

Catastrophic Job Destruction

(preliminary and incomplete)

Anabela Carneiro

(Faculdade de Economia do Porto)

Pedro Portugal

(Banco de Portugal, NOVA School of Business and Economics)

José Varejão

(Faculdade de Economia do Porto)

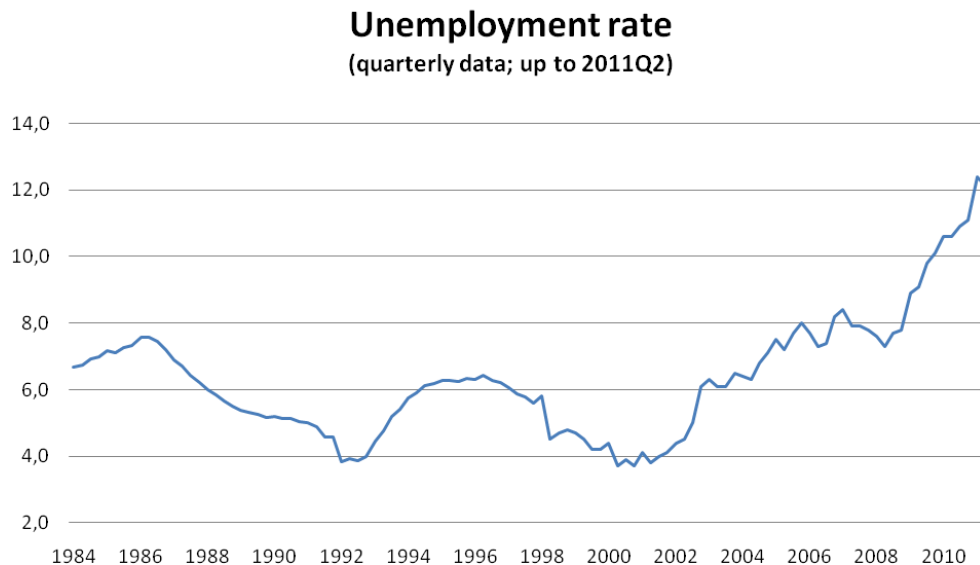
Abstract

1. Introduction

When the great recession hit the Portugal, the Portuguese economy was already facing severe macroeconomic imbalances. In a prescient, but unfortunately overlooked study, Olivier Blanchard (2007)¹ warned: “Portugal is in serious trouble. Productivity growth is anemic. Growth is very low. The budget deficit is large. The current account deficit is very large...In the absence of policy changes, the most likely scenario is one of competitive disinflation, a period of sustained high unemployment until competitiveness has been reestablished.”

The competitive disinflation adjustment process has generated historically high unemployment rates. Currently, the unemployment rate is above 12 percent, which is around two times the “natural rate of unemployment” that prevailed for decades (see figure 1).

Figure 1: The evolution of the unemployment rate

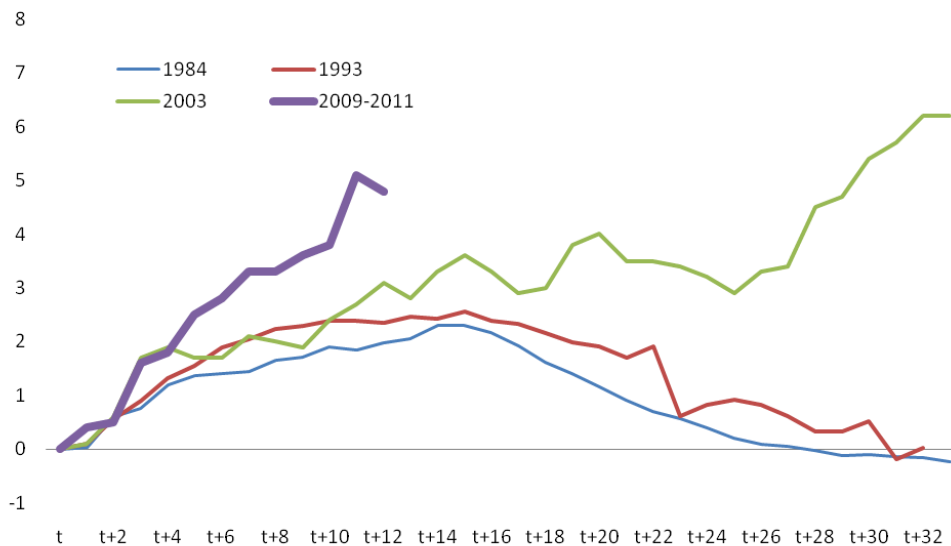


¹ Blanchard’s first writing of this study was actually disseminated in 2005.

Macroeconomic imbalances were accompanied by ill designed labor market institutions which make the Portuguese labor market a disfunctional market. Extreme employment protection, a very generous unemployment insurance system, and a poorly conceived wage setting process all contribute to the deplorable performance of the Portuguese labor market. We shall characterize those institutions in more detail below.

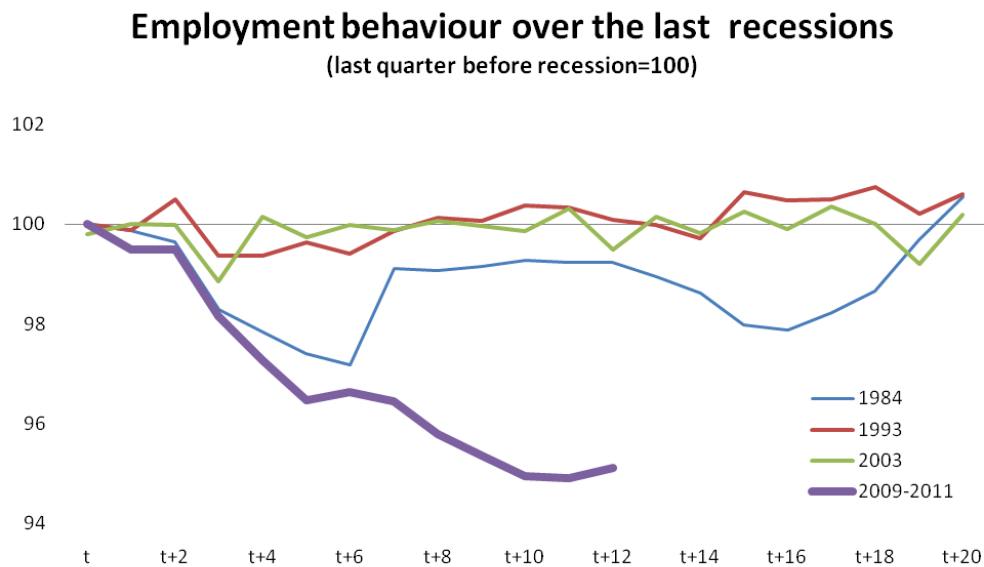
When we compare the labor market outcomes of the current recession with previous recessions it is clear that the previous steady-state will take much longer to achieve if all feasible (see figures 2 and 3).

Figure 2: Unemployment rate recovery across recessions



Three years after the beginning of the recession the unemployment rate is five percentage points higher and the employment fall is five percent. This reflects not only the deepness of the recession, but also the underlying macroeconomic dynamic and the nature of the labor market institutions.

In a sclerotic labor market such as that in Portugal the intensity of flows into and out of unemployment is very low. In particular, low flows out of unemployment translate into very long unemployment spells. On average, the duration of unemployment was, in 2010, 25 months. This makes the unemployment experience of an individual very painful, nearly catastrophic.



The plan of the paper is the following: section two characterizes the Portuguese labor market institutions; section three provides evidence on job and worker flows over the last two decades; in section four the wages of displaced workers are analysed; section five concludes.

2. Labor market institutions

2.1 Employment protection

The Portuguese labour market is dysfunctional, with very weak flows between employment and unemployment. The explanation given by Blanchard and Portugal (2001) for this conspicuous characteristic labour mobility is that it stems from the strong protection

of employment embedded in Portuguese labour legislation, above all in terms of the legal framework for firings. Fundamentally, very long unemployment spells -- a painful way of experiencing unemployment -- are the counterpart of job protection. The OECD ranking for the Employment Protection Legislation (EPL) Index consistently places Portugal among the countries with the highest levels of protection.

Figure 4: Employment Protection Legislation

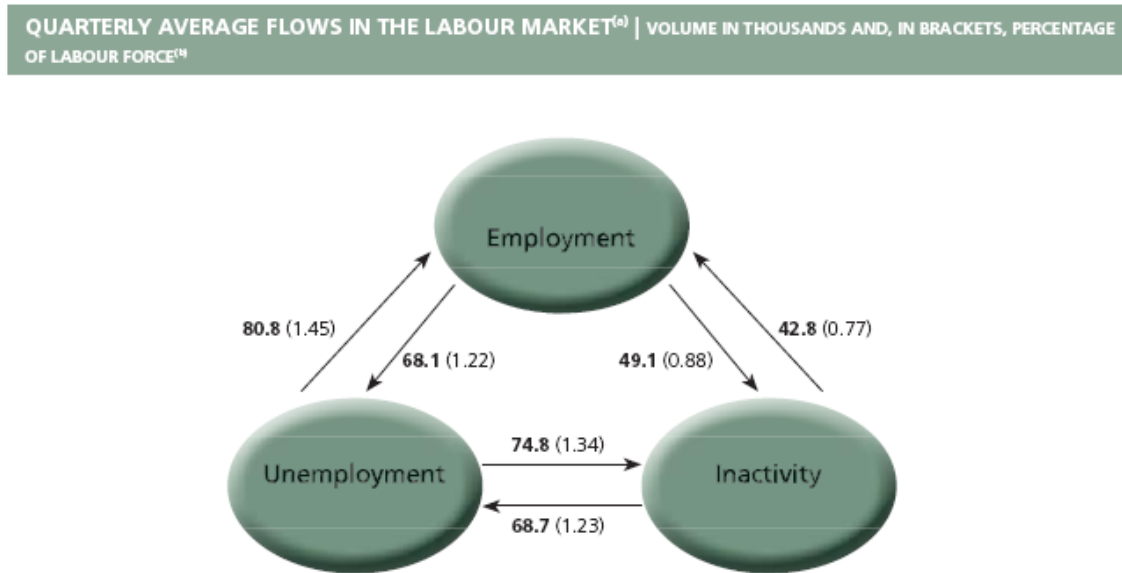
Table 20 - Employment protection legislation				
	1990		2008	
	Regular contract	Temporary Contract	Regular contract	Temporary Contract
Italy	1.8	5.4	1.8	2
Sweden	2.9	4.1	2.9	0.9
Germany	2.6	3.8	3	1.3
Belgium	1.7	4.6	1.7	2.6
Denmark	1.7	3.1	1.6	1.4
Greece	2.3	4.8	2.3	3.1
Portugal	4.8	3.4	4.2	2.1
Netherlands	3.1	2.4	2.7	1.2
Slovak Republic	2.5	1.1	2.5	0.4
Spain	3.9	3.8	2.5	3.5
Finland	2.8	1.9	2.2	1.8
Austria	2.9	1.5	2.4	1.5
France	2.3	3.6	2.5	3.6
United Kingdom	1	0.3	1.1	0.4
Czech Republic	3.3	0.5	3.1	0.9
Ireland	1.6	0.3	1.6	0.6
Hungary	1.9	0.6	1.9	1.4
Poland	2.1	0.8	2.1	1.8
Average	2.5	2.5	2.3	1.7
Standard deviation	0.9	1.7	0.7	1.0
coeff of variation	0.4	0.4	0.3	0.6

Source: OECD

There is abundant empirical evidence that there is a greater prevalence of long unemployment spells in countries with greater job protection. Fundamentally, the high costs of firings increase production costs, bringing down feasible wages (the wage that guarantees zero profits). Job protection in turn increases workers' bargaining power, and this means higher bargaining wage (the wage to which the worker aspires). In this model, the equilibrium is re-established by making unemployment more painful, that is, by reducing the

arrival rate of job offers. This brings down the transition rate from unemployment to employment, and increases the expected duration of unemployment (see figure 5).

Figure 5: Labor Market Flows

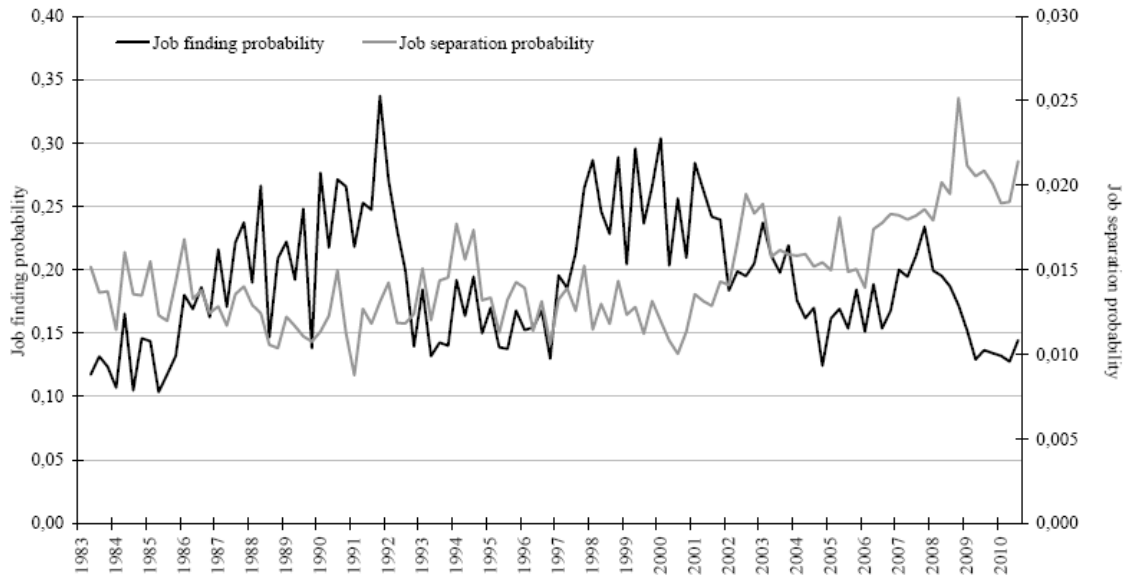


Sources: INE and Banco de Portugal.

Notes: (a) Considering the common sample component of quarter t and quarter t-1, and using the population weights for quarter t. Average values for the four quarters of 2010.

There is direct and indirect evidence on the job arrivals rate in the European Household Panel, where Portugal has the lowest arrival rate of job offers among all the countries represented on the panel (Jolivet, Postel-Vinay and Robin, 2006; Addison et al., 2009). Torres (20011) calculated the probability of a worker leaving a job and finding a new one exhibited in figure 6, using data from the Employment Survey. Job separation and finding probabilities are very low. Job finding probabilities are more cyclical than job separation probabilities. And there is a recent upward shift in in job separation probabilities.

Figure 6: Job Finding and Separation Probabilities



Source: INE

Elsby et al. (2009) offer a revealing international comparison based upon the computation of job finding and job separating probabilities from suitable Employment surveys. They concluded that those probabilities are very low, and show that job separations are almost acyclical and that the finding probabilities are strongly cyclical. In the work of Varejão and Portugal (2007) there is documented evidence that only 25% of establishments change the composition of their work force. Ejarque and Portugal (2007) solve a dynamic model of labour demand, using relevant sample moments of the Portuguese labour market, to show that the presence of adjustment costs can lead to a significant reduction in the flow of jobs.

2.2 Unemployment Insurance

In this setting, unemployment protection will tend to cushion the pain associated with the joblessness experience, and generate an ever steeper fall in the transition from unemployment to employment.

The unemployment insurance, as a system to protect the unemployed, was only introduced in Portugal in 1985, and even then some what in a muted way. It was only broadened significantly in 1989. The structure of the system is relatively simple. Unemployment benefits are only available after a minimum period of contributions to social security (currently 450 days in the last 24 months). The replacement rate is 65 per cent, unless this value is less than the Social Support Indexation (IAS, an amount close to the monthly minimum wage) or more than three times the IAS. In the first case, the benefit is made up to one IAS and in the second is brought down to three. The maximum duration for receiving the benefit depends fundamentally on the age of the unemployed worker and, marginally, on the period during which contributions were made. Duration varies between 270 and 1140 days. Once the allowable number of days has been reached, there is also, for those on very low salaries, an additional period of half the maximum potential duration standard subsidy.

Currently, the Portuguese unemployment insurance system is arguably one of the most generous among the OECD countries, most notably in what respects the maximum potential duration of unemployment benefits. For Portugal, there is abundant evidence supporting the notion that unemployment benefit recipients stay unemployed during a much longer period (twice as much) than non-recipient individuals (Addison and Portugal, 2002; Addison and Portugal, 2003; Portugal and Addison, 2007; Addison and Portugal, 2008).

2.3 Wage setting

The Portuguese Constitution provides the juridical principles of collective bargaining and grants unions the right to negotiate. The effects of the agreements are formally recognized and considered valid sources of labor law.

Underlying the bargaining process there is a mandatory minimum monthly wage which sets the minimum floor for wage negotiations. Currently, there is a unique legal minimum wage that applies to all workers. Workers formally classified as apprentices receive just 80% of the full rate. The minimum wage is updated annually by the parliament, under government proposal. Decisions on the level of the minimum wage are taken on a discretionary basis, usually taking into account past and predicted inflation and after consulting the social partners.

Recently, the social partners agreed on a sharp increase in minimum wages. This move implied that the fraction of minimum wage earners doubled in just three years (see below).

Concerning the bargaining mechanisms, a distinction should be made between the conventional regime and the mandatory regime. Conventional bargaining results from direct negotiation between employers' and workers' representatives. A mandatory regime, on the other hand, does not result from direct bargaining between workers and employers, being instead dictated by the Ministry of Labour. The Ministry can extend an existing collective agreement to other workers initially not covered by it or it can create a new one, if it is not viable to extend the application of an existing document. A mandatory regime is applied when workers are not covered by unions, when one of the parties involved refuses to negotiate or bargaining is obstructed in any other way.

Beyond the existence of compulsive extension mechanisms, voluntary extensions are also possible, when one economic partner (workers' representative or employer) decides to subscribe to an agreement which it had initially not signed.

Therefore, the impact of collective bargaining goes far beyond union membership and the distinction between unionized and non-unionized workers or firms becomes irrelevant.

Usually, collective negotiations are conducted at the industry or occupation level. Firm-level negotiation, which for a time was a common practice in large public enterprises, has lost importance. The law does not establish mechanisms of coordination between agreements reached in different negotiations; however preference is given to vertical over horizontal agreements, and the principle of the most favorable condition to the worker generally applies.

Since most collective agreements are industry-wide, covering companies with very different sizes and economic conditions, their contents tend to be general, setting minimum working conditions, in particular the base monthly wage for each category of workers, overtime pay and the normal duration of work.

However, whatever the wage floor agreed upon for each category of workers at the collective bargaining table (the bargained wage), firms are free to pay higher wages, and they often deviate from that benchmark, adjusting to firm-specific conditions (see Cardoso and Portugal, 2005). To the difference between the actual wage and the bargained wage we call wage cushion

2.4 Nominal Wage rigidity

The notion of nominal rigidity of wages is associated with barriers to a nominal fall in wages (legal, contractual and others). Since the 1950s it has been impossible in Portugal to cut wages. This restriction, however, does not create unsurmountable restrictions for companies seeking real salary concession to peg rises to inflation. In such a case it will be enough to ensure that a nominal salary up-date (non-negative) is below inflation for the company to gain real negative variations. The higher the inflation rate, the more leeway on wages is available for companies. In a low-inflation regime, however, nominal wage rigidity may stop companies from adjusting to negative shocks on demand for their products through wage manipulation. The smaller the wage cushion (the difference between the wage actually paid and the wage agreed in collective pay bargaining) the more difficult this manipulation will become. A third area where there is leeway for adjustment could be in the structure of total pay, which is made up of base pay, regular and occasional payments and overtime.

An empirical study of wage variation distribution, in the absence of huge errors in measurement, gives a convincing picture of situations where there is nominal rigidity. Resistance to nominal negative variations in wages will mean far fewer negative variations but if this cannot happen, there will be a rise in nil variations.

In terms of recent developments in the empirical distribution of wage variations there are hardly any nominal negative variations (measured from base pay) and a clear likelihood that wage variations were nil. The move towards more nil variations is particularly revealing. This is probably associated with low inflation and weak productivity growth. There is also a salient move towards zero in the distribution of wage variations, corresponding approximately to the expected inflation rate and accentuating even more the low distribution spread (see below).

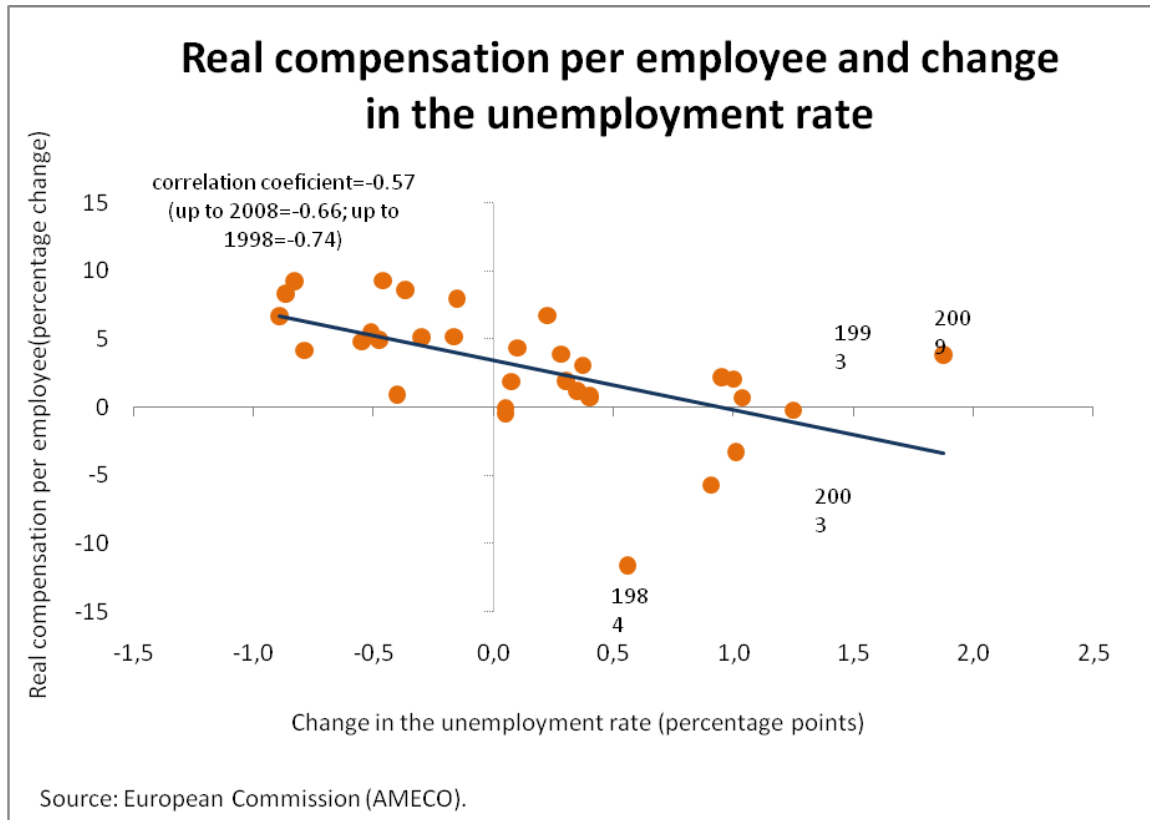
2.5 The (Falling) Cyclicalities of Real Wages

The Portuguese labour market was for decades conspicuous for its low and strongly counter-cyclical rates of unemployment, with clear evidence of a very weak mobility in the labour factor. Researchers pointed quite naturally to the flexibility of real wages as the main reason for this. Throughout this period, convincing evidence was gathered suggesting strong cyclical sensitivity of aggregate wages in the behaviour of the unemployment rate.

A description of the cyclical behaviour of wages may, however, be partly obscured by changes in the composition of the labour force over the economic cycle. Indeed, the use of aggregate wage indicators causes intractable confusion as to the effect of changes in wage dispersion, in the distribution of hours worked and in the composition of the workforce. There is an additional factor in the use of aggregate data, with the implicit assumption that the relationship between real wages and the economic cycle is common to all workers or groups of workers.

There is mounting evidence that the cyclicalities of real wages declined after the accession to the euro monetary union (Carneiro et al., 2010; Carneiro et al., 2012). With due proviso for the care to be taken over the interpretation of these results, owing to the uncertainty of the timeline associated with the measurement of the economic cycle, claim may naturally be made to the loss of real wage sensitivity as one of the mechanisms responsible, *inter alia*, for the Portuguese economy's current macroeconomic imbalances (Blanchard, 2007). Suggesting evidence is given in figure 7, below.

Figure 7: Cyclicity of real wages



Source: Bank of Portugal

2.6 On the inadequate architecture of the wage formation system in Portugal

In the debate over the Portuguese economy the essentiality of the link between unemployment and wage behaviour is mysteriously ignored. In the interpretation of these authors, the continued increase in the duration of unemployment, in conjunction with the

drop in the sensitivity of real wages to conditions in the Portuguese labour market, reflects mirrors an evolution of bargained wages that are out of sync with feasible wages.²

In turn, the growing generosity of the unemployment benefit system, particularly as regards the potential duration has undoubtedly facilitated the tolerability of unemployment status, in favour of persistently higher and less sensitive reservation wages and therefore higher unemployment.

In the Portuguese economy's current institutional framework, the successive increases in labour costs in the form of increases in minimum wages, impacting particularly on the marginal adjustment fringes of the Portuguese labour market, may lead to an undesirable fall in the arrival rate of job offers and, accordingly, a higher rate of unemployment.

The indication of a fall in the cyclical sensitivity of wages may be associated to the inadequate nature of the mechanisms for wage determination in low-inflation environments, in particular the severe nominal rigidity of wages and the widespread use of extension mechanisms applied to collective agreements. In turn, the growing generosity of the unemployment benefit system, especially with respect to the potential duration of the benefit, made unemployment less painful, favouring the emergence of reservation wages less sensitive to the rise in unemployment rates. Under these circumstances, one may assist to higher unemployment rate increases in order to overcome the macroeconomic imbalances in the Portuguese economy (Blanchard, 2007).

² See Blanchard and Portugal (2001).

3. The response of Portuguese firms to the 2008-2009 economic crisis

3.1 Data

All the evidence reported in this article was produced with data from Quadros de Pessoal - QP ('Personnel Records'). QP is an annual mandatory employment survey collected by the Portuguese Ministry of Labor that covers all establishments with wage earners. Every year, all employers with wage earners are legally obliged to fill in a standardized questionnaire. Currently, the dataset contains yearly information on about 350,000 firms, 400,000 establishments and 3 million employees.

Data are available on each establishment (location, economic activity, and employment), the firm with which it is affiliated (location, economic activity, employment, sales, and legal framework) and each and every one of its workers (gender, age, education, skill, occupation, tenure, earnings, and duration of work). The information on earnings is very detailed and complete. It includes the base wage (gross pay for normal hours of work), regular benefits, irregular benefits, and overtime pay, as well as the underlying mechanism of wage bargaining. Information on standard and overtime hours of work is also available. The dataset is longitudinal in nature. Each firm/establishment entering the database is assigned a unique identifying number and the Ministry implements several checks to ensure that a unit that has previously reported to the database is not assigned a different identification number.

This dataset allows us to compute measures of job turnover and the shares of employment creation and destruction accounted for by the entry and exit of establishments. All these variables may be computed from Quadros de Pessoal establishment-level files. For each spell

of the data, an establishment entry is identified whenever information for that establishment is reported to the datafile for the first time in the corresponding spell, i.e., if the establishment is not present in any of the preceding waves of the data. Similarly, an establishment exit in one year is identified whenever information for the establishment is absent for that year and for all subsequent years, i.e., if the establishment is not present in any of the subsequent waves of the data until the end-year. After identifying establishment entries and exits in every year, we can compute the corresponding number of jobs created and destroyed by new and exiting establishments (see Davis et al., 1996). Because we need at least one previous and two subsequent spells of the data to identify entries and exits, respectively, we cannot compute the rates of establishment turnover for the beginning and end-years. Similar entry and exit rates can also be computed at the level of the firm.

3.2 Employment and wages during the recession

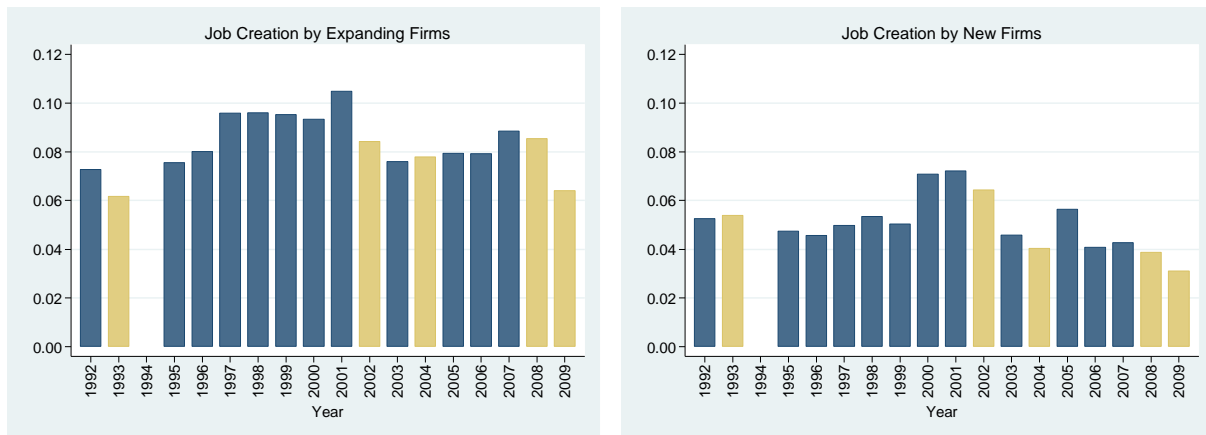
The current economic crisis originated a sharp decrease of total employment and a rise of total unemployment and the unemployment rate. Total employment fell by 4.2 percent between 2008 and 2010, the total number of individuals in unemployment increased by 51 percent, and the unemployment rate increased 3.6 p.p., reaching the 11.1 percent level by the end of 2010 (12.1 percent in the second quarter of 2011, although the two figures are not strictly comparable due to a series break).

The sharp fall of total employment that characterizes the current recession can be decomposed into the source of employment variation that originated it. To that purpose we consider two margins of employment variation: the employment variation accounted for by continuing firms and the employment variation accounted for by the entry and exit of firms.

Whereas we can compute similar measures of job creation and job destruction for the current and past recessions, we cannot go as far back in time as to compare the 2008-2010 recession with the 1983 recession, the only one that originated a similarly large drop of total employment.³

Figure 8 shows that employment creation along the two margins fell sharply in 2009. The level of job creation by both expanding firms dropped in 2009 to a level that is similar to that observed in 1993, whereas job creation by newly-created firms in 2009 set at its minimum during the entire period of observation.

Figure 8
Job creation



Source: own calculations on Quadros de Pessal data

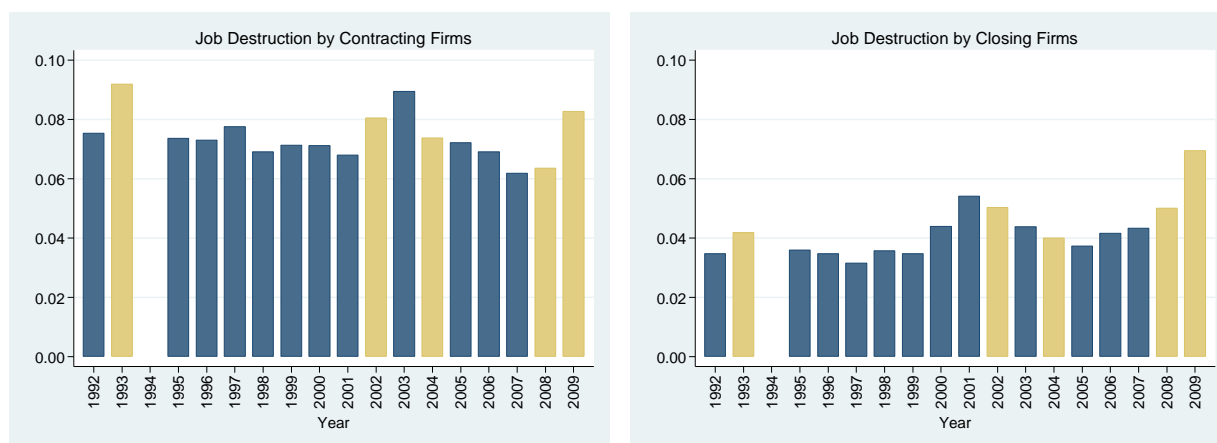
Differences relatively to the previous recessions are more clear along the destruction margin (Figure 9). Job destruction by firms that continue in operation increased very significantly in 2009, but again not more so than in the 1993 recession. Evolution along the exit margin is, however, strikingly

³ Using Quadros de Pessal, the only available data that allows for such a decomposition, is possible only from 1986 onwards.

different from the past. It is along this margin that an unprecedented massive and immediate amount of job destruction is observed. From 2007 to 2009, the rate of job destruction by closing firms increased 2.6 p.p. - in 2009, firms that closed down destroyed 6.9 percent of the corresponding average number of jobs that existed in that year.

Figure 9

Job destruction



Source: own calculations on Quadros de Pessoal data

Similar information can be obtained from the simple observation of the proportion of firms that were created and disappeared every year - the rate of firm creation decreased from 15 percent in 2005 to 9 percent in 2009, whereas the exact opposite occurred with the rate of firm closing (from 9 percent to 14 percent).

The overall pattern of job creation and job destruction by continuing and entering/exiting firms varies considerably across different types of firms. Multinational companies create fewer new jobs than Portuguese-owned companies but they also destroy fewer jobs. This is especially true if we consider the share of jobs destroyed due to firms closing operations (3.3 percent which compares to 6.9 percent for the aggregate of all firms).

The rate of job destruction decreases monotonically with firm size up to the 500 employee threshold - it is 9.7 percent for firms with less than 20 employees, 7.3 percent for firms between 20 and 49 employees, 6.4 percent for firms between 50 and 99 employees, 5.2 percent for firms between 100 and 249 employees, 2.7 percent for firms between 250 and 499, and 3.4 percent for firms with more than 500 employees.

Another feature of the firms' response to the current crisis is that although net employment variation is negative both in the subgroups of continuing firms and entering-exiting firms, the rate of job creation by continuing firms remains relatively high both in the overall economy (6.4 percent in 2009 and an yearly average of around 8.3 percent over the period between 1992 and 2009), and specially in some industries such as agriculture (7.6 percent), manufacturing (7.3 percent), construction (7.7 percent), and the financial sector (7.3 percent).

The composition of total employment by type of contract also changed during the current recession: in 2009, the share of temporary contracts in total employment decreased for the first time since the year 2000 and it became especially high in newly-created firms (at or above 35 percent since 2008) - Figure 10.

Figure 10

Share of temporary employment in total employment



Source: own calculations on Quadros de Pessoal data

Although it is expected that the incidence of temporary contracts in units that are about to close mirror the incidence in the overall economy, it is still surprising to see that it increased by 6.3 p.p. between 2006 and 2008.

On the wage-side, the current recession is characterized by a huge increase in the share of jobs that are paid at the legal minimum wage and by an above average incidence of nominal wage freezes. Although the increase in the share of minimum wages - from 7.9 percent of

total employment in surviving firms in 2006 to 14.2 percent in 2009 - can be attributed to the huge real increase of the value of the minimum wage that was agreed upon at the end of 2006 and was not reversed as the recession set in, part of it can also be attributed to the recession itself, the absence of spillover effects in the vicinity of the new minimum being responsible for the bunching of low-pay workers paid above the previous minimum, at the level of the new minimum wage (Figure 11).

Figure 11

Share of minimum wage earners in total



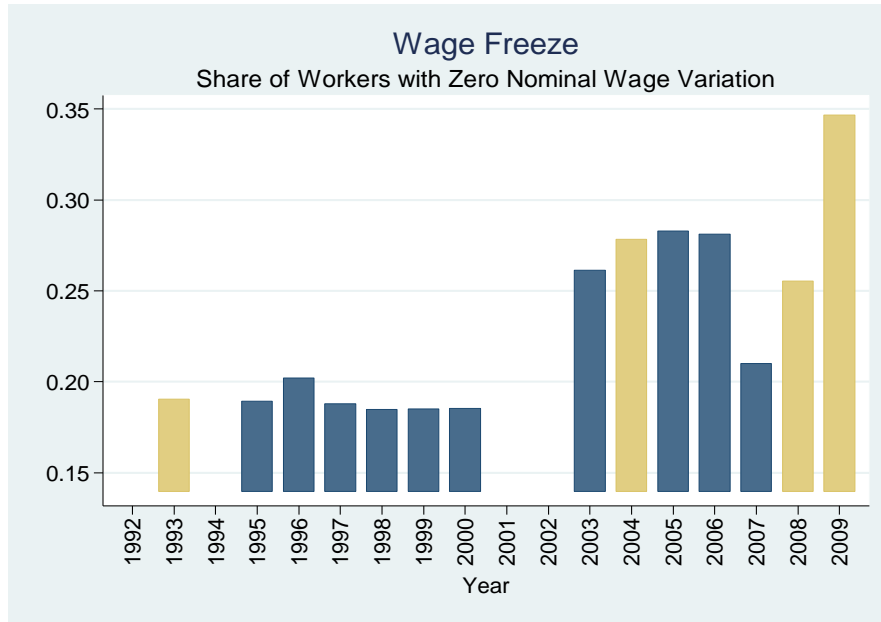
employment

Source: own calculations on Quadros de Pessoal data

Wage freezes, meaning zero nominal wage variation from one year to the next increased enormously (Figure 12) - in 2009, nominal wages remained unchanged at their 2008 levels for 34.7 percent of all employees that did not switch jobs. In 2007, 21.0 percent of all workers staying in the same job as in the previous year had their nominal wages unchanged.

Figure 12

Incidence of wage freezes on surviving matches

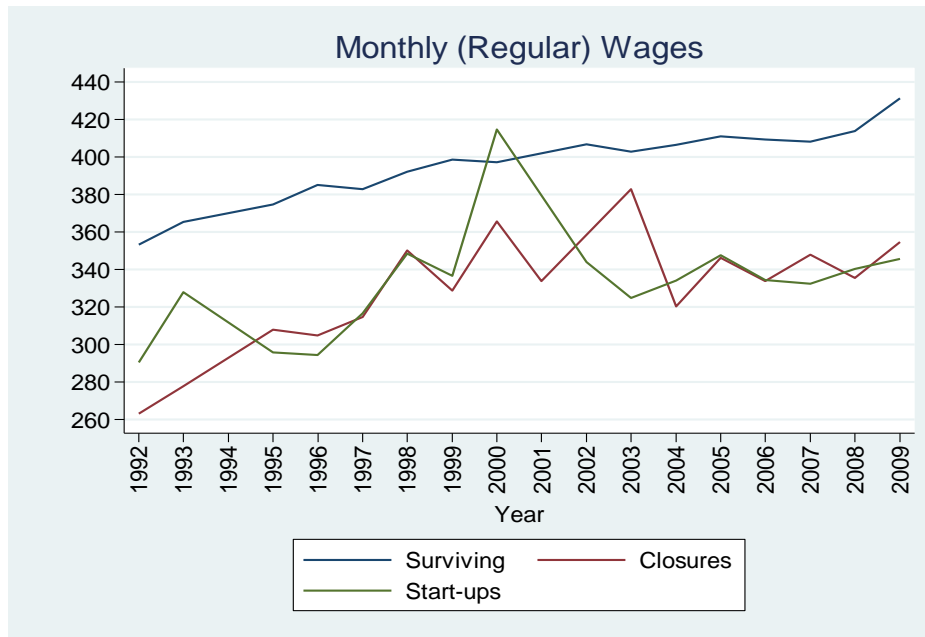


Source: own calculations on Quadros de Pessoa data

Notwithstanding, average real wages in continuing units continued to increase during the current recession (Figure 13). Similarly to what happened in the past, average wages paid by firms that survive in activity remained above those paid by firms that closed down and also by newly-created firms. The latter were the one that were paying the lowest wages in 2009.

Figure 13

Evolution of real wages



Source: own calculations on Quadros de Pessoal data

4. Who is being displaced?

In this section we estimate a three-way high dimensional regression model of wage determinants to characterize the workers were separated from their firms. To the flow of workers exiting from their employers we shall call match destruction. Among matches destroyed we shall distinguish among firm closures, job-to-job transitions, and mass-layoffs.

4.1 Estimation strategy

The methodology applied in this paper parallels that initially developed by Abowd and Kramarz (1999) and Abowd, Kramarz, and Margolis (1999), who presented a statistical framework permitting worker and firm fixed effects to be estimated simultaneously in

wage regressions. However, as noted earlier, and as elaborated upon below, we shall use a different algorithm to obtain an exact solution for the estimation problem, and we include a third fixed effect for the job title.⁴

The linear wage equation to be estimated has the form:

$$\ln w_{ijt} = X_{ijt} \beta + \theta_i + \varphi_f + \lambda_j + \varepsilon_{ijt}, \quad (1)$$

known in the statistical literature as a “three-factor analysis of covariance.” In this equation, $\ln w_{ijt}$ is the natural logarithm of the real hourly wage of individual i ($i = 1, \dots, N$) working at firm f ($f = 1, \dots, F$) and holding a job title j ($j = 1, \dots, J$) at date t ($t = 1, \dots, T_i$). There are T_i observations for each individual i and a total of N^* observations. X_{ijt} is a vector of k observed (measured) time-varying exogenous characteristics of individual i and firm j . θ_i is the person or worker fixed effect (capturing unobserved individual heterogeneity), φ_f is the firm fixed effect (capturing unobserved firm heterogeneity), and λ_j is the job title fixed effect (capturing unobserved job title heterogeneity). Wage heterogeneity is related to permanent unmeasured differences in employees, in firms, and in job titles. According to this equation, there are five components that explain the wage variability:

1. the observed time-varying characteristics of workers and firms ($X_{ijt} \beta$);
2. the workers’ permanent heterogeneity or worker fixed effects (θ_i);
3. the firms’ permanent heterogeneity or firm fixed effects (φ_f);
4. the job titles’ permanent heterogeneity or job title fixed effects (λ_j); and

⁴ This approach is explored at length in the work of Torres et al., 2011.

5. a residual component (ε_{ijt}) that we assume to follow the standard assumptions.

Application of the conventional least squares formula to estimate all parameters (worker fixed effects, firm fixed effects, job title fixed effects, and the coefficients of all observed time-varying worker and firm characteristics) requires the inversion of a high dimension matrix. This is impossible to achieve using standard software and present-day computers. Accordingly, special algorithms are required to estimate the full model parameters.

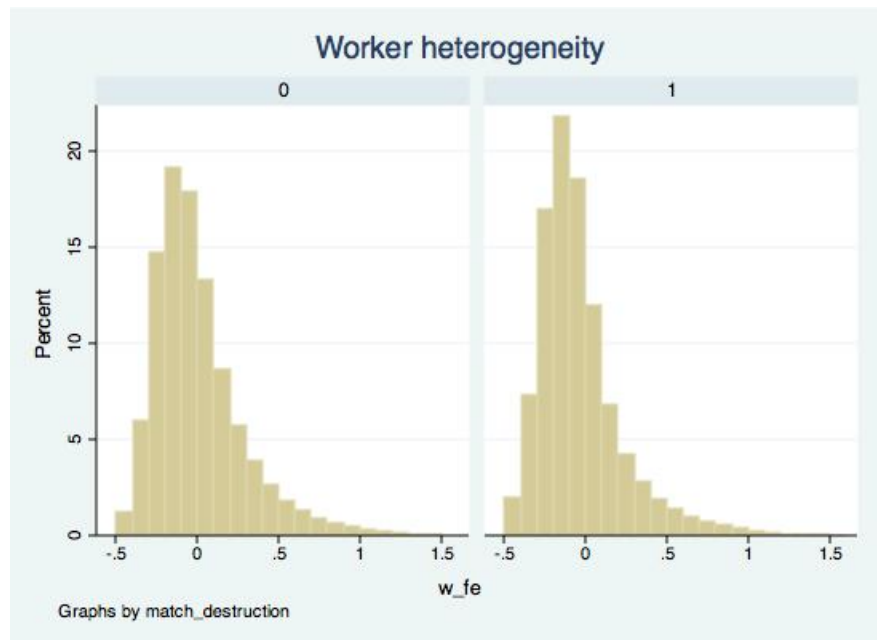
Abowd and Kramarz (1999) and Abowd, Kramarz, and Margolis (1999) proposed an approximate statistical solution that corresponds to using conditional estimation methods (based on a conditioning effects matrix, Z) providing estimators that are as similar as possible to full least squares, but computationally tractable. More recently, Abowd, Creedy, and Kramarz (2002) have developed an algorithm that permits an exact solution of the least squares estimation of equations such as (1), for the two fixed effects case. The user-written command *a2reg* is the Stata implementation of this algorithm.

However, using this command to estimate our wage equation (1) with close to 40 million observations, 23 explanatory variables, and only two of the three high-dimensional fixed effects (714 thousand firms and 6.8 million workers) failed due to memory limitations (in a computer with 8 Gigabytes of RAM and running Stata MP for Windows). We therefore followed an alternative methodology that was able to provide estimates for the regression coefficients and for both fixed effects. This procedure was first developed by Guimarães and Portugal (2010), for the estimation of linear regression models with two and three high-dimensional fixed effects. In brief, this methodology is based on a partitioned algorithm strategy, follows an iterative procedure, and provides an exact solution to the least squares problem. While computationally intensive given its iterative nature, this approach

nevertheless imposes minimum memory requirements. A detailed description of this methodology and how it can be implemented to estimate equation (1) is remitted to the Annex.

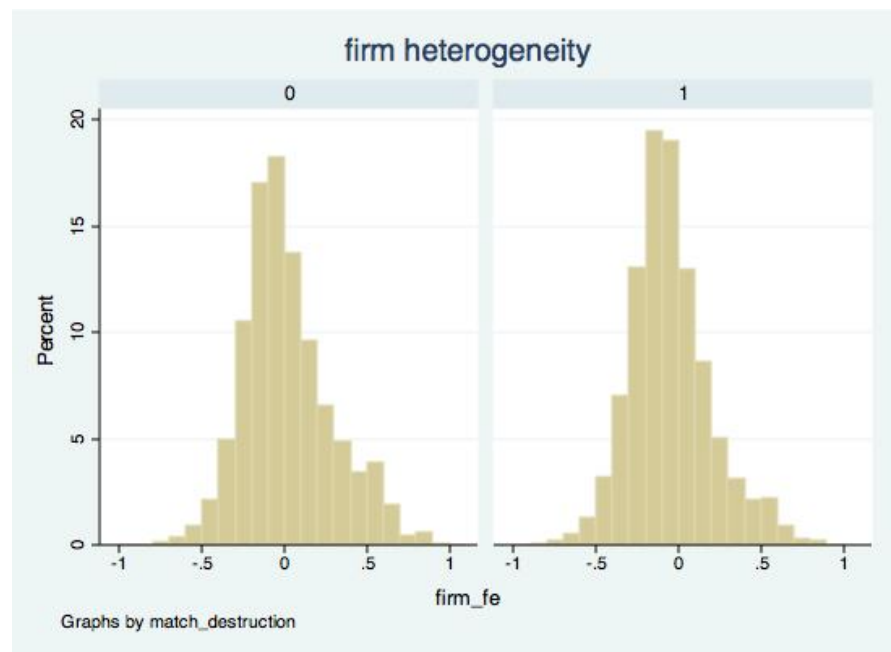
Figure 14 depicts the empirical distribution of permanent worker heterogeneity, both observed (such as gender or schooling) and unobserved. A distinction is made between continuing and destroyed matches. The graph is based on the estimation of 6844108 worker fixed effects. Not surprisingly, the shape of the distributions closely resembles the distributional shape of log wages. The linear correlation between log wages and worker fixed effects is 0.748. From comparison between job-stayers and job separations it is clear from the that workers that exited their firms have permanent characteristics that are associated with somewhat lower wages (faced lower worker fixed effects).

Figure 14: Permanent worker heterogeneity



Less well studied is the heterogeneity of wage policies across firms. In figure 15 we present the empirical distribution of the 714257 firm fixed effects. The role of firm heterogeneity on wage formation is quite important. The linear correlation coefficient between log wages and firm fixed effects is no less than 0.657. From the comparison between the two distributions it is clear that displaced workers collected much lower wages because the firms they exited post a much less generous wage policy.

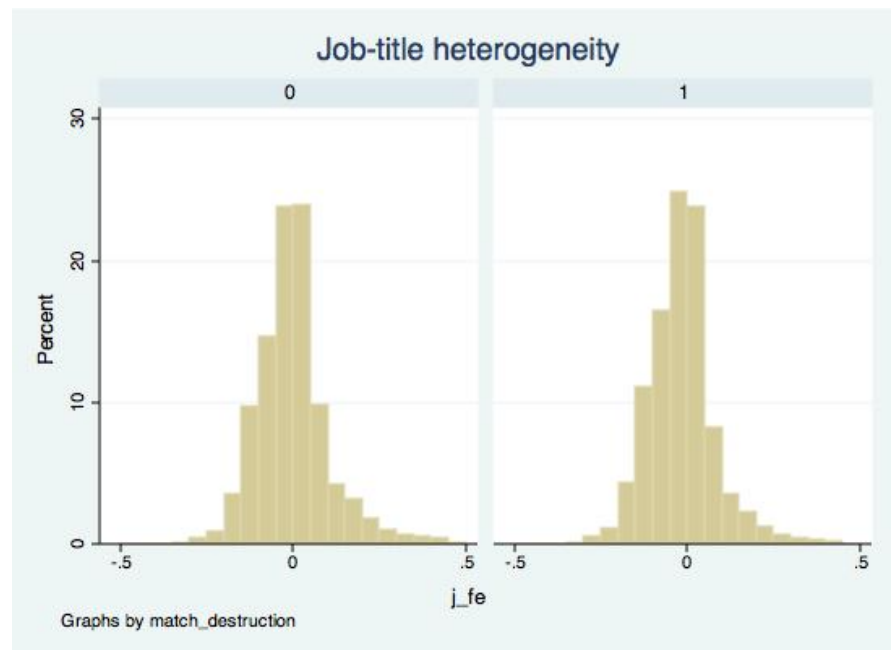
Figure 15: Permanent firm heterogeneity



The heterogeneity of job-title fixed effects is likely to be generated by heterogeneity across occupations and skills and by heterogeneity across collective agreements. In the current exercise, the notion of job title comes simply from the identification of distinct occupational categories within each wage collective agreement. Over the 25 years of the survey we could estimate 123215 job title fixed-effects. Job-title heterogeneity has a non-

trivial impact on the determination of wages. The linear correlation between job title fixed effects and wages is a respectable 0.519. Contrary to the previous evidence, it does not seem that displaced occupied positions that were better or lower paid than those of the non-displaced.

Figure 16: Job-Title Permanent Heterogeneity



To investigate whether the coefficient estimates on the reason for separation change significantly with the inclusion of fixed effects we implemented the conditional decomposition method suggested by Gelbach (2009). This procedure allows us to unambiguously disentangle the contribution of each excluded variable (each fixed effect) to the change in the coefficient estimate of the variable under scrutiny (the reason for match destruction). Thus, the -0.089 percentage point change in the coefficient of the match destruction dummy can be decomposed as the sum of -0.031 for the worker fixed effect, -

0.052 for the firm fixed effect, and -0.006 for the job title fixed effect.⁵ This suggests that the most relevant factor driving the wage penalty of displaced workers is the wage policy of the firms. Workers displaced due to a firm closure were already receiving less 15 percent than their counterparts due to a 10 percent wage penalty (say, because they sort themselves) into low-paying firms, a 4.5 percent wage loss related with unfavorable worker (permanent) characteristics, and a 0.5 percent wage drop due to sorting into low-paying job-titles. Workers affected by mass-layoffs face a much lower wage penalty (4.9 percent), and those that move directly to another job actually face a small wage premium (1.2 percent), influenced essentially by the impact of the worker fixed effect.

Table 1: Gelbach's Decomposition of the Wage Penalty of Displaced Workers (2009)

Fixed Effect	Match destruction	Firm closure	Mass-layoff	Job-to-job
Worker	-0.031	-0.045	-0.026	0.015
Firm	-0.052	-0.100	-0.020	-0.004
Job- title	-0.006	-0.005	-0.003	0.001
Sum	-0.089	-0.150	-0.049	0.012

⁵ According to Gelbach (2009), one can easily compute the asymptotic t-tests based on this procedure which can be viewed as an extended version of the Hausman test.

Conclusion

(To be written)

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