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The extensive margin and monetary policy ☆

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ABSTRACT

The creation of new firms, referred to as the extensive margin, is a significant but overlooked dimension of monetary policy. A monetary VAR documents that monetary policy has significant effects on firm creation. An analytically tractable model combining sticky prices and firm entry shows that entry alters the transmission of monetary policy innovations, acting much like a type of investment in more standard models. Monetary policy rules that offset the uncertainty of productivity shocks can raise the mean level of entry and thereby welfare, suggesting a new motivation for stabilization policy.

1. Introduction

Business cycles are characterized by sizeable investment dynamics of firm entry and exit. Just as real and monetary shocks may lead firms to adjust the scale of production, they also create opportunities to introduce new goods in the market, as lower costs or higher demand raise the profitability of new product lines. The first type of adjustment is commonly referred to as the intensive margin, whereas the second type of adjustment is referred to as an extensive margin. A small but dynamic strand of literature has studied how the extensive margin of firm entry and product variety can contribute to our understanding of the business cycle in closed and open economies, e.g. Kim (2004), Ghironi and Melitz (2005), Bilbiie et al. (2005), Jaimovich (2006, 2007). These aim to provide a more complete model of imperfectly competitive markets in manufacturing where entry drives profits to zero.[1] The question this paper investigates is their monetary policy dimension.

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[1] Recent open macro literature has explored the role of firm entry in the international business cycle, and analyzed international spillovers from policy and productivity shocks. (See Ghironi and Melitz, 2005; Corsetti et al., 2005, among others.) Some contributions have also reconsidered issues of the welfare effects of product varieties—with potentially relevant implications for the design of international and domestic price indexes. (See the above contribution and Broda and Weinstein, 2004.) The model here builds on a macroeconomic literature on firm entry, which focused on issues of indeterminacy of equilibria and increasing returns. (See Chatterjee et al., 1993; Devereux et al., 1996; Kim, 2004.) The flexible price case of our model will have several similar implications to these earlier papers. For an empirical study relating entry to exchange rate fluctuations see Campbell and Lapham (2004).

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There is a clear need for studies on this subject, given that the tendency for firms to fail is among the most recognizable features of recession, and that new startup firms are likely to be among the most sensitive to interest rate changes by policy makers. This paper argues that the extensive margin is a dimension of monetary policy that has been under-appreciated. Firstly, studying the dynamics of firm entry and exit may be a good place for economists to look for mechanisms of monetary policy transmission. It has been estimated that 25% of annual gross job destruction can be attributed to establishment deaths and 20% of annual gross job creation to new establishment births, as estimated by Davis and Haltiwanger (1990) on the basis of U.S. manufacturing data 1972–1986. Secondly, the extensive margin has welfare implications working through variety effects that are entirely distinct from the intensive margin. As a result, studying the extensive margin dimension of monetary policy may augment the welfare implications that motivate monetary policy.

A first novel contribution of this paper is to document empirically in U.S. data a correlation of extensive margin entry with monetary policy. The paper augments standard monetary VAR models with measures of new firm incorporations and net business formation. These measures of entry are found to respond significantly to monetary policy innovations.

The theoretical contribution of the paper is to formulate an analytically tractable model that combines price stickiness and firm entry decisions, as a means for studying the transmission and welfare implications of the extensive margin of monetary policy. In this model, firms must prepay a fixed cost in the period prior to production, which is the cost of an exogenously given quantity of intermediate inputs that are necessary to start up production. This startup fixed cost must be paid each period, and can be interpreted as investment expenditure under the simplifying assumption of complete depreciation of capital within one period. Firms cover such cost with their profits derived from monopolistic pricing. As demand and cost are affected by shocks, the number of firms that find it profitable to enter the market will vary over time. Firms enter the market by producing new differentiated products, thus enlarging the set of goods available to consumers and other firms. The preference specification allows for love of variety, so that enlarging the set of goods may have positive effects on household utility. Price stickiness takes the form of prices that are set one period in advance.

The first theoretical finding is that the dynamics of entry can be understood through their similarity to the more familiar dynamics of investment in production capacity at the intensive margin. For a given entry cost, a fall in the real interest rate raises the expected discounted profits from creating a new firm, thus encouraging new entrants. Depending on the degree to which consumers and firms' managers benefit from the increased variety of goods and intermediate inputs, the presence of the extensive margin amplifies the real effects of monetary policy.

The second finding goes beyond fluctuations in firm entry to study its unconditional expectation. Full nonlinear solution of the model indicates that the mean number of firms is a negative function of the variance of productivity shocks. Previous sticky price models have shown that monopolistic firms respond to uncertainty by raising prices, thus exacerbating monopolistic distortions. This paper finds that uncertainty additionally has a similar effect in terms of reducing the number of firms active in a market. This finding is far from obvious, since the higher prices set by firms in response to uncertainty will also raise expected profits, which in turn could potentially encourage entry. We provide a proof that the first effect must dominate the second in our model.

The paper then studies the role of stabilization policy. The negative effect of productivity uncertainty on entry noted above can be offset if monetary policy follows a countercyclical policy, expanding in response to positive productivity shocks as to stabilize marginal costs. This implies a new motivation for stabilization policy, which could be viewed as an extensive margin of the output gap. There is a very new but growing literature studying monetary policy in environments with nominal rigidities and firm entry. Bilbiie et al. (2008) study a rich environment with sunk entry costs in terms of labor units and Rotemberg costs of price adjustment. Their findings include a motivation for price stabilization distinct from ours, in that the costs of price adjustment lower firm profits and distort entry decisions. Lewis (2006, 2008) documents in a model with sticky wages that monetary shocks stimulate entry by raising demand, and investigates policy implications. This differs from the mechanism in our paper, whereby monetary expansion lowers the real interest rate, encouraging firms to make the investment in entry necessary for future production. This distinction applies also with Elkhoury and Mancini Griffoli (2006), where entry costs are modeled as legal fees with sticky prices. Finally, Uuksüla (2008) compares entry dynamics in sticky price models and limited participation models, using VAR evidence to discriminate between the two.[2]

This paper is organized as follows. The next section motivates the theoretical work to follow with some original empirical results. Section 3 introduces the model. The next two sections analyze monetary transmission and policy rules. Finally, the model is extended to include physical capital in the variable cost of production. The online appendix includes analytical details of the derivations.

2. A look at the evidence

As empirical motivation for our inquiry, Fig. 1 plots two metrics of entry, the U.S. index of net business formation and the number of new incorporations. The comovements with GDP are obvious, with correlations as high as 0.73 and 0.53,

[2] Since this paper focuses on stabilization policy, it abstracts from the growth dimension stressed by other macroeconomic models with entry, namely, the link between the creation of new firms and technological change when progress is embodied in new capital (e.g. Campbell, 1998). Nonetheless, the model here shares two standard predictions with this literature. First, current productivity shocks lead to entry—in this sense, entry is procyclical. Second, future productivity shocks leads to exit. The reason is, however, different from the obsolescence of current capital. Rather, exit is due to the anticipation of a fall in prices and sales revenue due to productivity gains in a (monopolistic) competitive environment.