition, the cyclical movements of real activity as implied by the model are manifestly asymmetric, with statistical evidence of both 'deepness' (troughs are deeper than peaks are tall) and 'steepness' (contractions are steeper than expansions).[3]

It is important to acknowledge that the macroeconomic literature has proposed a variety of mechanisms acting from both the supply and the demand side of the economy and capable to take account of different forms of non-linearity.[4] For instance, Peersman and Smets (2005) suggest that the financial accelerator theory may explain why the effects of money on output are stronger in contractions. However, this mechanism implies an analogous amplification (attenuation) of monetary policy innovations on both prices and real activity during contractions (expansions). To overcome such a discrepancy with the existing empirical evidence, the balance-sheet channel needs to be complemented with a mechanism capable of producing competing effects on prices, so as to obtain the desired non-linearity in the response of output, while generating symmetric price responses. In this respect, models with inverse 'L-shaped' or convex aggregate supply curves that belong to the Keynesian tradition are plausible candidates. A convex aggregate supply retains the property to be steeper for price levels above expected prices (see, e.g., Ball and Mankiw, 1994), so that it ensures a stronger (lower) reaction of output (prices) in contraction. Therefore, reconciling the macroeconomic theory with the evidence of no asymmetry in the response of prices typically calls for the coexistence of multiple driving forces. This paper provides an alternative explanation based on a simple and well-established behavioral mechanism.

Once it is recognized that loss aversion induces various types of asymmetry in the transmission of shocks to the economy, it seems relevant to provide some guidance as to how monetary policy should be designed to cope with such non-linearities. To this end, we derive the optimal monetary policy from the perspective of the Ramsey planner. In this context, the policy maker faces a non-trivial trade-off, as she needs to weigh the distortion stemming from price rigidity with the one induced by external habits in consumption. In fact, with only one policy instrument available the Central Bank cannot simultaneously ensure that output is at its efficient level and inflation is eliminated. The resulting policy is state-dependent and, due to loss averse preferences, it imposes the policy maker to attach greater importance to the consumption externality during contractions as compared with expansions.

The remainder of the paper is laid out as follows: Section 2 documents some evidence on a range of asymmetries that are consistent with the non-linear mechanisms that characterize the model we put forward; Section 3 presents the theoretical framework; Section 4 details the model solution technique; Section 5 discusses the key mechanisms that generate

[1] So far little effort has been made to explore the relevance of prospect theory for the dynamics of macroeconomic aggregates. Some applications to price-setting (Heidhues and Köszegi, 2005) and consumption theory (Bowman et al., 1999 and Koszegi and Rabin, 2009) have been proposed.

[2] These properties are in line with the evidence reported by Cover (1992), Morgan (1993), Karras and Stokes (1999), Weise (1999) and Dufrenot et al. (2004).

[3] These features have been extensively documented, among others, by Neftci (1984), Hamilton (1989), Sichel (1993) and, more recently, Morley and Piger (2012).

[4] The list of mechanisms that may give rise to asymmetries in the monetary transmission mechanism includes: non-linearities in investment (Bertola and Caballero, 1994), patterns of entry and exit from a given market under uncertainty about profit perspectives (Dixit, 1989), nominal rigidities in the labor and the goods market (Ball and Mankiw, 1994), learning and information aggregation (Chalkley and Lee, 1998), state-dependent pricing and convex aggregate supply (Devereux and Siu, 2007). However, none of these mechanisms is *per se* capable to take account of cyclical asymmetries in the joint reaction of output and prices to monetary policy innovations.