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Persistence of shocks and the reallocation of labor

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ABSTRACT

This paper proposes a theoretical and quantitative analysis of the reallocation of labor across firms in response to idiosyncratic shocks of different persistence. Creating and destroying jobs is costly and workers are paid a share of the value of the marginal worker. The model predicts that employment and labor costs react differently to transitory shocks and permanent shocks. Quantitative evaluation of the model on a panel of French firms shows the model's performance. Modest adjustment costs are needed to reproduce observed job reallocation and inaction rates. Removing adjustment costs leads to productivity gains of 1% at the steady state. These gains are 50% larger in an economy with only transitory shocks and an order of magnitude lower in an economy with only permanent shocks. Bargaining dampens the reallocation of labor across firms, leading to larger efficiency losses from adjustment costs.

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1. Introduction

Data on individual firms reveal the importance of idiosyncratic shocks: Davis and Haltiwanger (1999) document the coexistence of both job creation and job destruction within narrowly defined industries and at all phases of the business cycles. There is also an enormous amount of heterogeneity in firm-level productivity: In the typical four-digit industry, the lowest decile producer is half as productive as the highest decile producer.[2] A recent growing literature, based on the seminal work of Hopenhayn (1992) and Hopenhayn and Rogerson (1993), and surveyed in Hopenhayn (2014), investigates whether the allocation of resources input within firms across countries can matter for aggregate outcomes. Hsieh and Klenow (2009) find much larger microeconomic gaps in productivity across firms in poor countries. They suggest impediments to the reallocation of resources from low to high-productivity firms can have important aggregate consequences. While there exists a body of work that analyzes the allocation of physical capital across firms within a country as well as the importance of financial markets,[3] much less is known about the impact of labor market regulations and, more generally, labor adjustment costs. These costs may be technological (e.g., reduced efficiency during the period of adjustment), or they may be institutional (e.g., employment protection legislation). The responsiveness of labor costs to shocks also alters a firm's incentives to adjust its workforce. For example, following a negative shock, a firm may not have to reduce its workforce if the cost of labor decreases sufficiently.

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[2] See Syverson (2011) for a survey.

[3] See, for instance, Quadrini (2000), Cagetti and De Nardi (2006), Buera et al. (2011) and Midrigan and Xu (2014).

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The persistence and variance of shocks are crucial parameters that determine the benefits of reallocating resources across firms.[4] Firms face both permanent shocks (such as a change in consumers' taste or a new software) and transitory shocks (such as a climate shock or a power outage) and may well adopt different strategies depending on the persistence of the shocks. While the distinction between transitory and permanent shock is very popular in the consumption literature,[5] the literature on firm dynamics typically assumes a univariate AR(1) process whose persistence is calibrated or estimated as a range of values that greatly varies across studies despite its first-order importance.

I propose a theoretical and quantitative analysis of the firm-level employment and wage responses to idiosyncratic shocks of different persistence. Specifically, I show that the combined assumptions of (1) decreasing returns to labor, (2) Nash bargaining with multiple workers as in Stole and Zwiebel (1996), and (3) costly employment adjustment, imply that transitory shocks have a strong impact on wages and little effect on employment while permanent shocks have a strong effect on employment and little effect on wages.

The firm produces with decreasing returns to labor and is subject to transitory and permanent shocks to its profitability. The wage is negotiated every year, and workers are paid a share of the value of the marginal worker as in Stole and Zwiebel (1996). Finally, adjusting the level of employment is costly. The intuitive mechanism at work is as follows: If there is a shock that raises the marginal productivity of labor, and this shock is expected to last, then the firm pays the cost of hiring additional workers. Since the marginal product of labor is decreasing, this offsets the shock, so that the marginal worker is not much more valuable than before. Therefore, the wage does not increase much, but there is a substantial rise in employment. In the case of a transitory shock, it is not worthwhile to add more workers, because it will be costly to decrease employment after the shock expires. In this case, the marginal worker is more valuable in this period, so the wage rises. There is little change in employment in this case.

Then, I examine whether the model is able to quantitatively reproduce the patterns of employment and wage dynamics observed in firm-level data. In a preliminary step, I apply a simple econometric specification to a panel of French firms. I find that, at the firm level, transitory shocks have a strong effect on average wages, whereas permanent shocks have a very small effect on average wages. Then, I use the simulated method of moments and estimate the structural parameters – labor adjustment costs, workers bargaining power, and the sources of dispersion of the observed variables. In particular, I provide some evidence on the importance of adjustment costs and the strength of rent sharing. The estimation results indicate that the model is consistent with the data. Relatively modest adjustment costs (about two months of average annual wages per job created or destroyed) can reproduce the data well. This conflicts with the perceived rigidity of the French labor market.

I use the model to infer the cost of the regulation and its impact on labor productivity observed in the data, linking to the large body of work that followed Hsieh and Klenow (2009) and Restuccia and Rogerson (2008). These papers show that the dispersion in the productivity of factors inputs across firms (misallocation) has important consequences for aggregate output. I find that adjustment costs can explain one-fourth of the dispersion of labor productivity. Holding total employment constant, output increases by around 1% at the steady state if adjustment costs are removed. This number captures the misallocation of labor across firms. I find that the persistence of shocks is important for evaluating the impact of labor adjustment costs. Precisely, transitory shocks are responsible for more misallocation than permanent shocks, but the gains to reallocating labor are 50% larger in economies with only transitory shocks compared with the baseline economy. And, they are an order of magnitude lower in economies with only permanent shocks. With wage bargaining, labor costs tend to rise following positive shocks and they tend to fall following negative shocks. Hence, wage bargaining dampens the reallocation of labor across firms leading to larger efficiency losses from adjustment costs.

Related literature This paper is related to a large literature on firm dynamics, labor market regulations, and misallocation.

A number of recent studies that followed Hsieh and Klenow (2009) and Restuccia and Rogerson (2008) argue that factors of production are inefficiently allocated among firms (misallocation). Notably, Buera and Shin (2013), Moll (2014), and Midrigan and Xu (2014) quantitatively examine the impact of financing frictions on the dispersion of capital productivity. These authors show that the costs of misallocation strongly depend on the persistence of shocks. Yet, these papers neglect the distinction between less and more persistent variations in firm productivity, and it is customary to assume that firm productivity follows a stationary autoregressive process of order one.[6] This contrasts with the various dynamic models for individual workers that have been proposed in the earnings dynamics literature.[7]

Some empirical papers investigate the relationship between wages and profits but none consider this question simultaneously with that of employment flexibility. Georgiadis and Manning (2014) document a large amount of transitory volatility in firm-level average earnings and they attribute it to a mechanism in line with the theory below. Using matched employer–employee data from Italy, Guiso et al. (2005) find that wages are sensitive to permanent output shocks but not to transitory output shocks. They do not consider profitability shocks but output shocks, and they consider only the response of wages

[4] See Buera and Shin (2011, 2013), Gourio (2008), Moll (2014), and Midrigan and Xu (2014).

[5] See Meghir and Pistaferri (2011) for a survey.

[6] An important exception is Gourio (2008) who focuses on investment whereas I consider the joint response of wages and employment. Also, he obtains a closed-form solution by assuming quadratic adjustment costs and log-linearization of the model. Quadratic costs may be appropriate for approximating the behavior of very large firms, but they are at odds with observed patterns of factor adjustment at the plant level.

[7] See Meghir and Pistaferri (2011) for a survey.

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