When productivity goes up, firms raise salaries

blogs.lse.ac.uk/businessreview/2016/11/29/when-productivity-goes-up-firms-raise-salaries/

11/29/2016

Firms are important for workers' wages. This blog post investigates the extent to which differences in firms' pay are related to differences in firms' physical productivity. Based on matched employer-employee data from Sweden, it finds that firms that benefit from positive productivity shocks increase wages of incumbent workers. The impact is larger if the shock is shared with other firms within which there is substantial labour mobility, suggesting that the productivity evolution among firms that draw their labour from the same market segment is a crucial determinant of workers' wages.

Does the productivity of your firm affect your pay? Standard microeconomic theory says no. Firms have no power over setting wages when markets are perfectly competitive. All they can do is hire as many workers as they need for each type of labour at their respective market wages. Clearly, this view runs contrary to popular perception. Some firms pay higher wages than others. In some cases wage differences seem to compensate for unpleasant conditions. Firms operating in risky environments, where workers need to stand for long hours, for example, might have to pay higher wages to attract applicants. Other firms simply seem to be better for workers, paying higher wages and even offering other attractive perks.

Of course, many strands of modern economic theory predict wage differences across firms for identical workers. The work of recent Nobel laureates Peter Diamond, Dale Mortensen and Christopher Pissarides provides one explanation. Their point of departure is that searching for a job is a costly activity. Workers have to ask friends and family about possible vacancies, look for vacancies online, send out resumes, and participate in many rounds of interviews. The process is also costly for firms. They need to post their vacancies, process them, interview candidates, meet to rank them, and make selections. This takes time and costs money. The costs imply that when a candidate reaches the final stage the two sides have to decide whether or not to keep on looking for alternatives or strike a deal.

Workers have a minimum wage they are willing to accept in mind, which is called their reservation wage. Below that, they are better off rejecting the job and continuing their search. The value of the match from the point of view of firms

depends on profit expectations. These, in turn, depend on productivity developments, on how appealing to the public their goods and services will be and other costs including those of labour. Depending on their relative bargaining power, the worker and the firm will negotiate wages and other conditions of the job. Economists label these search and matching costs, frictions.

What does the empirical evidence tell us? Two findings have been corroborated by empirical studies in a multitude of countries and economic conditions. The first is that larger firms pay higher wages (Oi and Idson, 1999). The second is that more profitable firms share some of these profits with their workers in the form of higher wages (see Card, Devicenti and Maida, 2014 and references therein). These two facts are obviously interconnected, as larger firms often reap higher profits.

The empirical evidence is convincing: larger and more profitable firms pay higher wages — and that's not only because they attract more skilled workers. Identical workers are paid better if they work for these firms. While the facts are clear, what lies behind these facts is not so clear. Do larger firms or more profitable firms pay higher wages because they are more productive? Or do they have an advantage because consumers prefer their products, and the extra profits generated by this demand are shared with workers?

Why has an answer to this question proved so elusive? Measurement is an important part of the problem. Economists use the concept of total factor productivity (TFP) to measure the productivity of a firm, an industry or a country. TFP cannot be observed directly. It is instead calculated as the residual of total output that cannot be explained by inputs – labour, capital, and, depending on the measure of output, intermediate goods. Determining TFP at the country or industry level is relatively simple (although of course there is much debate on how to do so correctly), but at the firm level it becomes very complicated. Typically, we look at firms' sales, that is, the number of units sold of each product produced by a firm multiplied by their prices; but in order to build a measure of TFP we need a measure of physical output, that is, we need to separate prices from volumes sold.

In a recent paper (Carlsson, Messina and Nordstrom-Skans, 2016), we provide an answer to the first question: How important is firms' productivity for worker wages? Using one of very few data sets that contain measures of prices and sales for Swedish manufacturing plants, we construct a measure of TFP that begins with volumes sold. Linking this information with the wages of all workers employed in each firm provides compelling evidence of the importance of firms' TFP for worker wages. Usual econometric concerns such as differences in fixed firm-level wage policies, assortative matching, and endogenous match quality are dealt with by focusing on time-varying productivity for ongoing matched worker-firm pairs.

While firms' productivity matters for wages, it matters less than one might think. From one year to the next a typical change in firm level productivity explains some 25 per cent of the change in workers' wages. Over a longer time span, the response increases, and TFP changes or "shocks" can explain up to 50 per cent of the wage changes. Still, these results suggest that other shocks also affect wages. New consumer tastes and other demand shocks for a firm's products are primary candidates. Recent evidence suggests that firms' demand shocks matter more than firms' TFP shocks for other firm level outcomes, including a firm's closure (Foster, Haltiwanger and Syverson, 2008), growth (Foster, Haltiwanger and Syverson, 2016; Pozzi and Schivardi, forthcoming) and hiring and firing policies (Carlsson, Messina and Nordstrom-Skans, 2014[1]).

The paper offers a second interesting insight. It turns out that workers' wages are about three times more responsive to TFP shocks that are shared with other firms in the same industry than to shocks that hit only a single firm. We evaluate two possible explanations for this observation. The first is the wage bargaining structure in Sweden, which takes place predominantly at the industry level. Unions may better help workers coordinate their efforts to extract a bigger share of the pie when the productivity improvement has been shared across most firms in the sector. The alternative explanation has to do with workers' outside options. When a shock is shared across firms where workers' mobility costs are low (for example, because they share some industry-specific human capital), the worker may have more bargaining power to negotiate a wage increase since the threat to quit and go work in another firm becomes more credible.

Our findings show that, perhaps not surprisingly, most worker mobility happens within sectors. A worker who changes employer has a 54 percentage point higher probability of returning to the same, narrowly defined sector. Perhaps more surprisingly, the data supports market forces as the main reason behind a larger response to industry shocks. When the TFP shock is shared across firms within which worker mobility is high, the wage of incumbent workers is more likely to change. Thus, outside options appear to be a crucial determinant of workers' actual wages even in a country like Sweden where most workers are covered by collective agreements. In other contexts where wage negotiations are more decentralized and take place predominantly at the firm level (e.g., the United States and the United Kingdom), worker outside options may be even more important.

[1] Carlsson, Mikael, Julián Messina and Oskar Nordström Skans 2014. "Firm-Level Shocks and Labour Adjustments". Sveriges Riskbank Working Paper Series 293. December.

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- *This blog post is based on the authors' paper Wage Adjustment and Productivity Shocks, Economic Journal of the Royal Economic Society, September 2016.*
- *The post gives the views of the authors, not the position of LSE Business Review or the London School of Economics.*
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