Available online at www.sciencedirect.com
ScienceDirect
Journal of Economic Theory 137 (2007) 300–325
JOURNAL OF Economic Theory
www.elsevier.com/locate/jet

Firm dynamics and markup variations: Implications for sunspot equilibria and endogenous economic fluctuations

Nir Jaimovich

Department of Economics, Stanford University, USA

Received 3 April 2006; final version received 15 December 2006
Available online 23 March 2007

Abstract

This paper analyzes how the interaction between firms' entry-and-exit decisions and variations in competition gives rise to self-fulfilling, expectation-driven fluctuations in aggregate economic activity and in measured total factor productivity (TFP). The analysis is based on a dynamic general equilibrium model in which net business formation is endogenously procyclical and leads to endogenous countercyclical variations in markups. This interaction leads to indeterminacy in which economic fluctuations occur as a result of self-fulfilling shifts in the beliefs of rational forward looking agents. When calibrated with empirically plausible parameter values and driven solely by self-fulfilling shocks to expectations, the model can quantitatively account for the main empirical regularities characterizing postwar U.S. business cycles and for 65% of the fluctuations in measured TFP.

JEL classification: E32; L16

Keywords: Sunspots; Business cycle; TFP; Firm dynamics; Markup

1. Introduction

This paper analyzes how the interaction between firms' entry/exit decisions and variations in competition gives rise to self-fulfilling, expectation-driven fluctuations in aggregate economic activity and in measured total factor productivity (TFP). To this end, I formulate a dynamic general equilibrium model in which fluctuations in the economy can occur, even in the absence of shocks to fundamentals. Consumer sentiment may drive the economy into self-fulfilling, alternating periods

E-mail address: njaimo@stanford.edu.

0022-0531/$ - see front matter
doi:10.1016/j.jet.2006.12.005

of contractions and expansions through the effect of consumers' expectations on their aggregate demand. Variations in aggregate demand lead to variations in the number of operating firms, which in turn affect the degree of competition, leading to fluctuations in aggregate economic activity.

Three basic stylized facts motivate this paper: the existence of monopoly power in the U.S. economy; procyclical variations in the number of competitors; and markups being countercyclical and negatively correlated with the number of competitors. To model the interaction between firms' entry/exit decisions and markup variations, I assume that the economy is characterized by the presence of many different sectors. Each sector is comprised of different, monopolistically competitive intermediate firms. Within a given sector, each firm takes into account the effect that the pricing and production of other firms have on the demand for its goods. This leads to the price elasticity of demand for the typical firm being positively related to the number of firms in its sector, and induces the setting of a lower markup in response to an increase in the number of competitors. The number of firms in a sector is determined by the equilibrium condition that all firms earn zero profits in every period. This condition is enforced by firms' decisions to either enter or exit an industry. [1]

The interaction between net business formation and variations in the degree of competition leads to equilibrium indeterminacy, which ensures that a continuum of stationary sunspot equilibria will exist. [2] The intuition I can provide for why sunspot equilibria occur in the model is as follows: suppose that households expect an increase in output. Other things equal, this leads to a rise in the demand for consumption and investment, inducing new profit opportunities, resulting in net firm creation, and thus to a fall in the markup, which acts as a true technology shifter. In this environment, a positive shock to consumers' expectations generates an increase in aggregate economic activity confirming the initial optimistic expectations, until the economy eventually returns to its non-stochastic steady state.

The existence of sunspot equilibria allows me to explore the empirical implications of the model for economic fluctuations. I find that, for empirically plausible parameter values, a calibrated version of the model when solely driven by self-fulfilling shocks to expectations can quantitatively account for the second-moment properties of key macroeconomic variables in the postwar U.S. data. The model is also consistent with the forecastable movement puzzle emphasized by Rotemberg and Woodford [48] and Benhabib and Wen [10]. Finally, the model gives rise to endogenous variations in measured TFP. These are a result of the effects of variations in the number of operating firms on the markup, and they account for 65% of the volatility in measured TFP in postwar U.S. data.

In their seminal papers, Benhabib and Farmer [6] and Farmer and Guo [25] show that, with sufficiently large returns-to-scale, an otherwise standard RBC model can be indeterminate and can also quantitatively account for business cycle fluctuations when driven by sunspot shocks. However, this result requires a degree of externalities (or increasing returns to scale in the variable factors of production) that is inconsistent with empirical estimates. Benhabib and Farmer [7], Benhabib and Nishimura [9], Harrison [33], and Harrison and Weder [34] show that, when more

[1] The structural model is close to the model in Portier [42], who documents the procyclicality of business formation and the countercyclicality of markups in French data. He studies the response of his model economy to a technology shock and to a government spending shock, showing that variations in the number of firms and their effect on the markup serve as an internal magnification mechanism. Gali and Zilibotti [27] use a similar structure and study its implications for the existence of poverty traps.

[2] That is, stationary, stochastic, rational expectations equilibria triggered by disturbances that are unrelated to uncertainty about economic fundamentals.