3.1. How do firm dynamics and worker mobility influence real wage growth?

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1. Introduction

The modern approach to labour economics uncovered an unsuspected turbulence of job and worker flows underneath the surface of smooth employment aggregates (Blanchard and Diamond, 1992; Davis, Haltiwanger, and Schuh, 1998). Even in sclerotic labour markets, such as the Portuguese one in which job and worker flows are about one third of those of the United States, the intensity of these flows is well above what would have been guessed by simply observing the behaviour of aggregate employment (Blanchard and Portugal, 2001).

To better understand the dynamics behind aggregate real wage growth it will be useful to identify the contributions of job and worker flows. In this vein, the role of the entry and exit of firms and of the accessions and separation of workers can reveal the importance of job and worker restructuring in driving real wage growth. Furthermore, by decomposing aggregate real wage growth into a number of components, we will be able to disentangle the cyclical sensitivity of real wages associated with new firms and newly hired workers from that of incumbent firms and job stayers. It has been argued that the presence of implicit contracts inhibits the employers to fully accommodate product demand shocks and local labour market conditions when they set their wages. Such a constraint, however, is not present when they hire new workers, which makes the cyclicality of real wages stronger for newly hired workers in comparison with job stayers (Carneiro, Guimarães, and Portugal, 2012).

Worker churning, that is, the difference between worker flows and job flows, may well be excessive and inefficient in highly segmented labour markets, like the Portuguese one, due to the extensive use of fixed-term contracts. Fixed-term contracts may be employed for a number of reasons: to screen workers, to cushion against negative product demand shocks, or just to avoid firing costs (Portugal and Varejão, 2010). Be that as it may, if fixed-term contracts are perva-

sive, it means that entry wages are likely to be systematically below those of incumbent workers, accentuating the negative contribution of worker restructuring to real wage growth.

2. Empirical methodology

We follow Foster, Haltiwanger, and Syverson (2008) and present a decomposition that allows us to quantify the importance of job and worker restructuring on aggregate real wage changes. We study how changes in the composition of jobs and workers in the labour market affects aggregate real wage growth.

We proceed with the analysis in two steps. First we measure the relative contributions of within-firm variation, reallocation between incumbents, and entry and exit to real wage growth. We then decompose the aggregate real wage growth at the worker level for continuing jobs.

The basic idea underlying the decomposition is that aggregate real wage growth (ΔW_t) between year t and year s, $t = s + 1$, can be decomposed into within-firm wage growth (W_i) and job restructuring. The latter arises from changes in the labour shares between continuing firms (B_i), the entry of firms (N_i), and the exit of firms (X_i).

Therefore, in the first step aggregate real wage growth can be written as:

$$\Delta W_t = W_i + B_i + C_i + N_i + X_i \tag{10}$$

where i represents a firm. In this decomposition, W_i measures the weighted average real wage growth within a firm and B_i is a between-firm effect that indicates changes in the labour shares between continuing firms, weighted by the growth rate of real wages.

The between effect is positive (negative) if the continuing firms that have a relatively high real wage level increased (decreased) their labour share amongst the continuing firms. The term N_i measures the contribution of entering firms to average real wage growth. This contribution is positive if the real wage level of the new firms is higher than the wage level of the continuing firms in the founding year.

The exit effect is measured by the term X_i and is positive if the real wage level of the exiting firms is lower than the real wage level of the firms that continue operating in the market. The magnitude of the entry and exit effects will depend on the labour shares of the new and exiting firms, respectively. The term C_i is a covariance term.

In the second step we further decompose the within-firm variation of the continuing firms at the worker level to gauge the contributions of hirings (N_j), separations (X_j), and continuing workers (W_j) to aggregate real wage changes.

The decomposition at the worker level is given by:

$$W_i = W_j + N_j + X_j \tag{11}$$

where j denotes a worker. In this step the sources of wage variation are the within component of job stayers, i.e., those who work in the firm in two consecutive years (W_j), the newly hired workers (N_j) component, i.e., those who work in the firm at time t but not at time s, and the separation of workers (X_j) component, i.e., those who work in the firm at time s but not at time t, for each of the continuing firms.

The within component reflects the average real wage growth rate of job stayers in continuing firms, the entry component is positive if newly hired workers have on average a higher real wage level than job stayers in the firm that hired them, and the exit component is positive if separated workers have on average a lower real wage level than job stayers in the firm from which they have been separated.

3. Data

We use a very rich and comprehensive employer-employee dataset known as *Quadros de Pessoal* (QP). This dataset was created by the Portuguese Ministry of Employment and consists of an annual mandatory employment survey addressed to establishments employing at least one wage earner. Data are available from 1982 to 2017 for each wage earner, with the exception of workers of the Public Administration sector and domestic servants.

Detailed data are available on the establishment (location, economic activity, and employment), the firm (location, economic activity, employment, sales, year of formation, and legal framework), and for each and every of its workers (gender, age, education, occupation, earnings – including base wage, seniority related earnings, other regular and irregular benefits, overtime pay, normal, and overtime hours – and tenure).

4. Results

4.1. *Worker flows*

Figure 22 presents the worker flows in the Portuguese labour market in the period from 2005 to 2017. Worker flows are decomposed according to firm and worker dynamics. In particular, Figure 22 depicts the contribution of new firms, firm closures, job stayers, worker accessions, and worker separations to employment changes.

We document two main findings. First, job creation and job destruction are remarkably large during this period. Second, job creation and job destruction seem to co-move positively, that is, periods of more job creation are also periods of more job destruction.

4.2. *Micro-level sources of aggregate wage growth*

In this subsection we present the results of the aggregate wage growth decomposition at the firm and worker levels. Figures 23 and 24 show the role of job and worker restructuring on aggregate wage variation, respectively, in the period under study.

The decomposition of aggregate wage growth according to firm dynamics is presented in Figure 23 and suggests that, in general, aggregate real wage growth is lower than that of job stayers. Therefore, worker and job restructuring affect real wage growth negatively. Job restructuring has an important role in explaining changes in real

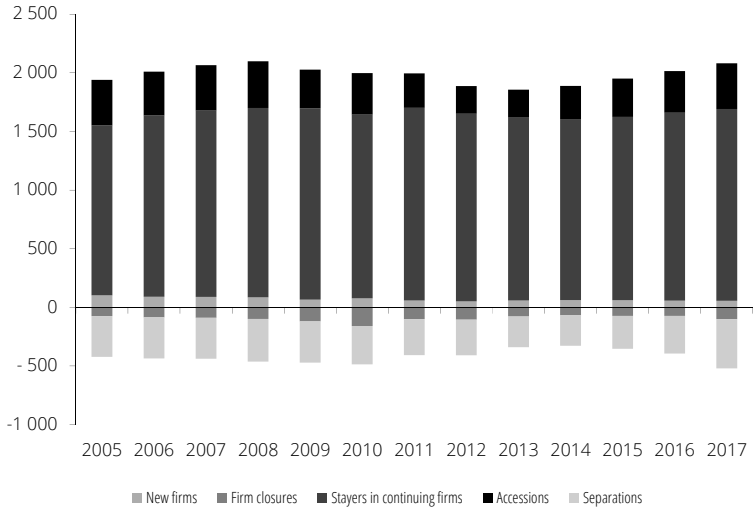

Figure 22: Worker flows (in thousands).

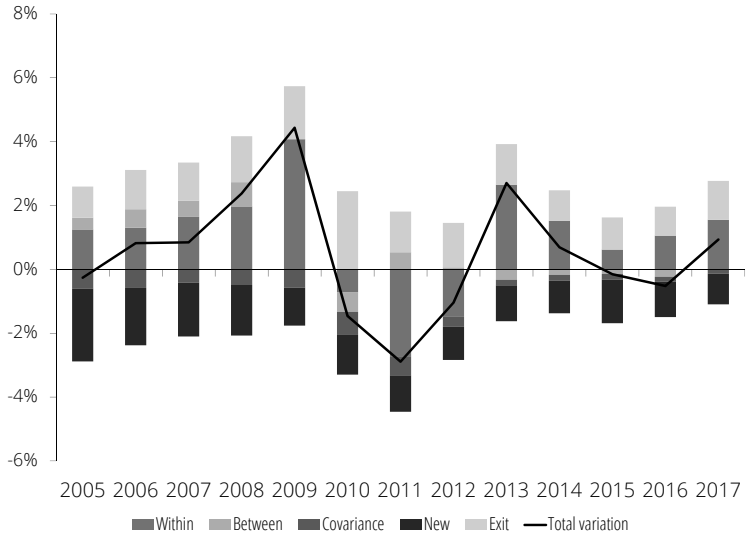

Figure 23: Decomposition of aggregate real wage variation at the firm level.

wages. New firms contribute negatively to real wage growth, implying that average real wages of new firms are lower than the average real wages of incumbents. Similarly, firm closures contribute positively to real wage growth, suggesting that on average real wages of exiting firms are lower than real wages of incumbents. These findings tally with a "cleansing effect" through which resources are reallocated toward more productive firms. The between component suggests that in the period from 2005 to 2008 the high-wage firms seem to have increased their labour shares while the opposite holds in the years from 2013 to 2016.

Figure 24 suggests that worker restructuring is important to explain within-firm wage growth. The results indicate that newly hired workers earn on average lower wages than job stayers, contributing negatively to aggregate wage variation. In contrast, the effect of worker separations is positive, which reflects the fact that separating workers earn less on average than job stayers. Overall, the net entry effect has a negative impact on aggregate real wage growth.

Importantly, the cyclicality of aggregate wage growth seems to be linked to the dynamics in the labour market. According to the decomposition at the firm level, the entry component is the most affected by the business cycle. In the aggregate, the correlation between the average real wage growth and the unemployment rate for continuing firms is -0.20. For continuing firms the correlation is -0.31, for those that exit it is -0.27 and for new firms equals -0.49. When the decomposition is performed at the worker level the cyclical sensitivity of the real wage growth of job stayers is the highest (the correlation is

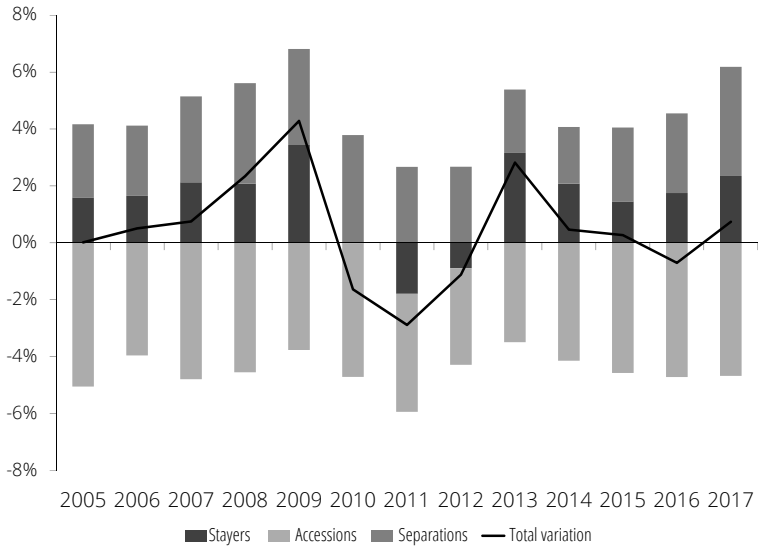

Figure 24: Decomposition of aggregate real wage variation at the worker level for continuing firms.

-0.41), the one for newly hired workers is -0.29, and that of separating workers is the smallest (the correlation is -0.20).

The analysis of the role of worker restructuring on aggregate wage growth also suggests that the within component is substantially affected during the economic downturn, highlighting the links between the cyclicality in job and worker restructuring and aggregate real wage growth.

Overall, the results uncover the micro-level sources of aggregate wage growth and show that changes in the composition of jobs and workers in the labour market are important drivers of wage variation.

5. Concluding remarks

We have shown that, at an annual frequency, the main driver of real wage growth is the within wage variation amongst incumbent firms. The reallocation amongst continuing firms (the between variation) plays a muted role. Because the average wage of entering and exiting firms is below the average wage of the ongoing firms, the contribution of job restructuring is negative. Similarly, because the average wage of newly-hired workers and workers separating from their employers is below the average wage of job stayers, the contribution of worker restructuring is also negative. Aggregate real wages are pro-cyclical because all of the components are also pro-cyclical. The cyclical

sensitivity of the real wages of workers employed by new firms is stronger than that of established firms.

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