A Work Project, presented as part of the requirements for the Award of a Master's degree in

Economics from the Nova School of Business and Economics.

WORKER REALLOCATION OVER THE BUSINESS CYCLE: A COMPREHENSIVE STUDY OF THE PORTUGUESE LABOR MARKET.

SIMON RAU

Work project carried out under the supervision of:

Prof. Dr. José Pedro Andrade de Portugal Dias

17-12-2021

WORKER REALLOCATION OVER THE BUSINESS CYCLE: A COMPREHENSIVE STUDY OF THE PORTUGUESE LABOR MARKET.

Abstract

This master thesis uses Portuguese employee-employer matched data covering more than 30 years to analyze worker flows over the business cycle, taking into account firm heterogeneity. The results show that Portugal has experienced declining worker flows over the past 30 years, which can generally be attributed to declining hiring rates through non-employment. Using AKM firm premia to create firm clusters by productivity, I find that firms contribute differently to the reallocation of workers in recessions depending on their rank in the firm productivity distribution. My results give no evidence of a cleansing effect that reallocates workers from low-productivity firms to high-productivity firms. Recessions have a negative impact on worker flows with firms adjusting employment through hiring fewer workers and increasing job-to-job worker reallocation. The decrease of hiring workers from non-employment can be explained by high employment regulation, which drives up firms' costs of adjusting employment, making adjustment through the firing channel more difficult. Overall, low-productivity firms adjust less likely to business cycles than high-productivity firms. My conjecture that small, unproductive firms are less exposed to national and international competition, employ workers who are less likely to change jobs because of their characteristics, and thus are less likely to adjust to business cycles needs to be the subject of future research.[1]

Keywords: (Labor Economics, Worker Reallocation, Business Cycle, Labor Adjustment Costs,)

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209).

[1] I would like to thank Prof. Pedro Portugal very much for helping me develop this thesis in all its steps. In addition I would also like to thank Daisy, Bruno, Marta, Johanna and Lea. It would not have been possible without your expertise, experience, support and availability.

Contents

List of Figures

List of Tables

List of Abbreviations

EG	Employment Growth
WF	Worker Flows
J2J	Job-to-Job
NE	Non-employment
SE	Standard Errors
AKM	Abowd, J. M., F. Kramarz, and D. N. Margolis (1999)

1 Introduction

For many years, labor market economists have not only studied the net flows of workers between employment and non-employment, but have been primarily interested in the gross flows of workers and jobs to study job mobility and to link micro-founded labor market models with micro and macro data. In doing so, they found large differences between gross and net flows of workers and jobs, suggesting that the labor market is much more dynamic than unemployment rates would imply and that there is a large underlying heterogeneity among firms, jobs, and workers (Fallick and Fleischman 2004; Contini and Revelli 1997; Krusell et al. 2015). In this thesis, I measure the flows of workers and refer to all movements of workers into and out of jobs, rather than job flows, which measure gross job creation and destruction. Worker flows include many forces that affect the demand and supply of labor and depend not only on the quality of the match between worker and job. On the labor supply side, reasons such as health, education, child-rearing, family relocation, and retirement influence a worker's decision to take a job. On the demand side, growth and decline of markets, restructuring of companies and industries, and changes in competition determine job creation and destruction (Tattara and Valentini 2010). By using matched employer/employee data to link worker mobility to firm heterogeneity, this paper contributes to the economics literature in analyzing worker flows and firm heterogeneity over business cycles, bringing new evidence from Portugal.

The literature on worker flows and firm heterogeneity finds significant differences in the reallocation of workers across heterogeneous firms and business cycles that are complex, as shrinking firms continue to hire workers and growing firms continue to lay off workers (Moscarini and Postel-Vinay 2012; Lane, Stevens, and

Burgess 1996; Lane, Isaac, and Stevens 1996; Steve J. Davis and Haltiwanger 1991). Haltiwanger, Hyatt, and McEntarfer (2018) and Bertheau, Bunzel, and Vejlin (2020) found similar patterns in the reallocation of labor between firms, noting that high-productivity firms "poach" worker from low-productivity firms, releasing proportionally more workers into unemployment during recessions. But does this reallocation of workers necessarily lead to a more efficient distribution of labor? To answer the eminent question of whether recessions accelerate or impede efficiency, economists have been analyzing the effect of economic downturns on the reallocation of labor. The literature (Haltiwanger et al. 2021; Mustre-del-Rio 2012; Foster, Grim, and Haltiwanger 2016) on worker reallocation distinguishes between two possible effects of recessions on worker reallocation. The "cleansing" effect promotes economic efficiency in recessions by purging less productive firms and redirecting labor to more productive sectors, while the "sullying" effect refers to the idea that workers are matched to high-productive firms at a lower rate in bad economic times. Caballero and Hammour (1999) find that the marginal cost of job creation rises during booms and firms have incentives for productivity-enhancing reallocation during recessions. Barlevy (2002) introduced a model which adds on-the-job search and first provided evidence of a sullying effect arising from job search and credit market frictions that is likely to dominate the efficiency-enhancing reallocation effect. Haltiwanger et al. (2021) and Foster, Grim, and Haltiwanger (2016) find empirical evidence of both "cleansing" and "sullying" effects during recessions that vary across recession periods. Haltiwanger, Hyatt, and McEntarfer (2015) state that firms adjust employment through job-to-job flows during booms while doing so mainly through the non-employment margin during recessions.

The question of whether the "cleansing" or the "sullying" effect prevails in recessions is, of course, related to the fluidity of the labor market and the extent of adjustment costs, in which labor market policy plays an important role as it can drive up adjustment costs (Martin and Scarpetta 2011; Varejão and Portugal 2006). Varejão (2003) finds a clear negative relationship between adjustment costs and worker flows. This negative effect reduces adjustments to transitory shocks, suggesting that the "cleansing effect" is reduced by employment protection. Serrano (1998) and Centeno and Novo (2011) analyze the role of fixed-term and permanent contracts on worker and job flows, arguing that the extent of worker and job flow is higher for fixed-term contracts and is used by firms to maintain some level of worker turnover.

This study builds on the research of worker flows and contributes to a better understanding of the reallocation of workers over the business cycle, relating to the theory of the sullying and cleansing effect. In particular, I address the question of how worker reallocation occurs across different types of firms and how this redistribution process changes over the business cycle. These findings are especially relevant for labor market policy, as they reveal which mechanisms prevail in the labor market during recessions.

1.1 Labor market characteristics in Portugal

The OECD Employment and Labor Market Statistics (OECD 2016) lists Portugal among the top 3 OECD countries in terms of the stringency of regulations on layoffs. The unemployment rate was 5.6% in 2020, continuing the downward trend prevailing since 2014. Long-term unemployment represented 31.7% of the total un-

employment figure in the same year and is above the OECD average (OECD 2020). Blanchard and Portugal (2001) compared the U.S. and Portuguese labor market, highlighting differences in unemployment and worker flows, with the Portuguese labor market showing significantly lower labor market flows and significantly higher unemployment spells. They blame job security regulations for low transitions rates between employment and unemployment, and long unemployment spells. In the presence of firing costs caused by employment regulation, economic theory predicts negative effects of job protection on worker flows. The greater the firing costs, the smaller employment outflows, because it is costly to adjust employment. Furthermore, high firing costs prevent firms from creating new jobs. As firing costs must be incorporated to create new jobs by a firm, a rise in firing costs raises the minimum productivity threshold required to create a new job. Thus, fewer jobs are created by firms and fewer workers are hired. The rate of transition from employment to non-employment in Portugal was the lowest in the OECD in 1999 and was not compensated by higher job-to-job transition rates (Portugal 1999). Labor reallocation in Portugal is higher for younger and less-skilled workers, most of whom are hired on temporary contracts. (Novo, Centeno, and Machado 2008)

2 Data

My analysis relies on Portuguese data coming from a longitudinal matched employer-employee dataset for the years 1986 to 2019 (excepting 1990 and 2002). The dataset was created by the Portuguese Ministry of Employment and is taken from a mandatory annual survey addressed to firms with wage earners, including over 7 M workers with 58M worker flow observations and more than 800 thousand firms. The survey

covers various firm and worker characteristics and covers almost all Portuguese employees, outside of Public Administration and domestic servants. For the analysis, I used a subset of variables, including information on the firm (firm identifier, industry, year of formation, employment, sales) and the worker (social security identifier, gender, age, education, hours worked, wage). The restrictions placed on the data exclude those individuals who were not working full time, who were aged less than 18 years and more than 60 years, and who earned a nominal wage less than 80 percent of the minimum wage.

Since the data was collected annually, it restricts each worker to only one job flow per year and thus comes with the disadvantage of dropping transitions between short-duration jobs and unemployment. However, despite this lack of information and given the long residence time of workers in employment or unemployment in Portugal (Blanchard and Portugal 2001) compared to the United States, the annual data are sufficient to capture the impact of recessions on worker reallocation.

2.1 Defining Business Cycles

Rather than regressing cyclical indicators, like non-employment rate or GDP growth, on worker flows, I divide my data set into recession and growth periods to analyze periodic differences. I base the division of periods into recessions and growth periods on the reference chronology of the Portuguese business cycle from the paper "Dating the Portuguese Business Cycle" (Rua 2017). Rua (2017) uses a non-parametric approach incorporating the NBER business cycle data methodology to classify quarterly real GDP. Table 1 in the appendix gives more detailed information on the business cycle periods. I work with the classifications in the relevant period between

1986 and 2019. This period includes 4 recessions, comprising a total of 18 quarters with an average duration of 5 quarters. Unfortunately, the recession period in 2002 is not included because, as mentioned above, no data are available for that year.

3 Methodology

3.1 Identifying Worker Flows

To identify worker flows I use hires of firms in a year and follow the the approach of Davis, Haltiwanger, and Schuh (1996), where hires (H_{it}) are all persons employed at a firm i at time period t but not at $t-1$. Formally, total worker flows (WF_t) in period t can be presented as:

$$WorkerFlows \equiv WF_t = \sum_i H_{it} \tag{1}$$

Furthermore, I distinguish between hires through job-to-job moves and moves to or from non-employment. Hire through a job-to-job transition is defined as a transition with at most one year of non-employment between two job spells at two different firms. Thus, for a job-to-job move, a worker is employed in $t-1$ at firm $i=m$ and in t at firm $i=k$ ($k \neq m$). The definition of non-employment allows an individual to hold short transitory jobs during a year but is not observed as being employed at both $t-1$ and t. With this distinction, equation (1) expands to:

$$WorkerFlows \equiv WF_t = \sum_i \sum_{j \in \{p,n\}} {H^j}_{it}, \tag{2}$$

where j=p denotes flows through job-to-job transitions and j=n flows through non-employment. To convert them to rates, all worker flows are divided by the average aggregate employment between t and $t-1$.

3.2 Firm productivity

Empirically, I identify firm productivity by the firm-specific wage premium. To rank firms by productivity I use the AKM specified model (Abowd, Kramarz, and Margolis 1999) to estimate the AKM firm premiums by regressing log earnings on person fixed effects, firm fixed effects, and controls for time and worker age. The model for the log earnings of person i in year t takes the form

$$w_{it} = \alpha_i + \phi_{J(i,t)} + X_{it}^{'}\beta + \varepsilon_{it}, \tag{3}$$

where the dependent variable w, the log of earnings by worker i in firm j in year t, is expressed as a function of individual heterogeneity α_i, firm heterogeneity $\phi_{J(i,t)}$ with $J(i,t)$ indicating the employer of worker i in year t, and measured time-varying characteristics. For the estimation, I used the iterative approach introduced by Guimarães and Portugal (2010). In the analysis, I exploit the presence of firm effects, which allow firms to systematically pay higher or lower wages than the mean. It is assumed that the firm-specific wage premium is closely related to, and therefore indicative of, firm productivity. I follow the approach of Haltiwanger et al. (2021) and construct quintiles based on these measures, and define high-productivity firms as those in the top two quintiles and low-productivity firms as those in the bottom three quintiles. Figure 1 clearly shows that the cluster of low productivity firms shrink, while firms in the high productivity cluster grow. These results support my

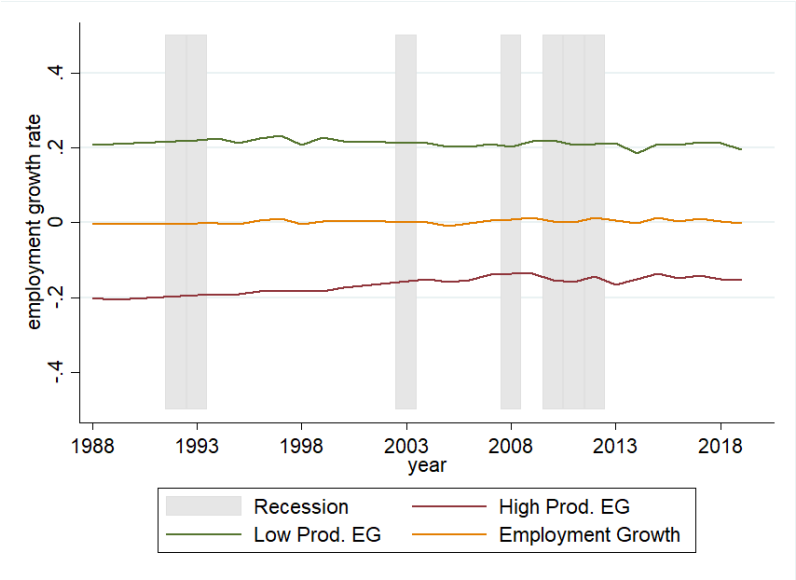

Figure 1: Employment growth for high and low productivity firms

classification of firms into high and low productivity groups, assuming that employment growth and productivity are closely related (Nordhaus 2005). It is worth noting that employment growth for both productivity clusters remained relatively stable over time, suggesting that the composition of firm characteristics in the clusters also did not undergo changes that were reflected in employment growth.

3.3 Estimation strategy

I take a dynamic approach to estimate the underlying movements of workers into and out of jobs, assuming it follows a Poisson process. In this analysis, flows are denoted by the inflow rate (h_t), the rate at which workers enter firms. I assume that in period t worker flows are determined by a Poisson process with the entry rates h_t. For the estimation and to obtain worker flow rates, I expose hirings in a firm i at time t to the overall employment of firm i in year t. I suppose that the sample of n observations $y_1, y_2, ..., y_n$ can be treated as realizations of independent Poisson random variables, with

$$y_i \sim [\mu_i = \lambda_i].$$

The means λ_i depend on a vector of explanatory variables x and N, where N_i denotes the size of the exposure set in the same unit in which the events occur:

$$\lambda_i = exp(x_i\beta)N_i,$$

which can be rewritten into the following log-linear model

$$log(\lambda_i) = x_i\beta + log(N_i), \tag{4}$$

where λ_i is the expected value of the number of events (number of hires), x is the vector of explanatory variables, and β the vector of corresponding regression coefficients. Note that the exposure set does change depending on the worker flow variable in my estimation. When estimating total worker flows, the number of workers in firm i is used as the exposure set. However, when estimating flows into and out of non-employment and job-to-job flows, total worker flows are used as the exposure quantity.

4 Results

4.1 Analysis of worker flows

In this section, I analyze worker flows and its decomposition into job-to-job and non-employment transitions. I present graphs displaying worker flows and it's decomposition. To quantify the worker flows across firms over the business cycle, I estimate regressions specified by the statistical model (4). The outcome of interest is the effect of recession periods on worker flows. The main explanatory variable is

a dummy variable indicating the state of the economy, where 1 is equivalent to a recession period and 0 otherwise. In the Poisson regression model, the log of the expected number of worker flows is a function of the explanatory variable (recession). For a one-unit change in the independent variable, the difference in the logs of expected counts is expected to change by the respective regression coefficient. Note that the estimates for all job-to-job flows and flows from non-employment refer to the worker flow exposure variable, not to the number of workers employed by firm i, which we use as the exposure variable in estimating worker flows. This means that the estimates for job-to-job flows and reallocation flows through non-employment indicate the change relative to total worker flows.

4.1.1 Aggregate worker flows

Before I quantify the effect of recessions on worker flows using regression analysis, I analyze the behavior of worker flow rates and their decomposition in job-to-job and non-employment flow rates. I relate the information on the behavior of worker flows over a period of more than 30 years to the debate on the changing stability of employment relationships (Steven J. Davis and Haltiwanger 2014; Fujita, Moscarini, and Postel-Vinay 2020). Figure 2 displays aggregate worker flows decomposed into job-to-job and non-employment transitions. The shaded areas highlight recession periods. The jump of worker flows in 1994 can be explained by survey bias due to the change in the survey date, since there has been a year and a half between the survey dates instead of one year between 1993 and 1994. Figure 1 shows a declining trend in total worker flows of almost 40% between 1988 and 2012, which is consistent with the results of Steven J. Davis and Haltiwanger (2014), who find lower worker flows after 2000 caused by stronger employment protection and an

aging labor force. Looking at the decomposition of worker flows, decreasing worker flow rates in Portugal are generally due to declining rates of reallocation through non-employment (-31% between 1988 and 2019), while rates of job-to-job transitions more than doubled (110% between 1988 and 2019). The results give evidence that the exchange of workers between employment and non-employment has been decreasing in Portugal, but also show that firms have increasingly hired workers by poaching other firms in recent decades. The results on the composition of worker flow point in the same direction. Flows from the non-employment account for 80% of total worker flows on average, but the share has declined from 0.91 in 1988 to 0.76 in 2019, corresponding to an increase in the share of worker flows from poaching. This development suggests that firms have been shifting worker turnover away from the non-employment margin towards the job-to-job margin. These results are at odds with the findings of Hyatt (2015), who attributes the decline in U.S. worker flows to the decline in job-to-job flows due to an aging workforce, rising educational attainment, and declining entrepreneurship. However, one cannot conclude from the contrasting trends in job-to-job flows that the Portuguese labor market does not exhibit these trends without further research. After reaching its minimum in 2012, worker flows then began to catch up by 38% by 2019, reflected in a 27% increase in non-employment flows and a 67% increase in job-to-job flows between 2012 and 2019. Although more research is needed here to draw a firm conclusion, these effects could be explained by a positive impact of liberalizing labor market reforms during the Troika era (Branco and Cardoso 2020) on workers reallocation rates. Overall, job-to-job transition rates remained largely stable; however, reallocation rates through unemployment are more volatile, indicating that employment adjustments

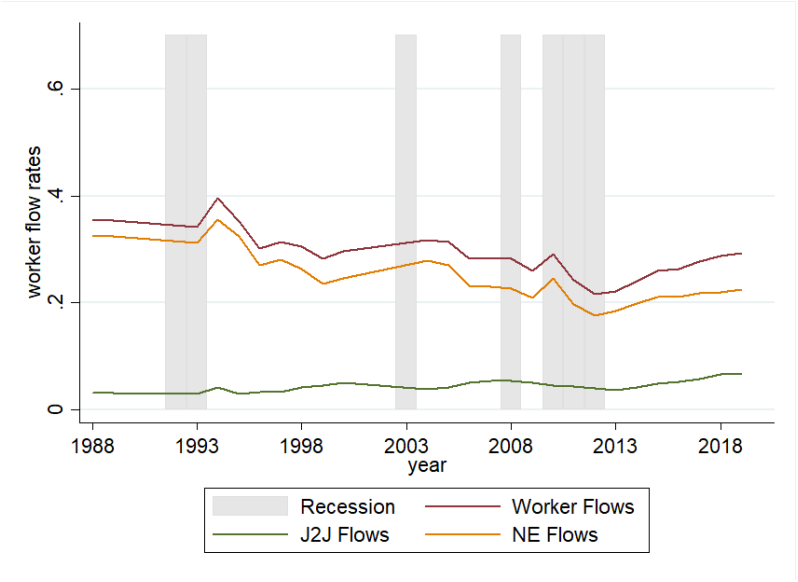

Figure 2: Worker Flows

are mainly made by movements through non-employment.

The effects of recessions on worker flows, decomposed by job-to-job transitions and moves through non-employment, are reported in Table 1. In a recession, the share of workers flowing into firms decreases, as the dummy variable coefficient estimate is negative (-0.116) and statistically significant. Two reasons could account for a decrease in worker reallocation rates during recessions. First, firms hire fewer workers from unemployment. Second, the "sullying effect" leads workers to match with companies at a lower rate in bad economic times, therefore decreasing worker reallocation rates from job-to-job.

To further investigate the mechanisms of recessions on worker reallocation, one needs to analyze the decomposition of worker flows into job-to-job transitions and moves through non-employment. In contrast with the negative impact of recessions on overall worker flows, column 2 of Table 1 reports a positive effect on job-to-job transitions that is significant at 1% confidence level. In the case of work-

Table 1: Effect of Recessions on Worker Flows

Variable	(1) Worker Flows	(2) J2J Flows	(3) NE Flows
Recession	-0.116***	0.0352***	-0.00745***
	(0.00703)	(0.0127)	(0.00273)
Observations	1,762,008	1,331,469	1,760,113
Number of firms	290,918	174,353	290,037

Robust SE in parentheses
*** p0.01, ** p0.05, * p0.1

ers moving from one job to another, the log of expected worker flows is increasing by 0.035, suggesting that the exchange of workers between firms is increasing during recessions. This result invalidates the assumption that the decline in worker flows is due to fewer workers moving between firms. The result of relatively higher transition rates from one job to another provides evidence against a sullying effect of recessions, that predicts lower job-to-job reallocation rates. This analysis cannot tell us whether the increase in job-to-job transitions leads to better job matches and thus to productivity-enhancing effects. Therefore, two additional conditions must be checked: First, whether worker reallocation is actually poaching from low-productivity firms to high-productivity firms, which I will analyze in the following sections. Second, if these new matches are actually of better quality and generate higher output.

Table 1 column 3 presents the effect of recessions on reallocation rates through non-employment, which is slightly negative (-0.007) and significant at the 1% confidence level, giving evidence that recessions have a small negative effect on firm's hires from non-employment. The negative effects of recessions on non-employment flows suggest that high layoff costs and hence high adjustment costs due to employment protection delay or even prevent employment adjustment through the layoff

channel. Thus, adjustments occur through the hiring channel (Portugal 1999), with firms hiring fewer workers from non-employment. However, given the small decline, the effect does not suggest a large adjustment by firms hiring fewer workers from non-employment.

4.1.2 Worker flows decomposed by firm productivity

Figure 3 divides worker flows for firms clustered by productivity into hirings from other firms and hirings from non-employment. Potential differences in worker flows between firm types can provide insight into the hiring behavior of high and low-productivity firms. Figure 3 shows that worker flow rates for high and low productivity firms follow roughly the same pattern. Like in the aggregated case, it can be concluded that the adjustments in employment for both firm types mainly take place via reallocation through unemployment, as these rates are more volatile and the job-to-job rates hardly fluctuate at all. Total worker flows for high-productivity firms declined by 25% between 1988 and 2019, while it increased slightly by 1% for low-productivity firms over the same period. The convergence of worker flows between the firm productivity clusters can generally be explained by the decline (-39%) in non-employment flows for high-productivity firms over this period, while the non-employment rate for low-productivity firms declined less (-10%). Worker flows attributable to flows from the non-employment account for 88% of total worker flows for low-productivity firms and 82% for high-productivity firms, suggesting that low-productivity firms rely more heavily on hiring from non-employment than high-productivity firms. This conclusion is also supported by the larger decline in the share of non-employment flows in total flows for high-productivity firms (-18% between 1988 and 2019) than for low-productivity firms (-11%). One can also see an

increase in worker flows due to poaching. Between 1988 and 2019, job-to-job rates increased by 108% for high-productivity firms and by 180% for low-productivity firms, suggesting that both types of firms have increasingly hired workers through poaching in recent decades. Both types of companies are therefore increasingly engaged in worker turnover through the job-to-job channel. In Figure 3, neither the pattern of non-employment flows nor the pattern of employment flows across firm clusters, reveal any striking differences in firms' hiring behavior during recessions. The analysis of the graph does not reveal any poaching of high productivity firms from low productivity firms, as job-to-job rates for high productivity firms do not increase during recessions. In all decomposition, the worker flows in high-productivity firms are higher than worker flows in low-productivity firms, with the difference remaining roughly constant over time. Without having a clear answer to this question, one reason could be the composition of firms in the low and high productivity clusters. In the group of low-productivity firms, the share of small firms (firms with fewer than 3 employees) account for up to 10%, most of which I assume are family businesses or one-man enterprises where frequent staff turnover is unlikely, whereas these small firms only account for up to 5% in the high productivity cluster. My assumption is that small, unproductive firms are less exposed to domestic and international competition, employ workers who change jobs less often, and thus make lower adjustments to business cycles. This assumption is reinforced by Figure 4 in the appendix, which shows low (mean of 4.4%, 11.2% and 3.2% less than the mean of worker flows for high and low productivity firms, respectively) worker flows for firms with less than 3 workers.

Table 2 column 1 shows regression results for the effect of recessions on

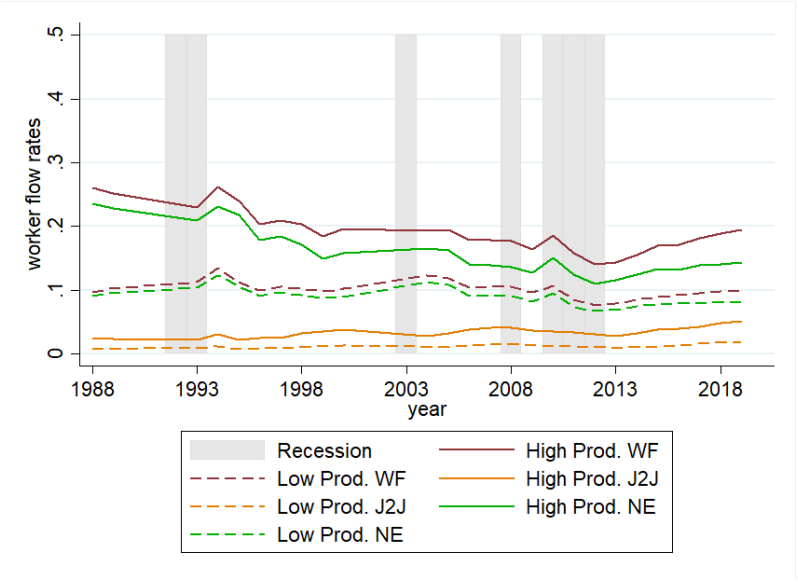

Figure 3: Worker Flows by firm productivity

worker flows decomposed into high and low productivity firms. The first row shows the estimate of the impact of recessions on total worker flows for high and low-productive firms. The estimated coefficient is negative and statistically significant at all conventional significance levels. The negative impact on recessions is larger for high-productivity firms (-0.133) than for low-productivity firms (-0.07), implying that high-productivity firms reduce their hiring of workers during recessions relatively more than low-productivity firms. These results contradict the results of (Haltiwanger et al. 2021), who find larger worker flow declines during recessions for low-productivity firms.

To analyze why the effect of recessions on worker flows is more negative for high productivity firms and to check whether this result is driven by a decline of poaching hires or hires from non-employment, one needs to analyze the decomposition of worker flows into job-to-job and non-employment reallocation rates. For high productivity firms, recessions have a positive and significant effect at the 1% confi-

Table 2: Effect of Recession on Worker Flows by Firm Productivity

	(1)	(2)
Variable	High Productivity	Low Productivity
Recession	-0.134***	-0.0798***
	(0.0101)	(0.00594)
Observations	719,341	1,042,663
Number of firms	102,267	188,650
	Robust SE in parentheses	
	*** p0.01, ** p0.05, * p0.1	

Table 3: J2J Flows by Firm Productivity

	(1)	(2)
Variables	High Productivity	Low Productivity
A) Poaching		
Recession	0.0448***	0.0049
	(0.0159)	(0.018)
Observations	618,035	713,434
Number of firms	74,822	99,531
B) Outflow		
Recession	0.00346	-0.0857***
	(0.0232)	(0.0131)
Observations	641,380	826,160
Number of firms	80,061	124,168
	Robust SE in parentheses	
	*** p0.01, ** p0.05, * p0.1	

Table 4: NE Flows by Firm Productivity

	(1)	(2)
Variable	High Productivity	Low Productivity
Recession	-0.0113***	-0.000695
	(0.00406)	(0.00257)
Observations	718,512	1,041,597
Number of firms	101,890	188,146
	Robust SE in parentheses	
	*** p0.01, ** p0.05, * p0.1	

dence level of 0.044 on reallocation rates due to poaching. The effect of recessions on low productive firms' poaching flows is slightly positive, but not significant at all conventional levels. In this sense, the results are consistent with those of (Foster, Grim, and Haltiwanger 2016), who also find that recessions in the U.S. enhance job-to-job reallocation for high productivity firms relative to low productivity firms. To test whether the higher churn rates for high-productivity firms are actually due to poaching workers from low-productivity firms rather than increased churning within the high-productivity cluster, I analyze job-to-job flows due to separations rather than hires. To examine whether this reallocation moves workers up the job ladder, I regress the recession dummy on worker flow rates due to job-to-job outflows and decompose it again by firm productivity. The effect of recessions on job-to-job separations is slightly positive (0.0034) but not significant for high productive firms, whereas for low productivity firms the effect is negative (-0.0857) and significant at all conventional levels. These results imply that firms with high productivity gain workers during a recession but do not lose workers through job-to-job moves, while firms with low productivity lose fewer workers but do not gain any. This does not evidence a redistribution of workers from low- to high-productivity firms, but rather higher worker reallocation rates within high-productivity clusters. Therefore, the analysis of poaching and outflow rates due to job-to-job moves shows no evidence of a poaching mechanism that redistributes workers up the career ladder. One possible reason could be the low substitutability of workers between high- and low-productivity firms, which prevents workers from moving from low-productivity companies to high-productivity companies.

Table 4 presents the effect of recessions on reallocation rates through non-employment by firm productivity. For high productivity firms, recessions have a negative (0.0113) and significant effect at the 1% confidence level on hires through non-employment, whereas the effect for low productive firms is not significant at all conventional levels. Although the impact is not large for high productive firms, the results support the argument that high productivity firms make adjustments through the hiring channel during recessions, i.e., they hire fewer workers and thus reduce flows through non-employment. For low-productivity firms, however, recessions have no significant impact on non-employment flows, which is surprising because one would expect recessions to have a larger impact on hiring and firing into and out of the non-employment since jobs at the lower end of the productivity distribution fail to generate positive surplus and are destroyed. These findings are also not consistent with findings of Haltiwanger et al. (2021), who state that low-productivity firms in particular lay off more workers into unemployment during recessions.

4.1.3 Summary of findings on worker flows

Portugal has experienced declining worker flows over the past 30 years, which can generally be attributed to declining hiring rates through non-employment. The results give evidence that the exchange of workers between employment and non-employment has been decreasing in Portugal. This supports the statement, that high employment protection reduces worker flows and rises the duration of an unemployment spell. Although overall worker flows have declined, firms have increasingly been engaged in hiring workers through poaching in recent decades. This devel-

opment suggests that firms shift worker turnover away from the non-employment margin to the job-to-job margin. The convergence of worker flows between the firm productivity clusters can generally be explained by the decline in non-employment flows for high-productivity firms. Low-productivity firms rely more heavily on hiring from non-employment than high-productivity firms, which have increasingly been engaged in hiring workers through poaching in recent decades.

Overall, recessions have a negative impact on worker flows. The negative impact of recessions on non-employment flows suggests that high layoff costs, and hence high adjustment costs due to employment protection, delay or even prevent employment adjustment through the layoff channel, leading firms to hire fewer workers. Although overall job-to-job hiring increases in a recession, I find no evidence of the "cleansing" effect, as the decline in workers leaving low-productivity firms due to poaching is not indicative of workers moving up the job ladder. The results rather indicate reallocation of workers within a cluster, suggesting low substitutionality between labor from low and high productivity firms. In general, high-productivity firms tend to adjust employment more in recessions than low-productivity firms. Additionally, low-productivity firm's have lower worker flow rates than high-productivity firms. This result can possibly be attributed to the composition of the firm clusters, where the low-productivity cluster contains a higher proportion of very small firms, which have much lower flows due to their nature as microenterprises or family businesses. This point is further discussed in the following section.

5 Conclusion

This thesis gives new insights on the worker reallocation using Portuguese employee-employer matched data covering more than 30 years. I analyze worker flows taking into account firm heterogeneity, which is necessary to understand worker flows over the business cycle. In addition, the thesis relates the findings to research on the sullying and cleansing effect. Using AKM firm premium to create firm clusters by productivity, I find that firms contribute differently to the reallocation of workers in recessions depending on their rank in the productivity distribution. My results on worker flows and their decomposition by firm productivity point to a decreasing effect of employment protection on worker flows. To analyze in depth the effect of employment protection on worker flows, further research could exploit the gap in employment protection between fixed-term and permanent contractors: Although temporary workers did not account for more than 15% of wage earners in Portugal in 1999, temporary contractors already absorbed more than 50% of employment adjustments (Portugal 1999). Furthermore, the evolution of the Portuguese labor market in recent decades has been characterized by the increasing use of more flexible forms of contracts instead of permanent contracts (Novo, Centeno, and Machado 2008). This development becomes increasingly interesting when analyzing the flow of workers. Therefore, an examination of worker heterogeneity, taking into account the different types of contracts, would shed more light on the discussion of employment adjustment and employment protection.

The fact that low-productivity firms have lower worker flows and adjust less to business cycles than high-productivity firms suggests that firm-specific characteristics affect the adjustment of employment to business cycles. My assumption that

small, unproductive firms are less exposed to national and international competition and therefore adjust employment less to business cycles is interesting for future research and could be one reason for the relatively low productivity in Portugal. Thus, further theoretical and empirical work is needed to study the impact of worker and firm heterogeneity on worker flows and the effects on productivity.

References

Abowd, John, Francis Kramarz, and David Margolis. 1999. "High Wage Workers and High Wage Firms." *Econometrica* 67 (2): 251–334. https://EconPapers.repec.org/RePEc:ecm:emetrp:v:67:y:1999:i:2:p:251-334.

Barlevy, Gadi. 2002. "The Sullying Effect of Recessions." *Review of Economic Studies* 69 (1): 65–96. https://ideas.repec.org/a/oup/restud/v69y2002i1p65-96.html.

Bertheau, Antoine, Henning Bunzel, and Rune Majlund Vejlin. 2020. *Employment Reallocation over the Business Cycle: Evidence from Danish Data.* IZA Discussion Papers 13681. Institute of Labor Economics (IZA), September. https://ideas.repec.org/p/iza/izadps/dp13681.html.

Blanchard, Olivier, and Pedro Portugal. 2001. "What Hides Behind an Unemployment Rate: Comparing Portuguese and U.S. Labor Markets." *American Economic Review* 91, no. 1 (March): 187–207. https://doi.org/10.1257/aer.91.1.187. https://www.aeaweb.org/articles?id=10.1257/aer.91.1.187.

Branco, RUI, and DANIEL Cardoso. 2020. "The Politics of Change. Coalitional politics and labour market reforms during the sovereign debt crisis in Portugal." *Journal of Social Policy,* 1–19. https://doi.org/10.1017/S0047279420000653.

Caballero, Ricardo J, and Mohamad L Hammour. 1999. *The Cost of Recessions Revisited: A Reverse-Liquidationist View.* Working Paper, Working Paper Series 7355. National Bureau of Economic Research, September. https://doi.org/10.3386/w7355. http://www.nber.org/papers/w7355.

Centeno, Mario, and Alvaro Novo. 2011. "Excess Worker Turnover and Fixed-Term Contracts: Causal Evidence in a Two-Tier System." *Labour Economics* 19 (December). https://doi.org/10.1016/j.labeco.2012.02.006.

Contini, Bruno, and Riccardo Revelli. 1997. "Gross flows vs. net flows in the labor market: What is there to be learned?" *Labour Economics* 4 (3): 245–263. ISSN: 0927-5371. https://doi.org/https://doi.org/10.1016/S0927-5371(97)00018-3. https://www.sciencedirect.com/science/article/pii/S0927537197000183.

Davis, Steve J., and John Haltiwanger. 1991. *Gross Job Creation, Gross Job Destruction and Employment Reallocation.* NBER Working Papers 3728. National Bureau of Economic Research, Inc, June. https://ideas.repec.org/p/nbr/nberwo/3728.html.

Davis, Steven J., and John Haltiwanger. 2014. *Labor Market Fluidity and Economic Performance.* NBER Working Papers 20479. National Bureau of Economic Research, Inc, September. https://ideas.repec.org/p/nbr/nberwo/20479.html.

Davis, Steven J., John C. Haltiwanger, and Scott D. Schuh. 1996. "Job Creation and Destruction."

Fallick, Bruce, and Charles A. Fleischman. 2004. *Employer-to-employer flows in the U.S. labor market: the complete picture of gross worker flows.* Finance and Economics Discussion Series 2004-34. Board of Governors of the Federal Reserve System (U.S.) https://ideas.repec.org/p/fip/fedgfe/2004-34.html.

Foster, Lucia, Cheryl Grim, and John Haltiwanger. 2016. "Reallocation in the Great Recession: Cleansing or Not?" *Journal of Labor Economics* 34 (S1): 293–331. https://doi.org/10.1086/682397. https://ideas.repec.org/a/ucp/jlabec/doi10.1086-682397.html.

Fujita, Shigeru, Giuseppe Moscarini, and Fabien Postel-Vinay. 2020. *Measuring Employer-to-Employer Reallocation.* Working Paper, Working Paper Series 27525. National Bureau of Economic Research, July. https://doi.org/10.3386/w27525. http://www.nber.org/papers/w27525.

Guimarães, Paulo, and Pedro Portugal. 2010. "A simple feasible procedure to fit models with high-dimensional fixed effects." *Stata Journal* 10, no. 4 (December): 628–649. https://ideas.repec.org/a/tsj/stataj/v10y2010i4p628-649.html.

Haltiwanger, John, Henry Hyatt, and Erika McEntarfer. 2015. *Cyclical Reallocation of Workers Across Employers by Firm Size and Firm Wage.* NBER Working Papers 21235. National Bureau of Economic Research, Inc. https://EconPapers.repec.org/RePEc:nbr:nberwo:21235.

———. 2018. "Who Moves Up the Job Ladder?" *Journal of Labor Economics* 36 (S1): 301–336. https://doi.org/10.1086/694417. https://ideas.repec.org/a/ucp/jlabec/doi10.1086-694417.html.

Haltiwanger, John C., Henry R. Hyatt, Erika McEntarfer, and Matthew Staiger. 2021. *Cyclical Worker Flows: Cleansing vs. Sullying.* NBER Working Papers 28802. National Bureau of Economic Research, Inc, May. https://ideas.repec.org/p/nbr/nberwo/28802.html.

Hyatt, Henry R. 2015. "The decline in job-to-job flows." *IZA World of Labor* (July): 175–175. https://ideas.repec.org/a/iza/izawol/journly2015n175.html.

Krusell, Per, Toshihiko Mukoyama, Richard Rogerson, and Aysegul Sahin. 2015. *Gross Worker Flows over the Business Cycle.* Discussion Papers 1530. Centre for Macroeconomics (CFM), June. https://ideas.repec.org/p/cfm/wpaper/1530.html.

Lane, Julia, David Stevens, and Simon Burgess. 1996. "Worker and job flows." *Economics Letters* 51 (1): 109–113. ISSN: 0165-1765. https://doi.org/https://doi.org/10.1016/0165-1765(95)00793-8. https://www.sciencedirect.com/science/article/pii/0165176595007938.

Lane, Julia I., Alan G. Isaac, and David W. Stevens. 1996. *Firm Heterogeneity and Worker Turnover.* Labor and Demography 9602001. University Library of Munich, Germany, February. https://ideas.repec.org/p/wpa/wuwpla/9602001.html.

Martin, John, and Stefano Scarpetta. 2011. "Setting It Right: Employment Protection, Labour Reallocation and Productivity." *De Economist* 160 (April). https://doi.org/10.1007/s10645-011-9177-2.

Moscarini, Giuseppe, and Fabien Postel-Vinay. 2012. "The Contribution of Large and Small Employers to Job Creation in Times of High and Low Unemployment." *American Economic Review* 102, no. 6 (May): 2509–39. https://doi.org/10.1257/aer.102.6.2509. https://www.aeaweb.org/articles?id=10.1257/aer.102.6.2509.

Mustre-del-Rio, Jose. 2012. *Job duration and the cleansing and sullying effects of recessions.* Research Working Paper RWP 12-08. Federal Reserve Bank of Kansas City. https://ideas.repec.org/p/fip/fedkrw/rwp12-08.html.

Nordhaus, William. 2005. *The Sources of the Productivity Rebound and the Manufacturing Employment Puzzle.* Working Paper, Working Paper Series 11354. National Bureau of Economic Research, May. https://doi.org/10.3386/w11354. http://www.nber.org/papers/w11354.

Novo, Álvaro A., Mário Centeno, and Carla Machado. 2008. "The Anatomy of Employment Growth in Portuguese Firms." *Economic Bulletin and Financial Stability Report Articles and Banco de Portugal Economic Studies,* https://ideas.repec.org/a/ptu/bdpart/b200807.html.

OECD. 2016. "Employment Protection Legislation: Strictness of employment protection legislation: individual and collective dismissals (Edition 2016)," https://doi.org/https://doi.org/https://doi.org/10.1787/53cd817d-en. https://www.oecd-ilibrary.org/content/data/53cd817d-en.

———. 2020. "Long-term unemployment rate (indicator)."

Portugal, Pedro. 1999. "Employment volatility, employment protection and unemployment." *Economic Bulletin and Financial Stability Report Articles.*

Rua, António. 2017. "Dating the Portuguese business cycle." *Economic Bulletin and Financial Stability Report Articles and Banco de Portugal Economic Studies,* https://ideas.repec.org/a/ptu/bdpart/e201703.html.

Serrano, Carlos García. 1998. "Worker turnover and job reallocation: the role of fixed-term contracts." *Oxford Economic Papers* 50, no. 4 (October): 709–725. ISSN: 0030-7653. https://doi.org/10.1093/oep/50.4.709. eprint: https://academic.oup.com/oep/article-pdf/50/4/709/6968590/50-4-709.pdf. https://doi.org/10.1093/oep/50.4.709.

Tattara, Giuseppe, and Marco Valentini. 2010. "Turnover and Excess Worker Reallocation. The Veneto Labour Market between 1982 and 1996." *LABOUR* 24 (4): 474–500. https://EconPapers.repec.org/RePEc:bla:labour:v:24:y:2010:i:4:p:474-500.

Varejão, José, and Pedro Portugal. 2006. *Employment Dynamics and the Structure of Labor Adjustment Costs.* IZA Discussion Papers 1922. Institute of Labor Economics (IZA), January. https://ideas.repec.org/p/iza/izadps/dp1922.html.

Varejão, José M. 2003. "Job and worker flows in high adjustment cost settings." *Portuguese Economic Journal* 2, no. 1 (April): 37–51. https://doi.org/10.1007/s10258-002-0015-y. https://ideas.repec.org/a/spr/portec/v2y2003i1d10.1007_s10258-002-0015-y.html.

Appendix

Business cycle dates		Duration (in quarters)			
Peak	**Trough**	**Contraction**	**Expansion**	**Cycle**	
		Peak to trough	Previous trough to this peak	Trough from Previous Trough	Peak from Previous Peak
1980 Q2	1980 Q4	2	-	-	-
1983 Q1	1984 Q1	4	9	13	11
1992 Q2	1993 Q2	4	33	37	37
2002 Q1	2003 Q2	5	35	40	39
2008 Q1	2009 Q1	4	19	23	24
2010 Q3	2012 Q4	9	6	15	10
Average		*5*	*20*	*26*	*24*

Table 5: Recession Periods

Source: Rua (2017)

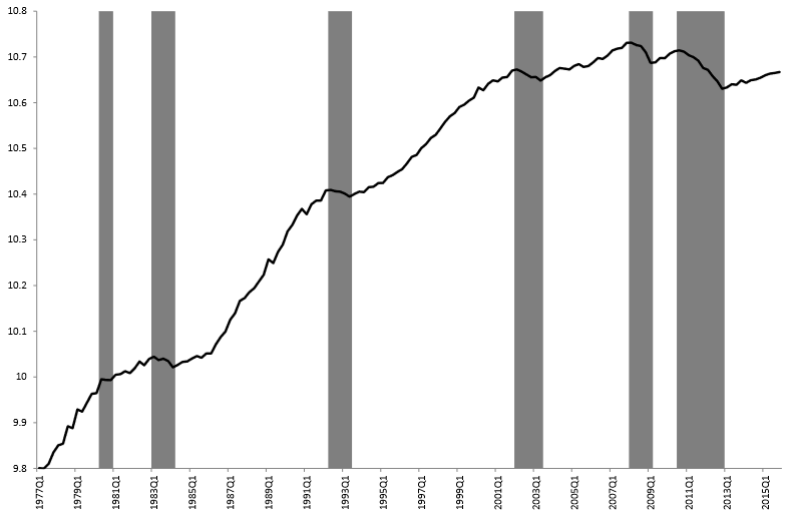

Table 6: Log Real GDP

Source: Rua (2017)

Variables	Mean	Min	Max	Obs
A) High Productivity				
L	34,24	1	26330	1,122,754
B) Low Productivity				
L	10,09	1	5091	748,501

Table 7: Summary Statistic on Firm Size by Productivity

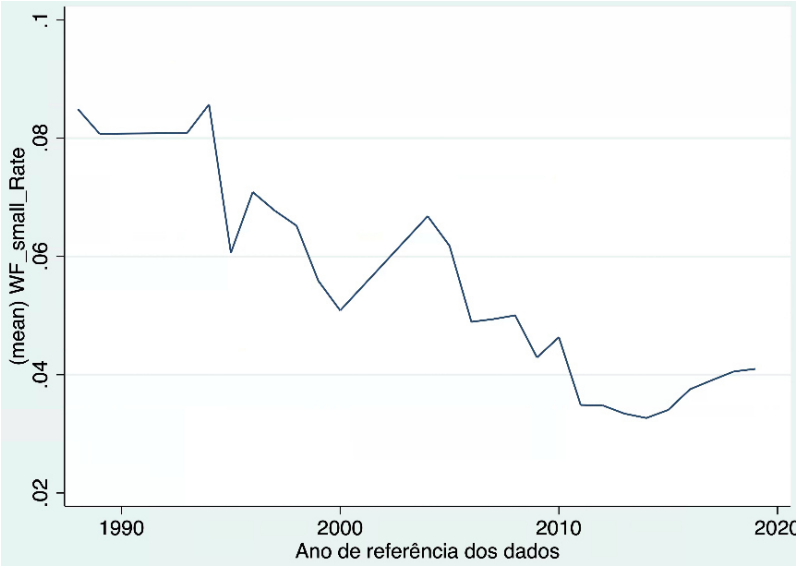

Figure 4: Worker Flows for Small Firms (less than 3 workers

Affidavit

I hereby attest that I have written my thesis

"Worker Reallocation over the Business Cycle: a Comprehensive Study of the Portuguese Labor Market"

independently and without the use of other than the stated aids. All passages that have been taken verbatim or in spirit from published or unpublished writings are marked as such.

The thesis has not been submitted in the same or a similar form to any other examining body.

Lisbon, 17. December 2021