Delayed Adjustment and Persistence in Macroeconomic Models

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September 29, 2016

Abstract

Our research explores a lingering economic puzzle: why are fluctuations in economic activity more persistent than standard models predict? We create a model that is capable of explaining aspects of this slow aggregate adjustment, and in particular slow investment adjustment and the so-called jobless recoveries. The crucial component of our model is the existence of intertemporal non-separabilities in production; one possible example of these non-separabilities is the accumulation of infrequent activities that are crucial to the firm in the long run but do not immediately benefit production in the short run - factors such as implementing new processes, worker training and staff meetings. We refer to these activities as organizational capital. When faced with higher demand or productivity, firms can temporarily expand production without investing in more capital or hiring more workers, by using this additional margin of adjustment. Eventually, further depleting the stock of organizational capital becomes costly, and investment and hiring increase slowly.

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Summary In this paper we show that a standard model with production function that features intertemporal non-separabilities in production can explain one of the most important puzzles in macroeconomics: the fact that fluctuations in economic activity are much more persistent than standard models predict.

As mentioned above, organizational capital can be interpreted as an example of these non-separabilities. We think of organizational capital as the accumulation of infrequent activities that are crucial to the firm in the long run, but do not immediately benefit production in the short run. The infrequent nature of these activities generates a margin of adjustment for production, which gives rise to more persistent dynamics in investment and hiring that are qualitatively and quantitatively different from standard models and consistent with the empirical evidence. Organizational capital and other intangible assets make up an important part of the productivity and stock market value of firms (Brynjolfsson et al. (2002)). However, the macroeconomics literature largely ignores this important input in the production process and non-separabilities that it introduces. In this paper, we explore the implications of intertemporal non-separabilities in production for business cycle fluctuations.

Modern theories of investment are micro-founded versions of Lucas (1967) "flexible accelerator" model: investment depends positively on the distance between the actual and the desired capital stock. Depending on the specifics of the model, capital adjusts gradually (with convex adjustment costs) or instantaneously (with fixed adjustment costs or irreversible investments) to its target. While intuitively attractive, these models have the counterfactual implication that investment is highest immediately after a change in demand or productivity, when the capital stock is furthest away from its target. In reality, firms slowly increase their investments, with most investment happening as much as 18 months after a shock. The most common solution to this problem, introducing adjustment costs in the change rather than the level of the capital stock (Altig et al. (2011)), is counterintuitive and inconsistent with plant-level data on investment dynamics.

Hiring or labour adjustment displays a very similar discrepancy between models and data. In the data, employment and hiring are highly positively correlated, and the persistence in both series is very similar and large. After recent recessions, job creation has remained low for up to 30 months during the so-called jobless recoveries. Most models of the labour market, including the dominant search and matching framework, show little persistence in employment over and above the persistence of the exogenous shocks, and none in hiring.

The non-separabilities in production can explain why the adjustment of investment is slow and why hiring has lagged behind in recent economic recoveries. When faced with higher

demand or productivity, firms can temporarily expand production without investing in more capital or hiring more workers. Eventually, further depleting the stock of capital and labour that is crucial in the long run becomes costly, and investment and hiring increase slowly, as they do in the data.

Preliminary results suggest that our model succeeds in capturing the delayed response in both investment and hiring. A broader version of the model will provide quantitative predictions relevant for understanding investment behaviour and the nature of jobless recoveries.

References

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