Financial fragility, patterns of firms' entry and exit and aggregate dynamics[☆]

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Abstract

We model the *entry–exit* process of industrial dynamics within a theoretical framework, in which the financial conditions of firms affect capital accumulation. The patterns of entry and exit affect the dynamics of the distribution of firms which are differentiated by the *equity ratio*, i.e. the ratio of net worth to the capital stock. We perform numerical simulations to study the interactions among changes in financial fragility, industrial dynamics and the macroeconomic performance.
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1. Introduction

In macroeconomic models with financial constraints (see, for example, Greenwald and Stiglitz, 1993; Bernanke et al., 1999; Kiyotaki and Moore, 1997) firms' supply decisions depend upon the degree of financial robustness/fragility, which is defined in different ways. In the theoretical framework put forward by Greenwald and Stiglitz, for example, production

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and investment decisions are affected by the risk of bankruptcy: the lower is the firm's net worth, the higher financial fragility and the risk of bankruptcy and the lower employment and output.

The authors, however, ignore the effects of actual bankruptcies on aggregate output, implicitly assuming that in case of bankruptcy the defaulted firm which leaves the market is replaced by a newly born firm with the same features. This framework, therefore, allows for an entry–exit process but a very peculiar one: the turnover of firms, in fact, is constrained by construction to yield a constant number of operating firms. Of course, this one-to-one replacement assumption is unduly restrictive and unrealistic. It is a well known empirical regularity, in fact, that the entry–exit process continuously modifies the total number of agents operating in a market, plays an important role in the evolution of the distribution of firms and affects macroeconomic variables.

In this paper, we abandon the one-to-one replacement assumption and allow for an unconstrained turnover of firms. In particular we exploit the presence of bankruptcy risk in a theoretical framework à la Greenwald-Stiglitz (Delli Gatti et al., 2000) to model an endogenous flow of exiting firms. As to the flow of entrants, we assume that it is influenced by current macroeconomic conditions (proxied by the number of surviving, non-bankrupt firms) and by stochastic factors. This *entry–exit pattern* of industrial dynamics will affect the evolution of the *distribution of firms* according to the degree of financial robustness/fragility which in turn will affect *aggregate outcomes.* In our opinion, in fact, firms' heterogeneity plays a crucial role in determining the macroeconomic performance.

This view is strongly rooted in the results of recent econometric investigations on longitudinal data at the firm level (Davis et al., 1996; Davis and Haltiwanger, 1996; Caballero et al., 1997; Stanca and Gallegati, 1999) which show that even within the same industry, firms exhibit very different behaviors at business cycle frequency: during a recovery, for example, when almost all industries expand, a significant fraction of firms decline and some leave the market. There is so much heterogeneity at the micro level that the usual representative agent approach to macroeconomics becomes questionable. In a theoretical setup which takes heterogeneity seriously, the evolution of the cross-sectional distribution of agents determines endogenous cycles and/or affects the propagation mechanism if fluctuations are generated by exogenous shocks.

In the mainstream literature on the business cycle based on the impulse-propagation mechanism and the representative agent hypothesis, the analytical framework is linear, so that large fluctuations (i.e., of a size comparable to the empirical evidence) are produced either by large shocks or by a sequence of small shocks. Since disturbances are white noise by assumption, the latter case is ruled out, and the analysis of fluctuations is confined to great events (oil shocks, wars, and so). On the contrary, if sufficiently self-reinforcing non-linearities are introduced, small shocks may generate large fluctuations. In this case, in fact, idiosyncratic shocks do not wash out in the aggregate.

If agents are heterogeneous, the propagation mechanism is affected by changes in the distribution of agents. In such a case, it is no longer true, as Lucas (1977) claims, that "business cycles are all alike". Whatever is the nature of the impulse, the propagation mechanism can make the difference, if it is large enough. In our framework, fluctuations may be due either to idiosyncratic disturbances or to aggregate shocks, propagated and amplified by agents' heterogeneity. The combination of agents' heterogeneity and non-linearities has