The Persistence of Differences in Productivity, Wages, Skill Mixes and Profits Between Firms in a Rapidly Changing Environment

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Abstract

In this paper, we construct a dynamic assignment model that can provide a unified explanation of persistent differences in productivity, wages, skill mixes and profits between firms in a changing and uncertain environment. Large expected organization capital (firm-specific knowledge) attracts skilled workers, who help to accumulate organization capital. Accumulated large organization capital, in turn, confirms high expectations. This positive feedback brings about persistent differences in these variables even in a changing and uncertain environment. From this feedback mechanism, we identify two sources of persistence: the heterogeneity of skills and the difficulty of measuring organization capital.

To examine the quantitative importance of the two sources, we estimate parameters and simulate the model. Because it is perceived organization capital that attracts skilled workers who help to accumulate organization capital, the effect of the perceived value on persistence provides information about the role of assignment in persistence in our framework. Exploiting this information, we differentiate two sources of persistence – positive assortative assignment and noisy information – from others by using an industry annual dataset from COMPUSTAT covering 1970 to 2004. COMPUSTAT provides data on an unbalanced panel of publicly traded firms in the US. It contains information from balance sheets, and information on incomes, cash flows and financial variables. The value added per worker and the average wage rate are constructed for each firm and each year.

The estimated parameters are all significant and their signs are consistent with theoretical predictions. By using the estimated parameters, we simulate not only the autocorrelations of relative productivity, relative wages and expected relative profits per worker, but also the correlation between relative productivity and relative wages; note that, in this paper, "relative" refers to the logarithm of each value relative to industry and year averages. All simulated autocorrelations replicate the observed autocorrelations quite well. The model is also able to explain the observed high correlations between relative productivity and relative wages. That is, our model can quantitatively account for the stylized facts of interest.

We use our model to conduct two counterfactual experiments. They show that if there were no skill difference between workers and, therefore, if there were no assignment problem, firms' relative advantages (disadvantages) would almost disappear in about five years. In addition, the correlation between relative productivity and relative wages would diminish substantially, while even if output perfectly predicted the level of organization capital, there is only a minor influence on variables' persistence and the correlation between relative productivity and relative wages. These exercises consistently suggest that a positive assignment mechanism accounts for a large part of the observed persistence of variables. The difficulty of estimating organization capital plays only an auxiliary role.

In order to check the robustness of our results, we are currently extending our research into two directions. Firstly, we are extending the model to allowing fixed effects that may still exist without the proposed mechanism. It permits us to separate the proposed mechanism from other reasons captured by the fixed effect. Secondly, we are reexamining the same model by using the micro data of the Basic Survey of Japanese Business Structure and Activities by the Ministry of Economy, Trade and Industry from 1995 to 2005. It covers all the enterprises with 50 employees or more and greater than a 30 million yen capitalization that are engaged in mining, manufacturing, wholesale and retail, or restaurant activities. Hence, we can examine how differences in countries and the coverage of firms influence the importance of proposed mechanism.