"Wage cyclicality of new hires:

A disaggregated analysis for Chile"

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Abstract

The objective of this thesis is to analyze the wage cyclicality of new hires considering and deepening the composition effect. First I distinguish between new hires from non-employment (entrants) and new hires from employment (job-changers). Then, the analysis is deepened by distinguishing worker transitions between type of contract and/or firm. I use administrative data of the Chilean Unemployment Insurance program between 2006 and 2017. The first finding is that wages of new hires are significantly more procyclical than those of job-keepers. Secondly, the wages of job-changers are significantly more sensitive than those of entrants, and both are significantly more procyclical than those of job-keepers. Third, within contract and/or firm transitions, wages of temporary workers who came from another firm are the most sensitive to the cycle. Finally, I quantify the relative importance of these transitions in the aggregate wage, resulting that the most important transitions are those entrants to a temporary contract, and those that change into another firm also have an important contribution, amplifying the effect of the wage cyclicality of the job-changers.

JEL classification: E24, E32, J64.
Keywords: wage cyclicality, unemployment, new hires, types of contract.

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Contents

1 Introduction and Research framework

Aggregate wage data hides relevant compositional effects of the work force over the cycle. Fortunately, recent disaggregated data allows researchers to draw more precise conclusions regarding wage flexibility by reflecting wage heterogeneity between groups of individuals. Recent empirical literature[1] has focused on the wage cyclicality of the new hires, given more relevancy to the analysis on the margin.

Pissarides (2009), Kudlyak (2009), and others have argued that a more disaggregated analysis would be more relevant for the analysis of employment adjustments, because it allows to understand to what extent the wages of new hires, specifically, respond to the cyclical conditions of the economy. A strong response means that mobility is operating and this delivers another relevant labor market adjustment mechanism, in which firms could adjust their marginal costs and contracting decisions in response to aggregate conditions.

The main aim of this study is to analyze in a disaggregated way, the wage cyclicality of new hires in Chile, distinguishing between new hires from non-employment and new hires from employment, and then distinguishing between type of contract transitions. The term new hires from non-employment refers to all individuals that come from unemployment, inactivity, self-employment, or from the public sector; while the term new hires from employment refers to job-changers towards another firm.

Studies that have analyzed the wage cyclicity of new hires[2], such as Carneiro et al. (2012) and Martins et al. (2012) with data from Portugal, Stüber (2016) with data from Germany and Haefke et al. (2013) with data from the U.S., find that the wages of new hires fall more strongly when unemployment rises, that is, that these wages are procyclical. This suggests that, on the margin, individual wages are more in sync with the cycle than average measures suggest, casting doubt on the common view that wages are relatively rigid and on the inclusion of wage rigidity in search and matching models (Shimer, 2004, 2005; Hall, 2005).

[1] See Carneiro et al. (2012), Stüber (2016), Haefke et al. (2013), Font et al. (2015), among others.

[2] See also previous studies, such as Bils (1985), Shin (1994) and Solon et al. (1994) that also regress individual level wages on unemployment as a cyclical indicator for the US.

Moreover, in the momentum of analyzing the adjustment more deeply, recent studies such as Gertler et al. (2016) with data from the U.S., have disaggregated the wage cyclicality of the new hires, questioning the direct evidence of wage flexibility, finding procyclicality only for the job-changers. Beaudry and DiNardo (1991) argue that differences in wage cyclicality between stayers and changers arise because of implicit insurance between workers and firms. However, this explanation abstracts from heterogeneity across jobs (Barlevy, 2001), so Gertler et al. (2016) consider that there could be a confusing cyclical variation in wages that is due to workers moving to better jobs/contracts during expansions.

Here arises my motivation to analyze the wages of new hires in a disaggregated way for Chile, distinguishing between new hires from non-employment and new hires due to workers changing jobs. The labor market composition of Chile is very heterogeneous (see Banco Central de Chile (2018)), so a disaggregated analysis becomes more relevant in this economy.

In addition, there is an important turnover of workers over time, e.g., Davis and Haltiwanger (1992) show that the reallocation of workers is at least twice the rate of reallocation of work. This significant job and worker turnovers plus wage heterogeneity can be an important source of flexibility in aggregate wages. Then, the composition of jobs within a firm can also vary over the cycle, that is why I delve deeper into the composition of workers, distinguishing transitions between fixed-term (temporary) or indefinite-term contract (permanent), analyzing the wage cyclicality considering the origin and destination of the reallocations.

After understanding the individual wage cyclicality of the different groups of new hires or new type of contracts, a second aim of this study is to quantify the relative importance of these transitions in the changes in the aggregate wage. This aggregate wage decomposition will indicate whether the workers whose wages are more sensitive to the cycle make up a large part of the transitions in the economy or not. The results will show how cyclical the individual wages of different workers are, and at the same time, how important these wage changes are in the aggregate wage.

Therefore, the research questions to be addressed are the following: How cyclical are the

wages of new hires considering the compositional effect? What is the relative importance of transitions between contracts in the change of the aggregate wage? My hypothesis is that the wages of job changers will be more procyclical than those of job-keepers. Within this group, my hypothesis is that the wages of temporary workers that came from another firm would be the most procyclical. This could be explained because of the implicit insurance between workers and firms and the possible improvement/worsening of the quality of the match in the face of a boom/recession.

In a boom there will be less unemployment and more vacancies, and it is more likely that someone employed will be a new hire, and that this worker will accept the new job if she earns more than before, which would explain the expected higher procyclicality of job-changers. In addition, the wage cyclicality of temporary workers that came from another firm is expected to be more cyclical than the rest, since they are more prone to be reallocated by the firms. In a recession, as their contract term is fixed, temporary workers are more prone to be reallocated to a worse quality job, and as they know they have unemployment risk, they will accept.

This analysis is particularly relevant for monetary policy. The wages of workers on the margin, in particular new hires (within and to another firm), may be more important in understanding the marginal costs of firms and, therefore, of the evolution of inflation. It is also relevant because this analysis on the margin will demonstrate inflationary pressures in real time and will allow the authorities to act with more precision in the event of an overheating of the economy, for example.

To carry out these estimations and analysis properly, I need a longitudinal matched employer-employee/contract data set for Chile that controls for worker and firm unobservable heterogeneity, and also for some variable characteristics such as type of contract, tenure and firm size. I have a unique and rich dataset for Chile that meets these requirements over the 2006-2017 period.

A relevant and recent study that analyzes the wage cyclicality of new hires is Carneiro et al. (2012), that uses a longitudinal matched employer-employee dataset for Portugal over the 1986–2007 period. They analyze the wage responses to aggregate labor market conditions

for newly hired workers and existing workers within the same firm and find that entry wages are more procyclical than wages of stayers.

The motivation of this study is based on Gertler et al. (2016), which argues that the interpretation of wage cyclicality as direct evidence of wage flexibility ignores the confusing cyclical variation in the wage of new hires that is due to workers moving to better jobs during expansions. Unlike Gertler et al. (2016), I control for unobservable firm heterogeneity. They find no evidence in the US of excess wage cyclicality for new hires from non-employment, and substantial evidence of procyclical improvements in the match for workers making job-to-job transitions.

At the national level, and at the Latin American level at the same time, there is a mimeo of Albagli et al. (2018) for Chile where they find that the wages of all new hires are significantly procyclical and not only the wages of job-changers as Gertler et al. (2016) suggest. In addition to the disaggregation that will be done in my work, another major difference is the database that is used. The database that I use in my study is the most reliable data for formal employment in Chile, and it is reported month by month, making it more accurate.

The results of my work are aligned with Carneiro et al. (2012) and Gertler et al. (2016), because first, the real wages of new hires are more sensitive to the cycle than those of job-keepers. Second, when decomposing new hires between entrants and job-changers, the wages of the latter are more procyclical than those of entrants. However, and in line with Albagli et al. (2018), new hires from non-employment (entrants) are also significantly more sensitive than those of job-keepers.

It is my understanding that there is no literature that has analyzed the cyclicality of wages breaking down the transitions between types of contract. However, there is the study of Devereux and Hart (2006) that estimates the wage cyclicality of within-company job movers and between-company job movers in Britain, finding that the wage of the latter are considerably more procyclical than those of stayers. In my deeper analysis into the composition of workers, in addition to demonstrating the cyclicality mentioned above, I will also demonstrate the cyclicality of workers who switch between contracts.

My intention when the composition effect is further disaggregated is to analyze the cyclicality of workers in a new type of contract and/or firm, and to understand the procyclicality among the new hires (entrants and job-changers). I find that the wages of temporary workers who came from another firm and/or from another type of contract are the most sensitive to the cycle. From another side, the wages of permanent workers that change from another firm with the same type of contract are the least procyclical.

Finally, I found that the transitions of entrants to a temporary contract are the most relatively important in the aggregate wage. The transitions to another firm are also relatively important, which amplify the effect of the procyclicality of job-changers. This suggests that firms are more flexible when the individual comes from another firm, but also implies that there are important wage changes of job-changers over the business cycle, which results in large changes of the aggregate wage.

The document is organized as follows. Section 2 describes the data. Section 3 explains the chosen methodology to identify and deepen the composition effect. Section 4 shows and discusses the results, and provides some robustness checks. Wage decomposition is discussed in Section 5. Section 6 concludes.

2 Data

2.1 Data description

This study uses monthly administrative records of the contribution records of workers participating in the Chilean unemployment insurance program (UI), which are maintained by the "Superintendencia de Pensiones", the agency in charge of the regulation and supervision of the program. The UI system entered into force in October 2002 and covers all employees over 18 years of age who are employed in the private sector and have a formal contract, either for a fixed-term ("temporary" workers) or indefinite-term ("permanent" workers). Employees of the domestic service, public sector employees (regulated by the Public Service Law), the self-employed, workers under the age of 18 and those hired as trainees and retirees, with the exception of pensioners disability, are excluded from UI.

Despite having monthly data, the regressions are based on annual data because of constraints on the kinds of data manipulation possible using statistical software based on the size of the database. I selected workers in the system between 2006 and 2017, due to the representativeness of the composition of workers since 2006. This is a unique and rich longitudinal matched employer-employee/contract data set for Chile that allows to estimate separately the wage cyclicality of new hires from non-employment versus those who make transitions from job-to-job, and also has information on individual and firm characteristics.

The main advantages of this database are the reliability, the precision of the data, and the coverage for formal employment. The fact that a Superintendence is in charge of this data ensures that the data is correct, which reflects the reliability of this database. Regarding precision, this data is reported month by month with the exact wage that the person earned that certain month, and also reports the individual and firm characteristics, so I do not have to resort to other databases or make assumptions to obtain this data. Finally, the administrative nature of the data implies a high degree of formal employment coverage.

Naturally, it is not without disadvantages. The main disadvantage is that it is only for formal private employment. However, the other databases in Chile that report the wages in a different way share this disadvantage, as well as the databases used in the wage cyclicality literature (as in Carneiro et al. (2012) and Gertler et al. (2016), for example). Therefore, it is not a serious problem[3]. This characteristics make this database a good source for the study of wage cyclicality in Chile.

I transform the original database into a panel defined at the worker-year level. I keep the month April[4] and pick at most one employment relationship for the individual in a given year. The first reason to select the month April is that is a normal month in Chile in the sense that there are not large special bonuses due to holidays, like in December or September (national holidays) in which the total wage is much higher than in other months. The second reason is that I have data until April 2017 so it allows to follow workers over a long period of time, making better use of data.

To pick at most one employment relationship for the individual in a given year, I have

[3]And also allows more comparability with these studies.

[4]For robustness checks I re-estimate the baseline regressions with a different month.

to establish a criteria when there are individuals that are reported as employees of two or more firms in the same month, or are reported twice or more times for the same firm in the same month. For the last case, my criteria, in the following order, is to keep the employment relationship in which (1) the type of contract is permanent; (2) the wage is higher. For the case in which individuals are reported in more than one firm in the same month, my criteria, in the following order, is to keep the employment relationship in which (1) the type of contract is permanent; (2) the wage is higher; (3) the tenure is higher.

Finally, wages are deflated by the monthly CPI, which is obtained from the National Statistics Institute of Chile (*Instituto Nacional de Estadísticas* -INE). Aggregate unemployment rate is also obtained from INE.

2.2 Descriptive statistics

The final data set for the period 2007-2017[5] used for the regressions has a total of 42,417,576 worker-year observations with

- 7,740,496 workers in total and 3,856,143 workers on average per year.
- 711,207 firms in total and 288,206 firms on average per year.

Since companies and workers are properly identified in the database, I can track workers' work history through companies and time. I can distinguish between workers that keep their jobs and new hires, and also contract transitions. Job-keepers are defined as workers who stay in the same firm between consecutive years.

Within new hires, there are job-changers that make transitions from job to job, i.e. new hires from employment, and new hires from non-employment that find a new job. Following Gertler et al. (2016), I define new hires from employment as workers that make a direct transition between firms. Therefore, new hires are workers who in year $t-1$ were working in another firm (new hires from employment), or workers who in year $t-1$ or earlier were not employed (new hires from non-employment).

[5]Information from year 2006 is used to identify the status of workers in 2007.

Table 1: Average real monthly wage by worker type, 2007-2017

Workers	Average wage (CL$[6])
Job-keepers	587k
New hires	385k
From non-employment	332k
From employment	440k
Total	499k

Source: UI database (2006-2017).

Table 1 presents descriptive statistics of average wages for each worker type[7]. The average real monthly wage in the sample is nearly CL$500k, while the highest average wage corresponds to that of job-keepers (CL$590k) and the lowest average wage corresponds to that of new hires from non-employment (CL$330k). This shows a wide range between the wage means across the types of workers, which reflect the importance of doing disaggregated analysis.

This analysis may be further disaggregated considering changes in the type of contract, which is shown in Table 2. In this deeper analysis, job-contract-keeper workers are those permanent or temporary workers who remain permanent and temporary in the same firm ($P_{f,t-1} \rightarrow P_{f,t}$ and $T_{f,t-1} \rightarrow T_{f,t}$), respectively. The range between the average wage of both types of job-contract-keepers (CL$360-650k) is even larger than the range between the average wage of job-keeper workers and new hires from non-employment (CL$330-590k) shown in Table 1. This demonstrates the great heterogeneity that exists within the two groups and the need for a more disaggregated analysis.

New contract/hires are all the rest of the transitions. Among these contract/firm transitions, those who earn less on average are the entrants who enter with a temporary contract ($ne_{t-1} \rightarrow T_t$). For another side, the workers who earn the most on average are those workers with permanent contracts who change to another firm with a permanent contract as well ($Pf_{t-1} \rightarrow P_{af,t}$).

[6]Chilean pesos.

[7]More information of the selected variables for the sample is provided in Table A1 of the Appendix.

Table 2: Average real monthly wage by contract/firm transitions, 2007-2017

Permanent worker (66.4%)	Average wage$_t$ (CL$)
$P_{f,t-1} \rightarrow P_{f,t}$	647k
$P_{f,t-1} \rightarrow T_{f,t}$	386k
$P_{f,t-1} \rightarrow P_{af,t}$	627k
$P_{f,t-1} \rightarrow T_{af,t}$	391k
Temporary worker (33.6%)	
$T_{f,t-1} \rightarrow T_{f,t}$	363k
$T_{f,t-1} \rightarrow P_{f,t}$	464k
$T_{f,t-1} \rightarrow P_{af,t}$	423k
$T_{f,t-1} \rightarrow T_{af,t}$	333k
Non-employment	Average wage$_t$ (CL$)
$ne_{t-1} \rightarrow P_t$	429k
$ne_{t-1} \rightarrow T_t$	299k

Source: UI database (2006-2017).

3 Empirical Approach

The methodology of this paper aims to empirically analyze the cyclicality of the wages of new hires in a disaggregated way. In the first place, I will unravel the composition effect among new employees from employment and from non-employment, similar to what Gertler et al. (2016) did with the aggregate unemployment as the cyclical variable. Secondly, I will go deeper into the composition effect, disaggregating by type of contract.

In the first exercise, I study the response of individual real wages of new hires to changes in aggregate conditions, disaggregated by composition effects. To control the unobserved characteristics, the following equation (1) is estimated by individual and firm fixed effects[8]. In this type of literature, period-fixed effects are not used because we are interested in comparing the wage cyclicality of new hires with respect to that of job-keepers, which is reflected in the cycle coefficient. Instead of period fixed effect, the standard literature[9] controls for time trend and/or time trend for each type of worker, as in the following base line specification:

$$\ln w_{ift} = \varphi x'_{it} + \gamma U_t + \beta^E E_{it} + \beta^N N_{it} + (\beta_u^E E_{it} + \beta_u^N N_{it}) U_t + \lambda_0 t + \lambda_E t \cdot E_{it} + \lambda_N t \cdot N_{it} + \alpha_i + \delta_f + \varepsilon_{ift} \tag{1}$$

where:

- $\ln w_{ift}$: log of the monthly real wage of the individual i, working in the firm f in year t.
- x'_{it}: individual and firm variable characteristics such as age, a quadratic in tenure (measured in months), type of contract and number of employees in the firm.
- U_t: aggregate unemployment rate, which captures the influence of cyclical factors on wages.
- E_{it}: dummy equal to 1 if the worker is a new employee from employment, i.e., who makes a transition from job-to-job, and 0 otherwise.

[8]The Stata command used is *reghdfe* by Correia (2016), which allows for the inclusion of multiple and high dimensional fixed effects and performs particularly well with large datasets.

[9]See for example, Carneiro et al. (2012); Gertler et al. (2016); Stüber (2016)

- N_{it}: dummy equal to 1 if the worker is a new employee from non-employment, and 0 otherwise.
- $E_{it}U_t$ and $N_{it}U_t$: Interactions intended to measure the additional cyclicality of the wages of each of the new hires with respect to job keepers.
- β^E and β^N are worker-type fixed effects of each type of new hires, which captures the systematic differences between the wages of these types of workers.
- t is a time trend, while λ_E and λ_N captures the time trend of each type of new hires real wage.
- α_i and δ_f are individual and firm fixed effects, while ε_{ift} is the error term.

The coefficient γ measures the semi-elasticity of real wages with respect to the unemployment rate for job-keepers. While the coefficients β_u^E and β_u^N give the corresponding differential in the semi-elasticity of wages with respect to the unemployment rate for each type of new hire. Therefore, the sum of the coefficient of the cycle and the coefficient of the interaction between the type of new hire and the cycle, $\gamma + \beta_u^E$ and $\gamma + \beta_u^N$, captures the semi-elasticity for each type of new worker.

Then I go further into the effect of the composition, distinguishing between contract transitions (permanent (P) and temporary (T)) that can be in the same or in another firm (af). I disentangle between workers from employment changing between contracts and new hires from non-employment (N) to any of the two types of contracts:

$$\ln w_{ift} = \varphi x'_{it} + \gamma U_t + \sum_{c \in C} \psi_c \cdot \mathbb{I}_c + \sum_{c \in C} \beta_c \cdot \mathbb{I}_c \cdot U_t + \lambda t + \sum_{c \in C} \lambda_c \cdot \mathbb{I}_c \cdot t + \alpha_i + \delta_f + \varepsilon_{ift} \qquad (2)$$

where the variables not defined above are:

- C: types of transitions between contracts.

$$C = \{T \to P_{af}, P \to T_{af}, P \to P_{af}, T \to T_{af}, P \to T, T \to P, N \to P, N \to T\}$$

- $\mathbb{I}_c$: indicator that takes the value 1 for the type of transition $c \in C$ of the individual.

4 Results

4.1 Composition effect in New Hires

Table 3 presents the estimated coefficients and robust standard errors of the semi-elasticity of the real wages with respect to the aggregate unemployment rate. In column (1) I analyze the wage cyclicality of new hires without considering the composition effect within this group, in an attempt to replicate the results of Carneiro et al. (2012) for Chile and to show that the wages of new hires are more procyclical than the wage of job-keepers. In other words, the regression in column (1) divides workers into two groups: job-keepers and new hires.

Table 3: Real wage sensitivity of new hires to aggregate unemployment

(Ln) Real wage	(1)	(2)
Job-keepers	-1.289***	-1.298***
	(0.011)	(0.011)
Incremental effect for:		
New hires	-0.914***	
	(0.022)	
From non-employment		-0.594***
		(0.031)
From employment		-1.244***
		(0.028)
Nr. Obs.	41,000,840	41,000,840

*p<0.10, **p<0.05, ***p<0.01

Notes: Robust standard errors in parenthesis, clustered by individual[10]. Controls for age, a quadratic in tenure, type of contract, number of employees in the firm, dummies and time-trends for each type of worker, and include worker and firm fixed effects.

[10]Estimates consistent standard errors even when the observations are correlated within groups.

As in Carneiro et al. (2012), the wages of new hires are more procyclical than those of workers who remain in the same job, which suggests wage flexibility for new hires. These results imply that, *ceteris paribus*, a 1 percentage point increase in the aggregate unemployment rate implies a decrease of 1.289% in the real wage of those that keep the same employment from the previous year, and a decrease of 2.203%[11] in the real wage of the new hires.

The disaggregation within new hires is presented in column (2), where new hires are categorized as new hires from non-employment and from employment. Consistent with the results in Gertler et al. (2016), wages of new hires from employment (i.e., job-changers) are largely more procyclical than those of new hires from non-employment (i.e., entrants). The real wage semi-elasticity with respect to the unemployment rate for these type of new hires workers is -2.542 and -1.892, respectively[12]. The wages of job changers are significantly more procyclical than those of job-keepers, and in line with Albagli et al. (2018), the wages of entrants are significantly more procyclical than the wages of job-keepers, which contrasts with Gertler et al. (2016)'s findings.

4.2 Composition effect: types of contract/firm transitions

In a second exercise, I propose to analyze the wage cyclicality of the transitions between types of contracts and/or firms, which is shown in Table 4. An increase of one percentage point in the aggregate unemployment rate will reflect in a decrease in real wages of -1.168% and -2.52% for new hires from non-employment that arrives to a permanent and to a temporary contract, respectively[13]. So the procyclicality within entrants would be mainly because of the temporary employment, and the results suggest a high flexibility for the latter which would not be expected without this contract transition disaggregation.

[11] This number corresponds to the sum of -1.289 and the incremental effect of -0.914.

[12] -2.542 corresponds to the sum of -1.298 and the incremental effect of -1.244, and -1.892 corresponds to the sum of -1.298 and the incremental effect of -0.594.

[13] -1.168 corresponds to the sum of -1.257 and the (non) incremental effect of 0.089, and -2.52 corresponds to the sum of -1.257 and the incremental effect of -1.263.

Table 4: Real wage sensitivity of contract/firm transitions to aggregate unemployment

	(Ln) Real wage
Job-contract-keepers	-1.257***
	(0.011)
Incremental effect for:	
From non-employment:	
$ne \rightarrow P$	0.089**
	(0.037)
$ne \rightarrow T$	-1.263***
	(0.045)
From employment:	
$T_f \rightarrow P_{af}$	-0.663***
	(0.063)
$P_f \rightarrow T_{af}$	-1.635***
	(0.064)
$P_f \rightarrow P_{af}$	-0.439***
	(0.041)
$T_f \rightarrow T_{af}$	-1.986***
	(0.047)
$P \rightarrow T$	-0.100
	(0.167)
$T \rightarrow P$	-0.677***
	(0.039)
Nr. Obs.	41,000,840

*p<0.10, **p<0.05, ***p<0.01

Notes: Robust standard errors in parenthesis, clustered by individual. Controls for age, a quadratic in tenure, type of contract, number of employees in the firm, dummies and time-trends for each type of worker, and include worker and firm fixed effects.

From employment, the most procyclical wages are those of temporary workers who came from another firm with the same and with another type of contract ($T_f \rightarrow T_{af}$ and $P_f \rightarrow T_{af}$), which is expected as the temporary employment usually presents a higher level of turnover than permanent employment. The semi-elasticity with respect to aggregate unemployment for these two types of workers is -3.243 and -2.892, respectively[14]. Therefore, firms are more flexible with job-changers who are also temporary workers.

The wage of temporary workers that change from a permanent contract in the same firm ($P \rightarrow T$) are the least procyclical, with a semi-elasticity of -1.357 but this finding is not significant. For another side, the wages of permanent workers that change from another firm ($T_f \rightarrow P_{af}$ and $P_f \rightarrow P_{af}$) and permanent workers that change from a temporary contract in the same firm ($T \rightarrow P$) are also very sensitive to the cycle, but less than those of entrants to a temporary contract, with a semi-elasticity of -1.92, -1.696 and -1.934, respectively[15].

4.3 Robustness

In order to check whether the results are robust to alternative definitions of the cycle, I propose in first place, in order to capture the lagged effect of the setting of the wages, to take the average of the unemployment rate from February to April and the three-month lag of the unemployment rate. Another cycle indicator is the regional unemployment rate instead of the aggregate unemployment rate that is used in the previous literature. Regional unemployment is a better proxy for external labor market forces (Blanchflower and Oswald (1994)), especially in Chile, considering some important unemployment differences between some regions.

Table 5 shows the results of the regressions considering new hires composition with these alternative cycle indicators between columns (1)-(6). In columns (1)-(4) it can be seen that the real wages of the new hires in all the disaggregations are still more procyclical than the wages of job-keepers, making clear that the results are robust to lagged unemployment rate measures. Wages of job-changers are still more procyclical than those of entrants, and the wages of both groups are still significantly more procyclical than those of job-keepers.

[14] -3.243=-1.257-1.986 and -2.892=-1.257-1.635

[15] -1.357=-1.257-0.100;-1.92=-1.257-0.663; -1.696=-1.257-0.439; -1.934=-1.257-0.677.

Columns (5) and (6) show the re-estimation with the regional aggregate unemployment rate as the cycle indicator, and it can be seen that the real wages of all the new hires are still more procyclical than the wage of the job-keepers. The finding that the wages of job-changers are more sensitive to the cycle than those of entrants remains, but only slightly. Therefore, when using a better proxy for the cyclicality of the economy, the procyclicality of all new hires is less with respect to job-keepers, and the gap between the wage sensitivity of both types of new hires narrows.

Another robustness check is to use another sample. November is another normal month in Chile when there are not large special bonuses, which is the reason to keep that month for an alternative sample. Columns (7) and (8) show this re-estimation and it can be seen that the results are robust to the baseline estimation because the wages of new hires are more procyclical than those of job keepers, the wages of job-changers are more procycical than those of entrants, and wages of both new hires are significantly more procyclical than those of job-keepers.

Table 5: Robustness check: Different cycle indicators and different sample for new hires estimations

(Ln) Real wage	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cyclical variable:	Average UR feb-apr		3 months lag UR		Regional UR		Aggregate UR	
Job-keepers	-1.592***	-1.599***	-1.882***	-1.882***	-0.909***	-0.911***	-1.622***	-1.631***
	(0.012)	(0.012)	(0.013)	(0.013)	(0.008)	(0.008)	(0.012)	(0.012)
Incremental effect for:								
New hires	-1.009***		-0.884***		-0.529***		-1.009***	
	(0.025)		(0.026)		(0.014)		(0.027)	
From non-nemployment		-0.693***		-0.721***		-0.463***		-0.515***
		(0.034)		(0.036)		(0.018)		(0.039)
From employment		-1.327***		-1.016***		-0.609***		-1.428***
		(0.031)		(0.033)		(0.017)		(0.034)
Nr. Obs.	41,000,840	41,000,840	41,000,840	41,000,840	40,658,220	40,658,220	38,156,651	38,156,651

*p<0.10, **p<0.05, ***p<0.01

Notes: Robust standard errors in parenthesis, clustered by individual. Controls for age, a quadratic in tenure, type of contract, number of employees in the firm, dummies and time-trends for each type of worker, and include worker and firm fixed effects.

As a final robustness check, I re-estimate these regressions including other sets of fixed effects. First, and following Albagli et al. (2018), I incorporate a firm size fixed effect to control for heterogeneity correlated with observables at the firm level. I follow the Chilean legislation that classifies firms by size into 4 categories[16], and I also add a fifth category for the largest firms, therefore, based on the number of workers in each year, I define 5 size categories: $(1): 1-9$ workers, $(2): 10-49$ workers, $(3): 50-199$ workers, $(4): 200-999$ and $(5): \geq 1000$ workers.

Second, I incorporate a gender-education-age fixed effect with the same purpose above at an individual level. I define an age range of 5 years, so I have 19 age categories between 18 and 110 years old. Regarding education, I define 8 level education categories: (1): less than basic school, (2): basic school, (3): high-school uncompleted, (4): high-school completed, (5): non-university higher education uncompleted, (6): non-university higher education completed, (7): university education and (8): postgraduate education.

Table 6 shows the results of the estimation for different sets of fixed effects. Columns (1) and (2) show that including size fixed effects, the semi-elasticity of wages is still higher for new hires (-2.109) than for job-keepers (-1.108), and that the semi-elasticity is higher for job-changers (-2.431) than for entrants (-1.814)[17]. Furthermore, the coefficients of semi-elasticity are very similar to those of the baseline estimation (-1.289,-2.203,-2.542 and -1.892 for job-keepers, new hires, job-changers and entrants, respectively.).

The results are also robust when education-gender-age fixed effects are included, which is shown in columns (3) and (4). In this estimation, the wages are more procyclical for all type of workers, more notably for job-keepers and entrants. Finally, when including both fixed effects in the regression, it can be noticed in columns (5) and (6) that the results remain and the magnitude of coefficients is very similar with previous estimations.

[16] Micro, Small, Medium, Large

[17] -2.109=-1.108-1.001; -2.431=-1.115-1.316; -1.814=-1.115-0.699.

Table 6: Robustness check: Different sets of fixed effects for new hires estimations

(Ln) Real wage	(1)	(2)	(3)	(4)	(5)	(6)
Job-keepers	-1.108***	-1.115***	-1.404***	-1.405***	-1.250***	-1.251***
	(0.011)	(0.011)	(0.013)	(0.013)	(0.128)	(0.013)
Incremental effect for:						
New hires	-1.001***		-1.074***		-1.124***	
	(0.022)		(0.025)		(0.025)	
From non-nemployment		-0.699***		-0.781***		-0.845***
		(0.031)		(0.034)		(0.034)
From employment		-1.316***		-1.329***		-1.366***
		(0.028)		(0.030)		(0.030)
Nr. Obs.	41,000,844	41,000,844	32,061,747	32,061,747	32,061,747	32,061,747
Worker and Firm FE	✓	✓	✓	✓	✓	✓
Firm size FE	✓	✓			✓	✓
Education-gender-age FE			✓	✓	✓	✓

*p<0.10, **p<0.05, ***p<0.01

Notes: Robust standard errors in parenthesis, clustered by individual. Controls for age, a quadratic in tenure, type of contract, number of employees in the firm, dummies and time-trends for each type of worker.

The same robustness checks are estimated for equation (2). Table 7 shows the robustness check for different cycle indicators in columns (1)-(3) and for different sample in column (4). In general, the results remain, qualitatively, the same because from non-employment, the entrants to a temporary contract are more procyclical than entrants to a permanent contract, and from employment, the most procyclical are temporary workers that came from another firm with the same or with another type of contract ($P_f \rightarrow T_{af}$ and $T_f \rightarrow T_{af}$).

Table 7: Robustness check: Different cycle indicators and different sample for contract/firm transitions

(Ln) Real wage	(1)	(2)	(3)	(4)
Cyclical variable:	Average UR feb-apr	3 months lag UR	Regional UR	Aggregate UR
Job-contract-keepers	-1.556***	-1.848***	-0.877***	-1.514***
	(0.013)	(0.014)	(0.008)	(0.012)
Incremental effect for:				
From non-employment:				
$ne \rightarrow P$	0.053	-0.056	-0.027	-0.029
	(0.041)	(0.044)	(0.023)	(0.046)
$ne \rightarrow T$	-1.382***	-1.271***	-0.926***	-1.165***
	(0.049)	(0.051)	(0.027)	(0.059)
From employment:				
$T_f \rightarrow P_{af}$	-0.765***	-0.622***	-0.317***	-1.077***
	(0.069)	(0.074)	(0.037)	(0.069)
$P_f \rightarrow T_{af}$	-1.679***	-1.165***	-0.919***	-2.289***
	(0.071)	(0.077)	(0.037)	(0.079)
$P_f \rightarrow P_{af}$	-0.485***	-0.367***	-0.080**	-0.599***
	(0.045)	(0.049)	(0.025)	(0.048)
$T_f \rightarrow T_{af}$	-2.119***	-1.699***	-1.088***	-1.957***
	(0.052)	(0.056)	(0.029)	(0.057)
$P \rightarrow T$	-0.332*	-0.637**	-0.346***	-0.675***
	(0.192)	(0.222)	(0.091)	(0.232)
$T \rightarrow P$	-0.783***	-0.778***	-0.327***	-0.904***
	(0.044)	(0.049)	(0.022)	(0.046)
Nr. Obs.	41,000,840	41,000,840	40,658,220	38,156,651

*p<0.10, **p<0.05, ***p<0.01

Notes: Robust standard errors in parenthesis, clustered by individual. Controls for age, a quadratic in tenure, type of contract, number of employees in the firm, dummies and time-trends for each type of worker, and include worker and firm fixed effects.

One of the differences with respect to the baseline estimation is the semi-elasticity of entrants to a permanent contract. With different measures of cycle indicators and with a different sample, the procyclicality for these workers is slightly higher (vs an incremental effect of 0.089 in the baseline estimation) but not significant. For the entrants to a temporary contract, the coefficients are very similar except for the estimation with regional unemployment rate as the cyclical indicator where the semi-elasticity for this group is less, as well as for the other groups with this measure.

The least procyclical wages from employment in the baseline estimation were those of the temporary workers that change from a permanent contract in the same firm ($P \rightarrow T$), but the coefficient is not statistically significant (with an incremental effect of -0.1). In this robustness check, this group shares the least procyclicality with the permanent workers that change from another firm with the same contract ($P_f \rightarrow P_{af}$). On the one hand, permanent workers are more stable in the firm and on the other hand, transitions of workers in the same firm could reflect an implicit insurance between workers and firm, that could explain the less flexibility of their wages.

Table 8 shows the results of the estimation for different sets of fixed effects for equation (2). Column (1) shows that including size fixed effects, the semi-elasticity of wages is still higher for temporary workers that change from another firm ($P_f \rightarrow T_{af}$ and $T_f \rightarrow T_{af}$), with a semi-elasticity of -2.761 and -3.137, respectively[18]. Furthermore, the coefficients of semi-elasticity are very similar to those of the baseline estimation (-2.892 and -3.243, respectively.).

The results are also robust when education-gender-age fixed effects are included, which is shown in column (2). In this estimation, the wages are more procyclical for all types of workers, and significant procyclicality is obtained for the entrants to a permanent contract. Finally, when including both fixed effects in the regression, it can be noticed in column (3) that the results remain and the magnitude of coefficients is very similar to previous estimations.

[18] -2.761=-1.067-1.694 and -3.137=-1.067-2.070.

Table 8: Robustness check: Different sets of fixed effects for contract/firm transitions estimations

(Ln) Real wage	(1)	(2)	(3)
Job-contract-keepers	-1.067***	-1.349***	-1.193***
	(0.011)	(0.013)	(0.013)
Incremental effect for:			
From non-employment:			
$ne \rightarrow P$	-0.020	-0.155***	-0.219***
	(0.037)	(0.043)	(0.043)
$ne \rightarrow T$	-1.376***	-1.348***	-1.418***
	(0.045)	(0.048)	(0.048)
From employment:			
$T_f \rightarrow P_{af}$	-0.745***	-0.816***	-0.860***
	(0.063)	(0.066)	(0.066)
$P_f \rightarrow T_{af}$	-1.694***	-1.731***	-1.749***
	(0.064)	(0.067)	(0.067)
$P_f \rightarrow P_{af}$	-0.522***	-0.504***	-0.550***
	(0.041)	(0.045)	(0.045)
$T_f \rightarrow T_{af}$	-2.070***	-1.992***	-2.037***
	(0.047)	(0.048)	(0.048)
$P \rightarrow T$	-0.135	-0.271	-0.261
	(0.167)	(0.175)	(0.175)
$T \rightarrow P$	-0.734***	-0.688***	-0.712***
	(0.039)	(0.044)	(0.044)
Nr. Obs.	41,000,840	32,061,747	32,061,747
Worker and Firm FE	✓	✓	✓
Firm size FE	✓		✓
Education-gender-age FE		✓	✓

*p<0.10, **p<0.05, ***p<0.01

Notes: Robust standard errors in parenthesis, clustered by individual. Controls for age, a quadratic in tenure, type of contract and number of employees in the firm, dummies and time-trends for each type of worker.

I can conclude that the model is robust to these variations. The wages of new hires are more sensitive to the cycle than those of job-keepers, consistent with previous literature[19]. When the new hires are disaggregated, job-changers' wages are more procyclical than those of entrants, and the wages of both groups are more procyclical than those of job-keepers. Finally, the wages of workers with a temporary contract who came from another firm, either from a permanent or a temporary contract, are the most procyclical within contract/firm transitions.

4.4 Discussion

In summary, the results of the analysis of real wage cyclicality for different types of workers show that firms tend to adjust wages on the margin. Therefore, wage flexibility of the formal employment sector occurs mainly in transitions to new jobs, especially to new firms and to temporary contracts. I can interpret that this flexibility is one of the adjustment margins that firms use as a buffer negative shocks in the economy, and particularly, mitigates the impact of negative shocks on hiring.

The procyclicality of job-changers can be explained with the argument that workers could move to better jobs/contracts during expansions, and to worse quality jobs/contracts during recessions. In other words, in a boom a worker could receive a better offer and increase her wage by changing to another job, which is the argument that Gertler et al. (2016) use to explain the excess flexibility that they observed in the real wages of new hires. In my case however, I can only use it to explain the procyclicality on job-changers real wages because I also find significant procyclicality on new hires from non-employment, although less.

When the composition effect is strengthened by allowing transitions between contracts, the wages of temporary workers that change from another firm are the most procyclical within this group. This reflects that firms tend to adjust wages to the most sensitive margin that are these type of workers. In a recession, as their contract term is fixed, they are more prone to be reallocated to a worse quality job (within or in another firm), and as they know they have unemployment risk, they will accept.

[19]See Carneiro et al. (2012), Gertler et al. (2016), Albagli et al. (2018), among others.

For another side, these results suggest that this flexibility facilitates cost adjustment by firms. In this sense, the response of wages partly determines the evolution of the marginal costs of firms and, through them, of aggregate supply. On the other hand, the reaction of wages partly determines the evolution of the wage bill and, through it, the behavior of aggregate demand. In this way, the combined response of aggregate demand and supply determines the impact of shocks on the evolution of capacity gaps and price pressures.

These roles in the labor market have historically been captured in the modeling of monetary policy, from the original formulation of the Phillips curve to the modern formulation of the New Keynesian analytical framework (Banco Central de Chile, 2018). A wage rigidity, as reflected in an aggregate analysis, suggested that monetary policy, through nominal variables, had an important capacity to affect employment and activity. Moreover, wage growth has a relevant impact on inflation, and therefore understanding its behavior is relevant in the conduct of monetary policy.

Consequently, these results also have implications regarding the instruments that central banks should use to inform their judgment of inflationary pressures. Furthermore, Moscarini and Postel-Vinay (2016) argue that monetary authorities concerned with inflationary wage pressure should pay more attention directly to the Employer-to-Employer transitions (i.e., job-changers). They point out that an important case to take into account is the post-Great Recession experience, which was characterized by full unemployment recovery but anemic recovery in both wages and the Employer-to-Employer rate.

I would like to emphasize that individual wages are more flexible than what is observed in aggregated statistics. Also, the composition effect inside the new hires is key to understand the dynamics of wage adjustment and then understand the impact of the economic cycle on the labor market. From the monetary policy perspective, on the one hand it is relevant for conducting it, and on the other hand, this adjustment on the margin facilitates the work of monetary policy by reducing the need for more aggressive macroeconomic stabilization policies.

5 Wage decomposition

In this section I quantify the relative importance of the contract transitions (both inside and towards another firm) in the changes in the annual aggregate wage. Based on Foster et al. (2001), the decomposition of aggregate wage change can be disentangled in 3 sources:

$$\Delta W_{.t} = \underbrace{\sum_{i \in cc}\left(\sum_{i=1}^{8} \bar{\phi}_{it}\Delta W_{it} + \sum_{i=1}^{8}(\bar{W}_{i,t-1} - \bar{W}_{.t})\Delta\phi_{i,t-1}\right)}_{S1} + \underbrace{\sum_{i \in uc}\sum_{i=1}^{2}\phi_{it}(W_{it} - \bar{W}_{.t})}_{S2} - \underbrace{\sum_{i \in cu}\sum_{i=1}^{2}\phi_{i,t-1}(W_{i,t-1} - \bar{W}_{.t}))}_{S3} \quad (3)$$

where $W_{.t}$ is the aggregate wage in year t, W_{it} is the wage of the individual i in t, $\Delta W_{.t}$ is the change in the aggregate wage between year t and $t-1$, ΔW_{it} is the change in the individual wage between year t and $t-1$, and $\phi_{it} = \frac{1}{E_{.t}}$ represents the weight of the individual in the total employment of the economy in a given year.

S1 is the wage change of the workers who remain working from the previous year and can make transitions between type of contracts and/or between firms (cc). This change implies 6 transitions:

(T1) Permanent worker remains in the same firm, but transits to a temporary contract: $P_f \rightarrow T_f$

(T2) Temporary worker remains in the same firm, but transits to a permanent contract: $T_j \rightarrow P_j$

(T3) Permanent worker transits to another firm with a permanent contract: $P_f \rightarrow P_{af}$

(T4) Temporary worker transits to another firm with a temporary contract: $T_f \rightarrow T_{af}$

(T5) Permanent worker transits to another firm with a temporary contract: $P_f \rightarrow T_{af}$

(T6) Temporary worker transits to another firm with a permanent contract: $T_f \rightarrow P_{af}$

This change also implies 2 states (non-transitions) from workers that remain in the same firm with the same contract:

(N1) Permanent worker remains in the same firm with a permanent contract: $P_f \rightarrow P_f$

(N2) Temporary worker remains in the same firm with a temporary contract: $T_f \rightarrow T_f$

For another side, S2 is the wage change due to the incorporation of non-employed to the employment (uc):

(T7) Non-employed enters to a permanent contract: $ne \rightarrow P$

(T8) Non-employed enters to a temporary contract: $ne \rightarrow T$

Finally, S3 is the wage change due to the workers that were working in $t-1$ but in t are in non-employment (cu):

(N3) Worker in a permanent contract is non-employed the next period: $P \rightarrow ne$

(N4) Worker in a temporary contract is non-employed the next period: $T \rightarrow ne$

The relative importance of the transitions between contracts and/or firms (T) is presented in Table 9, while the full decomposition is presented in Table A5 of the Appendix.

Table 9: Relative importance of contract/firm transitions in the aggregate wage (%)

	Transitions							
	(T1)	(T2)	(T3)	(T4)	(T5)	(T6)	(T7)	(T8)
$\Delta W_{.t}$	$P_f \rightarrow T_f$	$T_f \rightarrow P_f$	$P_f \rightarrow P_{af}$	$T_f \rightarrow T_{af}$	$P_f \rightarrow T_{af}$	$T_f \rightarrow P_{af}$	$ne \rightarrow P$	$ne \rightarrow T$
ΔW_{2007}	-0.1	6.9	25.0	23.5	2.6	23.7	4.3	-103.4
ΔW_{2008}	-0.3	11.8	22.9	38.6	0.1	40.1	-14.2	-186.2
ΔW_{2009}	-0.1	6.0	32.7	7.1	-3.3	18.9	-11.6	-76.6
ΔW_{2010}	-0.1	5.7	39.2	23.0	0.5	18.7	-13.6	-96.7
ΔW_{2011}	-0.1	8.2	46.6	27.6	0.9	31.5	-23.9	-152.6
ΔW_{2012}	0.0	5.5	39.1	19.8	2.2	21.4	-12.2	-76.4
ΔW_{2013}	-0.1	5.3	44.2	20.5	0.2	21.8	-16.7	-75.4
ΔW_{2014}	-0.9	10.2	59.3	12.4	-15.2	36.5	-46.6	-173.0
ΔW_{2015}	-0.6	9.1	65.5	12.1	-13.1	32.9	-42.2	-157.3
ΔW_{2016}	-1.4	15.7	108.5	23.9	-33.5	59.3	-95.6	-315.7
ΔW_{2017}	-0.4	4.9	48.4	4.6	-10.7	19.3	-29.1	-104.8
Mean	-0.4	8.1	48.3	19.4	-6.3	29.5	-27.4	-138.0

On average, the transitions that are relatively more important in the aggregate wage change are the workers who enter to a temporary contract (T8) and workers in a permanent contract that change into another firm with the same contract that they had before (T3). On one side, we know that wages of entrants to a temporary contract ($ne \rightarrow T$) are very sensitive to the cycle, and now we know that they also contribute largely to the aggregate wage change, where its negative sign implies that these new entrants earn lower wages than the average. On the other side, we know that wages of permanent workers that change from another firm with the same contract ($P_f \rightarrow P_{af}$) are one of the least procyclical within the from employment transitions, but their change is relatively important on the aggregate wage change.

The transitions that are relatively less important on average, are those involving temporary workers who change from a permanent contract, either within the same firm or another ((T1) and (T5), respectively.), and permanent workers that change from a temporary contract in the same firm (T2). We know that wages of the transitions in the same firm ($P_f \rightarrow T_f$ and $T_f \rightarrow P_f$) are not very sensitive to the cycle within the from employment transitions, and now we know that their change is not very important in the aggregate wage. In other words, the transitions of contracts in the same firm do not represent a key factor in the change of the aggregate wage.

However, temporary workers that change from another firm and from the other type of contract ($P_f \rightarrow T_{af}$) are very sensitive to the cycle, but their change is relatively unimportant in the aggregate wage. This reflects that for one side, firms are very flexible with this type of workers, but on the economy, the wage change of these workers are relatively not very important. Finally, the wages of the rest of the workers that change to another firm ((T4) and (T6)) are also quite relatively important to the aggregate wage, and they are very sensitive to the cycle too.

This decomposition reflects that, in general, the net contribution of job-changers between firms ($P_f \rightarrow P_{af}$, $T_f \rightarrow T_{af}$ and $T_f \rightarrow P_{af}$) has been relatively important between 2007 and 2017. Furthermore, entrants to a temporary contract that are also very sensitive to the cycle, imply the largest contribution to the aggregate wage, within the contract/firm transitions.

Finally, transitions between permanent and temporary contracts in the same firm do not represent a great contribution on the aggregate wage.

6 Conclusion

In this thesis, using recent administrative data on Chile I present consistent panel data evidence that affirms that the wage cyclicality of new hires is more procyclical than the job-keepers, and when analyzing the composition effect, this "excess" flexibility is mainly due to the procyclicality of job changers. Moreover, I find significant evidence of procyclicality for new hires from non-employment in Chile, which differs from the international literature. This conclusion was reached including individual and firm fixed effects, controlling for their respective unobservable heterogeneity, and is robust to other specifications.

Another result that I can extract from the present study is that when analyzing the wage cyclicality of workers who changed between contracts and/or firms, the wages of workers that transitioned to a temporary contract in another firm are the most procyclical within transitions from employment. This result is expected because temporary employment presents a higher level of turnover, so firms will be more flexible with these workers. For another side, the least procyclical wages are those of entrants to a permanent contract, and within employment transitions, are those of permanent workers who came from another firm with the same type of contract, and temporary workers that change their contract in the same firm.

Finally, when quantifying the relative importance of the transitions between contracts and/or firms, the net contribution of job-changers between firms is relatively important between 2007 and 2017, while the contribution of entrants to a temporary contract is the largest. From this, it can be concluded on one side, that in addition to the procyclicality of the wages of job-changers, this group is also a key factor in the change of the aggregate wage. For another side, when disaggregating the composition effect among entrants, it can be concluded that entrants to a temporary contract are very sensitive to the cycle and, at the same time, this type of workers are very important to the economy.

Often this empirical analysis that considers heterogeneity of workers is absent from the macroeconomic debate. Most of the labor market indicators that are regularly reported are highly aggregated, which implies that much relevant information, such as differences in the behavior of different groups or changes in the composition of flows, is ignored. This information can be very valuable in the interpretation of aggregate events and in policy decision-making, and its omission is more important in economies whose composition of the workforce and employment is very heterogeneous, as in Chile (see Banco Central de Chile (2018)).

The labor market plays a central role for monetary policy. In the short term, the way in which this market responds to shocks, and the way in which employment and wages are adjusted, will be key to the behavior of variables such as activity and prices. As recommendation, monetary policy decisions could greatly benefit from having and analyze this type of data in the margin, which allows, in a certain way, in real time to detect the evolution of inflationary pressures and thus help monetary policy decision-making.

For future studies it would be interesting to analyze issues by sector, because there are sectors with a greater number of fixed term contracts, which are the most flexible ones. This would help to continue incorporating the complexity of the labor market in the framework of analysis and projections, in order to improve the reading of the behavior of the Chilean economy, and would benefit monetary policy as well.

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A. Appendix

A.1 Descriptive statistics

Table A1: Means of selected variables by type of worker, 2007-2017

	Job-keepers	New hires	Entrants	Job-changers
Age (in years)	38.8	34.6	33.7	35.6
Proportion of permanent contract	0.847	0.427	0.424	0.43
Tenure (in months)	40.8	6.3	6.4	6.1
Proportion of female	0.384	0.351	0.41	0.29
Education level (proportion of workers)				
Less than basic school	0.0441	0.0517	0.0458	0.0577
Basic school	0.0668	0.0858	0.0777	0.0941
High-school uncompleted	0.1137	0.1213	0.0965	0.147
High-school completed	0.3711	0.4418	0.4112	0.4735
Non-university higher education uncompleted	0.0452	0.0427	0.0378	0.0477
Non-university higher education completed	0.0389	0.0337	0.0299	0.0377
University	0.0440	0.0367	0.0342	0.0393
Postgraduate education	0.0083	0.0050	0.0044	0.0057
Non-defined	0.268	0.1814	0.2625	0.0973
N	23,907,016	18,510,560	9,414,621	9,095,939

Source: UI database (2006-2017).

Table A2: Unemployment rate, 2007-2017

Year	Unemployment rate (%)
2007	6.8
2008	7.6
2009	9.8
2010	8.6
2011	6.9
2012	6.5
2013	6.4
2014	6.1
2015	6.1
2016	6.4
2017	6.7

Source: INE (2019)

A.2 Results

Table A3: Real wage sensitivity of new hires to aggregate unemployment, with controls

(Ln) Real wage	(1)	(2)
Job-keepers	-1.289***	-1.298***
	(0.011)	(0.011)
Incremental effect for:		
New hires	-0.914***	
	(0.022)	
From non-employment		-0.594***
		(0.031)
From employment		-1.244***
		(0.028)
Controls:		
Age	0.008**	0.008*
	(0.004)	(0.004)
Tenure squared	-1.64e-06***	-1.25e-06***
	(0.000)	(0.000)
Type of contract	-0.214***	-0.213***
	(0.000)	(0.000)
N° employees of the firm	2.87e-07***	2.84e-07***
	(0.000)	(0.000)
Nr. Obs.	41,000,840	41,000,840

*p<0.10, **p<0.05, ***p<0.01

Notes: Robust standard errors in parenthesis, clustered by individual. Controls for dummies and time-trends for each type of worker, and include worker and firm fixed effects.

Table A4: Real wage sensitivity of new contracts/hires to aggregate unemployment

	(Ln) Real wage
Job-contract-keepers	-1.167***
	(0.011)
Incremental effect for:	
From non-employment:	
$ne \rightarrow P$	0.089**
	(0.037)
$ne \rightarrow T$	-1.263***
	(0.045)
From employment:	
$T_f \rightarrow P_{af}$	-0.663***
	(0.063)
$P_f \rightarrow T_{af}$	-1.635***
	(0.064)
$P_f \rightarrow P_{af}$	-0.439***
	(0.041)
$T_f \rightarrow T_{af}$	-1.986**
	(0.047)
$P \rightarrow T$	-0.100
	(0.167)
$T \rightarrow P$	-0.677***
	(0.039)
Controls:	
Age	0.008*
	(0.004)
Tenure squared	-1.66e-06***
	(0.000)
Type of contract	-0.199***
	(0.000)
N° employees of the firm	2.81e-07***
	(0.000)
Nr. Obs.	41,000,840

*p<0.10, **p<0.05, ***p<0.01

Notes: Robust standard errors in parenthesis, clustered by individual. Controls for dummies and time-trends for each type of worker, and include worker and firm fixed effects.

A.3 Wage Decomposition

Table A5: Aggregate wage decomposition (%)

	Transitions								Non-transitions			
	(T1)	(T2)	(T3)	(T4)	(T5)	(T6)	(T7)	(T8)	(N1)	(N2)	(N3)	(N4)
$\Delta W_{.t}$	$P_f \rightarrow T_f$	$T_f \rightarrow P_f$	$P_f \rightarrow P_{af}$	$T_f \rightarrow T_{af}$	$P_f \rightarrow T_{af}$	$T_f \rightarrow P_{af}$	ne$\rightarrow P$	ne$\rightarrow T$	$P_f \rightarrow P_f$	$T_f \rightarrow T_f$	P$\rightarrow ne$	T$\rightarrow ne$
ΔW_{2007}	-0.1	6.9	25.0	23.5	2.6	23.7	4.3	-103.4	10.2	6.2	20.5	80.5
ΔW_{2008}	-0.3	11.8	22.9	38.6	0.1	40.1	-14.2	-186.2	6.7	8.9	32.5	139.1
ΔW_{2009}	-0.1	6.0	32.7	7.1	-3.3	18.9	-11.6	-76.6	18.2	1.4	19.8	87.5
ΔW_{2010}	-0.1	5.7	39.2	23.0	0.5	18.7	-13.6	-96.7	20.2	6.4	25.4	71.4
ΔW_{2011}	-0.1	8.2	46.6	27.6	0.9	31.5	-23.9	-152.6	24.0	4.3	29.6	103.9
ΔW_{2012}	0.0	5.5	39.1	19.8	2.2	21.4	-12.2	-76.4	18.6	3.5	19.6	59.1
ΔW_{2013}	-0.1	5.3	44.2	20.5	0.2	21.8	-16.7	-75.4	20.0	4.0	16.5	59.7
ΔW_{2014}	-0.9	10.2	59.3	12.4	-15.2	36.5	-46.6	-173.0	32.2	4.8	31.0	149.3
ΔW_{2015}	-0.6	9.1	65.5	12.1	-13.1	32.9	-42.2	-157.3	38.5	1.9	30.6	122.6
ΔW_{2016}	-1.4	15.7	108.5	23.9	-33.5	59.3	-95.6	-315.7	49.8	6.2	49.9	232.8
ΔW_{2017}	-0.4	4.9	48.4	4.6	-10.7	19.3	-29.1	-104.8	28.7	1.1	32.9	105.0
Mean	-0.4	8.1	48.3	19.4	-6.3	29.5	-27.4	-138.0	24.3	4.4	28.0	110.1

Source: UI database (2006-2017).