

Financial Fragility, Fluctuations and Growth

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A not negligible branch of literature claims that, because of informational imperfections, financial factors play an important role in output fluctuation. In the "old" Keynesian literature, financial fragility is "systemic" (Minsky, 1982) and it can endogenously cause the business cycle. In the "new" Keynesian literature financial fragility represents an amplification mechanism in the spirit of the impulse-propagation approach (Bernanke and Gertler 1989, 1990; Greenwald and Stiglitz 1988, 1990, 1993; and Kiyotaki and Moore, 1997) where informational imperfections make the system deviate from the first best solution.

If financial factors are important to explain output fluctuation, in our opinion they are important to explain growth as well. So we present here a model of fluctuations and growth.

We develop our model in a non standard environment already present in a few output fluctuation investigations. Indeed, the traditional approaches to fluctuations (and to economics in general) have been criticized because they share a common analytical tool: the "representative agent" hypothesis. Beginning with Kirman 1992, economists have shown that although the representative agent allow for simplification and make easier economic investigations, it leads often to misleading results. Theoretical research and applied investigation demonstrate that macroeconomics is not equivalent to the simple "summation and averaging" process of individual agents. Since the aggregate can be (and under very general conditions it is) different from the sum of its components, it is misleading to analyse the behavior of a representative agent as if it were representing the whole economy. On the other hand very restrictive analytical (and empirically implausible) conditions are requested to have exact aggregation. Recent empirical works show

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that heterogeneity can explain aggregate dynamics: idiosyncratic shocks affect the rate of change of macroeconomic quantity (Davis et al. 1996, Davis and Haltiwanger 1996, Caballero et al. 1997. Two recent books: Gallegati and Kirman 1999, and Delli Gatti *et al.* 2000, collect articles in which heterogeneity is explicitly modeled). A second important consideration is that heterogeneity allow for the introduction of interactions among the economic agents that are not mediated by the market price. Direct interactions are able to generate non linearities and to produce the break down of the law of large numbers allowing to explain some economic puzzles.

In our model production is obtained using only capital. The dynamic of its productivity is the main focus of our investigation. Firms are engaged in research and development activities that allow them to improve the productivity of capital. This activity is supposed to depends on two factors. The first one is due to environment factor (represented by a stochastic process) and it is equal for each firm. In the second one interaction play a central role. Each firms knows the productivity level of the most efficient firms and try to reach this level. Financial factors come into the picture because R&D is costly. Firms may not rely on an always positive stream of profits due to the presence of idiosyncratic price shocks. In this way firms have to borrow from a bank to finance both capital and R&D investments. In this framework each firm has its own history and it's far from being a representative firm. When a sequence of negative price shocks beat a firm its equity level decreases and it can become negative. In this case the firm goes bankrupt. As we want to maintain a situation with a plurality of firms the possibility of exit the market pushes us to consider and explicitly model the entry process.

Summing up two are the main element of the model. The first one is the presence of a R&D activity that introduce an endogenous factor of growth. The second is the presence of idiosyncratic price shocks and the turnover of firms that add fluctuations around the growth path.

We analyse the model using a simulation technic. This allows us to monitor the dynamics of heterogeneity and its capability to explain macroeconomic stylized facts. In particular we can analyze the frequency distribution of firms with respect to some factors like the financial position, the capital productivity and size. We show that there are some regularities in the behavior of the characteristics of these distribution that help us to understand both macroeconomic and industrial dynamics.

The paper is organized as follow. In sections 2 we describe the model: after having exposed the theory of the firm, describing the R&D and firms turnover processes. Section 3 presents the simulation's results. Section 4 concludes.