A Trap for Some, a Stepping Stone for Others: Low-Pay Duration and Transitions out of Low Pay Among Young Labor Market Entrants

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Low-paid workers have a higher risk of unemployment and poverty, and have been a lasting concern of policy makers. We investigate the duration of low-pay spells and transitions out of low pay for labor market entrants, using a discrete-time competing risks framework, weighted by the probability of low-wage entry, to account for different transition paths out of low pay, including firm change. We find that college-educated workers may use low-paid jobs as stepping stones to higher-paid jobs in other firms, or will rapidly evolve into high pay with their first employer. Low-pay jobs may be a trap for the low-skilled, but also a way to avoid extended periods of unemployment. Finally, large firms and knowledge-intensive industries provide more opportunities to leave low pay.

Keywords: low wage, employment, job duration, skills, human capital

JEL codes: J24, J31, J62, J63

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1 Introduction

Low-wage jobs have been a concern of policy makers for a long time (see, for example, Bluestone and Harrison 1988; OECD 1996b, 1997, 2015). This concern may be justified by the evidence that low-paid workers are not only more likely to fall into unemployment and of having repeated spells of unemployment (Stewart 2007), but are also at higher risk of poverty (Sloane and Theodossiou 1996). Furthermore, workers with low paying jobs and the unemployed are also affected by a scarring effect, in which being in a low-paid job has a persistent and recurrent negative influence in their careers (McKnight 1998; Arulampalam, Booth, and Taylor 2000; Arulampalam 2001). These issues become even more relevant in a world where technological change is driving a polarized division of "good" and "bad" jobs (Goos and Manning 2007) in line with the segmented labor market theory (Doeringer and Piore 1971; Reich, Gordon, and Edwards 1973). Besides, the proportion of low-wage workers has been increasing, and this long-term trend has accelerated in recent years (Clark and Kanellopoulos 2013). Thus, understanding the low-wage phenomenon is important to craft suitable policies.

Because young workers are more likely to experience low-wage jobs, we investigate the duration of low pay and transitions out of low pay among young labor market entrants. Though low-pay transitions have seen several efforts in the literature using dynamic models, only a few authors have looked into the duration of low-wage jobs. We aim to contribute to the understanding of low-wage duration and transitions by using a competing risks duration model to simultaneously analyze transitions into different destinations (a similar approach to that of Pavlopoulos and Fouarge 2010). A novelty of our analysis is that, besides simultaneously considering transitions into high-pay or into non-employment, we explicitly distinguish between low-pay transitions inside the company and transitions to other companies. Job changes are important determinants of transitions into and out of low pay (Holzer, Lane, and Vilhuber 2004) and researchers need to properly account for job mobility when studying movements out of the low-wage status. Considering several transition destinations allows us to study how job mobility relates to the careers of young workers (Topel and Ward 1992), and to understand if low-wage jobs are traps or stepping stones into higher-paid jobs (OECD

1997, chap.2; Knabe and Plum 2013).

Our primary focus is how workers' human capital can influence early mobility paths. We also look into how firm characteristics such as size, knowledge intensity and technology intensity relate to transitions out of low pay. We use a large linked employer-employee Portuguese data set (*Quadros de Pessoal*), which includes detailed information on workers and firms. Given that Portugal has some of the highest levels of low-wage persistence in Europe (Menezes, Sciulli, and Vieira 2011; Clark and Kanellopoulos 2013), the country is a natural candidate for the sort of analysis carried in this work.

We also look into the probability of low-wage entry into the labor market among young individuals. In this regard, our work offers another novel contribution to the literature by using predicted probabilities from a model for the likelihood of low-wage employment as weights for the competing risks model, to account for sample selection bias. The probability of labor market entry with a low wage is likely to be defined endogenously, and using weighted models may help deal with endogenous sampling (Solon, Haider, and Wooldridge 2015).

Our results suggest that the likelihood of low-wage entry is reduced by higher levels of human capital. In particular, we find that college graduates and workers in skill-intensive occupations are less likely to enter the labor market earning a low wage. Additionally, employment in larger organizations also lowers the probability of low pay. The competing risks model shows that higher educational attainments and skills are associated with a higher propensity to exit low pay, especially through intra-firm wage progression (and possibly accumulation of firm-specific human capital) but also through inter-firm mobility, using low-paid jobs as a stepping stone. Higher levels of human capital and skill-intensity also decrease the probability of long periods of non-employment. In addition, our results suggest that low-pay jobs may also be a trap for some workers, especially those with less education. But even if it is so, these low-paying jobs provide the opportunity to accumulate human capital, for some workers, thus decreasing the probability of non-employment.

Our findings raise the need for policies to attenuate labor market segmentation, given that knowledge and technology intensive firms, as well as large employers, provide more opportunities for workers to exit the low-wage state.

However, if jobs in such firms are out of reach for the less-skilled, those in the unprotected segment are destined to remain employed in smaller and worse firms where possibilities for high wages dwindle, or else be pushed into long periods of unemployment.

2 Literature on low-pay duration and transitions

Workers may experience wage growth through job retention or job mobility. Wage growth through job retention originates from seniority, as workers become more productive with tenure, receiving on-the-job training and accumulating firm-specific human capital (Becker 1993). The returns to job mobility come from changing employers and moving to better-paying jobs or jobs with better wage-growth prospects. Low-wage workers often find it hard to progress through job retention because of the high, and often involuntary, turnover of low-paying jobs (Parsons 1986; Holzer and LaLonde 2000). The situation is aggravated by the long-run negative influence that involuntary turnover and short tenures have on future earnings, wage growth, and employment (Bartel and Borjas 1981; Neumark 2002).

While Topel and Ward (1992) find that mobility is responsible for part of the wage-growth at earlier career stages, high-paying firms are less accessible to low-wage workers (Andersson, Holzer, and Lane 2005). Some low-wage workers are able to escape low pay, most often by moving to high-wage firms and securing longer-lasting jobs in those firms (Andersson, Holzer, and Lane 2005), using initial low-wage jobs as stepping stones to improve their careers. There is some empirical evidence on the stepping-stone effect in the works of Uhlendorff (2006), Mosthaf, Schnabel, and Stephani (2011), Knabe and Plum (2013), and Cai, Mavromaras, and Sloane (2016). Holzer, Lane, and Vilhuber (2004) find that employer changes play an important role in entries and exits of the low-paid status. However, rather than getting returns to tenure or mobility, most low-wage workers often find themselves in what is called the low-pay, no-pay cycle, alternating between bad jobs and no job at all (Arulampalam 2001; Stewart 2007) or are caught in a low-pay trap where state-dependence is displayed in low-paying, dead-end jobs.

Several have focused on how persistent low-wage employment is and on the

determinants of transitions out of low-wage employment, using mostly household panel surveys. Using the British Household Panel Survey (BHPS), Sloane and Theodossiou (1996) find that women are less likely to move from a low-paying job into a high-paying one, young individuals have a higher likelihood of falling into a low-paying job, and that having more human capital, be it through education or on-the-job training, increases the likelihood of staying in a high-paying job. Also using the BHPS, Stewart and Swaffield (1999) use a bivariate dynamic model for low-pay transitions accounting for selection based on initial conditions (Heckman 1981) and find that transitions are strongly influenced by state dependence. They also conclude that more-educated workers are less likely to remain low-paid and are less likely to move to a low-wage job if they have a high-paid job, whereas women face a higher likelihood of falling into and staying in low pay. Cappellari (2002) uses a similar model to analyze transitions for workers in Italy, and finds that education and gender play a role on low-pay transitions and presents evidence of state dependence (see also Cappellari 2007).

Cappellari and Jenkins (2008) use the BHPS and extend Stewart and Swaffield's (1999) analysis by accounting for several other selection mechanisms, but focus only on men. Clark and Kanellopoulos (2013) find different levels of low-pay persistency in several European countries. Recently, Cai, Mavromaras, and Sloane (2016) used a multinomial dynamic logit model with random effects, also dealing with the initial conditions problem and find the presence of both state dependence and stepping-stone effects in low-pay jobs, but uncover no evidence of a low-pay, no-pay cycle. Even though these studies generally indicate skills and demographic characteristics as the most relevant determinants of low-pay transitions, Pavlopoulos, Muffels, and Vermunt (2012) suggest that errors in wage measurement account for half of the observed transitions, meaning that the low-pay trap is even more prevalent.

The extant literature has studied low-pay persistence from one year to the next, but little attention has been paid to the duration of low-wage employment and how its duration influences transitions out of low pay. Phimister and Theodossiou (2009) study how the duration of low-paid spells differs between men and women and use a competing risks framework to account for transitions to different labor market states in different regressions correcting

for unobserved heterogeneity. Pavlopoulos and Fouarge (2010) analyze the role of labor market institutions on the duration of low pay among young men and how these institutions relate to workers' human capital, using a multinomial logit competing risks model accounting for unobserved heterogeneity. They suggest that in countries with more regulated labor markets and with a more vocation-oriented educational system, general human capital has a larger influence in low-pay transitions whereas in less regulated markets firm-specific human capital determines transitions out of low wage. Their conclusions are, however, limited by a small data set. More recently, Cai (2015) also focused on the duration dependence of low pay using Australian data, and concluded that there is negative duration dependence — the longer workers are in a low-paying job, the less likely it is that they will leave that state.

We build on these three previous contributions in the analysis of low pay duration and transitions with some advantageous distinctions. The previous works use smaller samples which might have limited the statistical significance of some results. This does not happen in our analysis given the large data set we use. Our methodology is also innovative, by modeling low-pay transitions using a multinomial model weighted by the probability of entering the labor market earning a low wage. This allows us to mitigate bias that might arise from the endogeneity of low-wage labor market entering. Finally, we analyze not just transitions out of low pay into high pay or unemployment, but we also describe the paths into high pay by considering intra-firm upward mobility or wage growth through moves to other companies. Previous works did not provide details on the origins of the transitions to higher pay.

3 Data for transitions and duration of low-paid employment

3.1 Definition of low pay

While there is a considerable body of research on low-pay persistence and transitions, there is still no consensus on what constitutes low pay. According to Sloane and Theodossiou (1996) the definition should depend on the objectives of the study at hand: if one wants to study low pay in a context

of poverty, then an absolute measure such as the third decile of the wage distribution should be used; if equity is the major concern of the analysis, then a relative measure such as some percentage of the median wage should be used (see also OECD 1996a, for a discussion on low-pay definitions).

Given the lack of a consensual definition, it has become commonplace to analyze low pay using more than one definition. For example, Stewart and Swaffield (1999) use three thresholds: half of the median, two-thirds of the median, and half of the mean wage. Cappellari (2002) uses the first quintile and the third decile. The first quintile is also used in Cappellari (2007). Mason and Salverda (2010) and Clark and Kanellopoulos (2013) use the two-thirds of the median threshold for international comparison. Clark and Kanellopoulos (2013) also use the bottom three deciles. Using Portuguese data, Vieira (2005) uses three thresholds: two-thirds of the median, the first quartile, and the bottom three deciles.

The two-thirds of the median wage is perhaps the most common threshold in the literature. Some of the advantages of this measure are that it has been adopted by international organizations such as the OECD (1996b), it makes a comparison with other works possible, and because it is a relative measure it allows for changes in the distribution of low pay over time.[1] As can be seen in Table 1, the two-thirds of the median threshold in our data, however, is too close to the minimum wage (especially in the most recent years) to be used in our analysis. The minimum wage compresses the wage distribution from the left side, and using the two-thirds of the median would result in a narrow definition of low pay as well as many transitions out of low pay caused by small wage increments. Thus we choose the 30th percentile of the wage distribution, which is around 25% to 30% higher than the minimum wage in most years.

A further issue to consider when identifying workers as low-paid is how to measure wages. In the literature, hourly wages are often preferred because both part-time and full-time workers can be included in the analysis. An argument can be made that part-time workers should not be directly compared to those working full-time when studying low-pay duration because part-time workers have considerably different and less stable attachments to the employer. We exclude part-time workers for this reason. Our data

[1] See also Mason and Salverda (2010) for a more detailed discussion of this threshold.

Table 1: Minimum wage and low-pay thresholds (€)

Year	Minimum wage	$\frac{2}{3}$ Median	30th percentile
2002	436.59	471.88	567.51
2003	433.43	470.19	567.52
2004	434.08	472.76	564.69
2005	434.97	468.53	565.35
2006	434.46	472.32	563.95
2007	442.86	475.77	570.72
2008	456.31	485.77	587.08
2009	486.06	506.08	611.90
2010	505.98	519.49	635.95
2011	498.43	504.83	617.34
2012	485.00	500.37	612.20

Note: Wages adjusted to inflation using the Consumer Price Index, base 2012.

include information on monthly wages (the salary structure in Portugal is based on monthly wages) and monthly hours worked. However, the information on the number of hours worked is often not as reliable as that for wages. We experimented with definitions of low pay using monthly wages and hourly wages, and found that, while many workers are identified as low-paid in both cases, there is still considerable variation. Thus, in our sample, an individual is identified as being low-paid if she is a full-time worker earning a wage (including overtime) in the 3rd decile of the wage distribution of all full-time workers. Wages are adjusted for inflation using the Consumer Price Index (CPI), base 2012.

3.2 Sources of data and sample composition

We use the *Quadros de Pessoal* (QP) data set, a longitudinal matched employer-employee data set covering the Portuguese economy. The data originate from a mandatory yearly survey that every company with at least one paid employee submits to the Portuguese Ministry of Employment and Social Security since 1985. The data set does not include some sectors of the economy such as the primary sector and parts of Public Administration or the military. On average, there are around two million worker observations each year, and information on workers includes age, gender, schooling, tenure, labor status, and job assignment. Additionally, each worker has a unique identification number allowing for the mapping of workers' job-to-job flows. Information on firms includes region, sector, date of foundation, and

legal structure. Given the data's extension and detail, it can be used to study issues requiring large samples while controlling for several heterogeneity factors.

Compared to the data used by many of the previous studies on low-pay transitions which have used household panel surveys, the *Quadros de Pessoal* data present some advantages for this type of research. Its dimension, both in terms of the number of individuals covered and the number of observations per worker, allows us to follow workers for several years. Often, studies using household panels have to deal with the issue of panel attrition. Given the mandatory nature of the QP, problems with attrition are much reduced. However, when individuals do not show up in our data, we are left to make assumptions as to what their current state is, because we cannot unambiguously say that the subject is in unemployed. Many of the household panels have information even when the individual is out of the labor market. Commonly, one can also find family background information in the household panels. This is also lacking in our data set.

Our sample is composed by labor market entrants (no previous experience registered in the data set), joining the labor market as full-time paid employees before completing their 30th. Restricting the analysis to young labor market entrants brings an advantage in terms of identification, given that employers have little information about a worker's ability other than education and other observable characteristics, and will make hiring decisions largely based on its signaling effect (Farber and Gibbons 1996).

The period covered in our sample goes from 2002 to 2012. Our data's yearly nature gives rise to an inherent difficulty in identifying labor market entrants. Working spells that begin and end between the dates of two consecutive yearly surveys would not be registered in the data. Given that young people and especially young low-wage workers are more likely to experience shorter employment spells, some individuals in our sample might have had previous employment relationships and are not technically labor market entrants. To estimate our models, we require complete job spells, with one observation for every year since the worker joins the labor market until he experiences either a transition out of low pay or out of the first firm (Allison 1984). We limit the sample to the workers' first job spell. Additionally, because we are interested in the duration of low-pay spells and not of working spells, if a

worker leaves low pay but remains in the same firm the low-wage spell ends and the following observations are censored.

Occasionally, in the original data there are some gaps between the start and end of a spell. Whenever reasonable, we fix these gaps assuming most data is unchanged. For example, if the worker is in a given firm in year t and in year $t+2$, and the admission date is the same in both periods, but no observation exists for year $t+1$, this gap will be fixed using data from the observation in year t. After correcting or removing invalid or incomplete observations, we get our working low-wage sample with 780,313 observations, corresponding to 479,724 workers in 154,131 companies. We also use a sample composed by high-wage labor market entrants created according to the same criteria. It amounts to 1,157,731 observations of 456,438 workers in 98,361 firms.[2]

For each observation, we determine the transition destination by looking at the spell's next observation. There are five possible categories for transition destinations: 1) the worker is still in the same company as a low-paid employee; 2) the worker is still in the same company but is no longer low-paid; 3) the worker leaves the current company and, in two years or less, joins another firm as a low-paid employee; 4) the worker leaves the current company and, in two years or less, joins another firm as a high-paid employee; 5) the worker leaves the current company and if there are no observations in the two following years he will be classified as having gone to non-employment.[3] We can also identify transitions from paid-employment into business ownership. This is, however, an uncommon case among labor market entrants in our sample, and so workers who experience such transitions are not included, reducing the number of possible transition destinations for the sake of parsimony and ease of estimation.

3.3 Descriptive statistics

In Table 2 we present descriptive statistics for the more relevant variables in our work. It reveals that women are slightly more prevalent in the sam-

[2]The number of observations in the high-wage sample is higher because it is composed of full working spells, rather than high-pay spells. The number of individuals is, nonetheless, very similar.

[3]We cannot identify if the individual became unemployed, inactive, self-employed or if she joined one of the sectors not represented in the *Quadros de Pessoal*.

ple of low-wage entrants than in the high-wage sample (46% versus 43% of the observations). Low-pay entrants are younger than high-wage entrants, by almost two years. This age difference can in part be explained by the different academic achievements of both groups. While 68% of the low-wage observations have less than 12 years of schooling and did not conclude high school before joining the labor market (similar to the sample of all full time workers), among high-pay entrants no more than 34% have a basic level of education. About 36% of the high-wage entrants have at least a college-level education, compared to just 5% of low-wage entrants (a share considerably smaller than that observed among the full sample). Portugal has a relatively uneducated population, but, as is to be expected, the concentration of low-education workers is higher among the group of low-paid labor market entrants.

Low-pay entrants also seem to take longer to join the labor market since finishing school (6.7 years) than entrants in high-paying jobs (5.9 years), even though the former are younger and less-educated. In broad terms, this variable is defined as the difference between the worker's age when she first appears in the data set and the years of schooling required to attain her stated education level plus six more years. One caveat to this definition is that, given possibility of interval-censoring derived from the yearly nature of our data, the worker might have already had (several) short prior working experiences that were not recorded in the survey. This may be common especially among low-skilled workers who are more susceptible to engage in less stable job relationships with shorter durations or in more informal employment arrangements. Thus, the assumption that a worker's first observation in the data set corresponds to the first employment relationship may often lead to measurement error, and the interpretation of the variable "years from school to labor market" should be done with care as we believe that it may be overestimated. Additionally, low-ability individuals may spend more years in school to achieve a given education level. This may also overestimate years from school to the labor market. With these explanations, it is possible that low-wage entrants are less skilled and less able to find employment, spend more time searching for employment or have intermittent and short job spells, and thus require a longer period of time since leaving the

Table 2: Descriptive statistics for labor market entrants and all full-time workers

	Low-wage entrants	High-wage entrants
Female	0.46	0.43
	(0.50)	(0.50)
Age	21.79	23.79
	(3.31)	(3.05)
Basic education	0.68	0.34
	(0.47)	(0.47)
High school	0.27	0.31
	(0.45)	(0.46)
College	0.05	0.36
	(0.21)	(0.48)
Years from school to labor market	6.74	5.86
	(4.17)	(3.71)
Managers	0.00	0.02
	(0.06)	(0.13)
Intellectual and scientific workers	0.02	0.19
	(0.14)	(0.40)
Technicians	0.04	0.14
	(0.19)	(0.35)
Clerical support	0.11	0.18
	(0.31)	(0.38)
Service and sales workers	0.34	0.21
	(0.47)	(0.41)
Craft workers	0.19	0.11
	(0.39)	(0.32)
Plant and machine operators	0.08	0.05
	(0.27)	(0.23)
Elementary occupations	0.20	0.08
	(0.40)	(0.27)
Tenure	2.10	2.54
	(1.87)	(2.15)
Permanent contract	0.32	0.25
	(0.47)	(0.44)
Company age	10.70	11.80
	(16.56)	(19.80)
Firm size (1–9 employees)	0.36	0.18
	(0.48)	(0.39)
Firm size (10–49 employees)	0.29	0.26
	(0.45)	(0.44)
Firm size (50–249 employees)	0.17	0.23
	(0.38)	(0.42)
Firm size ($\geq$ 250 employees)	0.18	0.32
	(0.38)	(0.47)
High-tech manufacturing	0.02	0.04
	(0.14)	(0.20)
Low-tech manufacturing	0.19	0.10
	(0.39)	(0.30)
Knowledge-intensive services	0.13	0.30
	(0.34)	(0.46)
Less knowledge-intensive services	0.42	0.34
	(0.49)	(0.47)
Foreign-owned equity ($\geq$ 5%)	0.08	0.15
	(0.27)	(0.36)
Number of observations	780,313	1,157,731
Number of individuals	479,724	456,438
Number of firms	154,131	98,361

Note: Mean values, and standard deviations (in parentheses). All variables are dummies, except worker's age, tenure, years to labor market, and company age. Statistics for low-wage and high-wage entrants computed at the beginning of the observed spell of each worker, except for tenure. Statistics for company age computed for the first observation of each firm in the sample.

educational system to join the labor market.[4]

In the data, occupations are classified according to the International Standard Classification of Occupations (ISCO-08). Knowledge-demanding occupations such as intellectual and scientific, technical, or clerical jobs are preferred by high-wage entrants (19%, 14%, and 18% respectively), whereas low-wage labor market entrants are mostly concentrated among service and sales occupations (34%) and other elementary occupations (20%). Only around 6% of low-wage workers hold skilled occupations such as management or scientific, technical or knowledge-based jobs.

Low-pay entrants, on average, experience a job separation event after 2.1 years, sooner than high-pay workers (2.5 years), resulting in shorter working spells. Compared to the whole full-time working population (over seven years), both groups of entrants have much shorter tenures, aligned with the stylized fact that most new jobs end early, especially among the young (Farber 1999). This may be related to the smaller share of labor market entrants who have a permanent contract relative to all full-time workers. Around 32% of low-wage entrants, and only 25% of high-wage entrants have a permanent contract. These figures contrast with what is found in the whole economy, where 58% of full-time workers hold a permanent contract. This difference is to be expected, given that firms hiring individuals who recently entered the labor market may be less willing to commit to a permanent contract, but it is surprising that the percentage is higher for low-wage entrants than it is for high-pay entrants. A possible explanation may be linked to composition effects of the different kinds of occupations chosen by each group. We will come back to this issue when discussing our results.

Low-pay entrants are employed in younger firms, in line with findings that younger firms pay smaller wages (Brown and Medoff 2003). Most low-wage entrants work in small firms, whereas high-wage entrants are more concentrated in firms with over 250 employees — large firms pay higher wages on average (Oi and Idson 1999). High-pay entrants are more likely to be employed in firms with at least 5% of equity owned by foreign entities, also possibly related to the larger size. Though the largest share of full-time em-

[4]This variable was not computed for the whole sample because for many workers who were already employed before our observation period begins it is not trivial to identify when they joined the labor market. Even if we were to adopt some reasonable assumptions, it would often lead to some guess work and more measurement error in a variable that is already prone to such issues.

ployment in the Portuguese economy is in the less knowledge-intensive services sector (35%), the percentage of low-wage entrants in this sector is eight percentage points higher in comparison to high-wage entrants (42% versus 34%). Indeed, the share of high-wage young workers in knowledge-intensive firms (30%) is close to the share in less knowledge-intensive industries.[5] Employment in low-technology manufacturing companies also represents a considerable share of low-pay workers, accounting for 19% individuals in our low-wage sample. The proportion of high-pay entrants in high-tech (4%) is twice as large compared to the share among all full-time workers, but it is nonetheless a minute value in line with Portugal's industrial composition. This distribution of workers across industries is in line with the distribution across occupations discussed earlier, in that low-paid workers are employed in sectors where low-skilled jobs are more common.

Table 3 presents the distribution of transitions for every individual in our low-wage sample, at the end of a low-pay spell. We compute the distribution at the end of the spell to determine the final destination, because the "low wage, same firm" state is the base state and does not correspond to a transition destination by itself. The table shows that the most frequent transition destination when a low-paying working spell ends is to long-term non-employment, representing almost 40% of the cases, suggesting a low-pay no-pay cycle (Stewart 1999).[6] Our data shows that there is a considerable amount of low-wage persistence, where around 32% of the individuals do not leave the low-pay state in the observed period. Most of such workers (21%) leave their current firm to join another firm but do not considerably improve their wage and remain in the low-pay state; the remaining 11% are workers who do not experience any kind of transition during the observed period (in duration models' parlance, these workers are said to be censored when observation ends). Nonetheless, about 28% of the individuals in our sample experience a transition to a high-wage job, with wage increases in the current firm accounting for the majority of such transitions (15%). The scenario is bleak for low-paid labor market entrants if we consider that almost 72% of them either could not get out of the low-wage state or ended up not being

[5]Industries aggregated according to technology and knowledge intensity, following OECD's classification (Hatzichronoglou 1997).

[6]In our sample, long-term non-employment occurs when a worker is not present in our sample for at least two years after the spell under analysis is over.

employed. These results point to both the existence of a scarring effect of low-paid jobs for some workers, but also to a stepping-stone effect for others.

Table 3: Distribution of low-pay transition destinations

Transition destination	Frequency	Percentage	Cumulative percentage
Low wage, same firm	51,431	11.31	11.31
High wage, same firm	69,072	15.19	26.50
Low wage, different firm	97,209	21.37	47.87
High wage, different firm	59,927	13.18	61.05
Non-employment	177,169	38.95	100.00
Total	454,808	100.00	100.00

Note: Computed at end of spell.

In Table 4 we can see in more detail how tenure relates to our transition destinations. The figures in the table reinforce the idea of a low-wage trap. As tenure grows, the proportion of workers who maintain their wage position in the firm increases, which suggests a negative duration dependence of low-pay. Most transitions out of low-wage occur during the first year on the job, with about 29% of transitions being into long-term non-employment, and only about 19% into high-wage employment. Years spent on the job noticeably reduce mobility, and transitions to other firms are more common during the first year on the job. Those who move to another firm are more likely to find another low-paying job (15.3%) than they are of improving their wage situation (9.7%). There is also a considerable drop in the share of workers who go into long-term non-employment after the first year of tenure when poorer employer-employee matches are weeded out. However, tenure does not seem to increase the likelihood of significant pay-growth in the same firm that allows a worker to leave the low-wage state. While the share of transitions to high-wage in the same firm increases slightly from the first year to the second (from 8.9% to 9.7%), the percentage progressively drops with each additional year. Thus, while permanence in a low-wage job and accumulation of firm-specific skills may be a way to avoid non-employment, it seems to increase the persistence of low pay.

The distribution of transition destinations by level of education (Table 5) shows that low-wage entrants with a college education are more likely to experience a transition into a high-wage job than to non-employment (48% versus 32%), but for the two other education levels non-employment is the predominant transition destination (35.4% for those with a high school diploma, and

Table 4: Distribution of low-pay transition destinations by years of tenure (%)

	Tenure						
Transition destination	1	2	3	4	5	≥ 6	Total
Low wage, same firm	37.13	57.56	64.20	69.43	72.38	77.84	48.31
High wage, same firm	8.85	9.56	9.12	8.21	8.17	6.48	8.85
Low wage, different firm	15.25	10.42	8.50	7.09	5.92	4.38	12.46
High wage, different firm	9.71	6.16	4.88	3.65	3.06	1.80	7.68
Non-employment	29.06	16.30	13.31	11.63	10.47	9.50	22.70
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

40.9% for those without one). Additionally, education increases the proportion of transitions to high-wage, but this difference is especially noticeable in transitions to high-paid jobs in different firms amounting to a gap of eight percentage points between workers with no more than a high school diploma and college graduates (from 14.8% to 22.8%). This suggests that college graduates use low-wage jobs as a stepping stone into high-pay, taking on low-paying jobs to acquire skills and labor market experience, and then either moving to other firms offering higher wages or by improving their wage with the initial firm. For less-educated workers, however, low-paid jobs offer few opportunities for breaking the low-pay, no-pay cycle.

Table 5: Distribution of low-pay transition destinations by level of education (%)

Transition destination	Basic	High school	College
Low wage, same firm	11.31	11.86	7.97
High wage, same firm	13.11	18.76	24.71
Low wage, different firm	22.86	19.20	12.27
High wage, different firm	11.86	14.83	22.83
Non-employment	40.85	35.35	32.23
Total	100.00	100.00	100.00

Note: Computed at end of spell.

Table 6 provides the transition distribution for the more relevant occupations in our sample. We see that low-wage workers in more skills-demanding occupations such as intellectual, scientific, or technical jobs are less likely to go to long-term non-employment than workers in other occupations. Moreover, the share of transitions to high-wage among knowledge occupations is much higher than in other occupations, with transitions to high-wage in the initial firm accounting for over 24% of the changes, and transitions to high-wage in a different firm representing about 18% of the total. Sales and

services workers have a higher probability of going to non-employment and also of low pay in a different firm. This is to be expected given the typically unskilled nature of jobs in this category.

Table 6: Distribution of low-pay transition destinations by occupation (%)

Transition destination	Intellectual & scientific	Technicians	Service & sales workers	Craft	Plant & machine operators
Low wage, same firm	9.05	9.03	10.99	12.08	13.72
High wage, same firm	25.37	24.38	12.53	17.76	15.08
Low wage, different firm	13.06	14.99	23.73	20.41	23.35
High wage, different firm	18.77	18.58	12.88	12.92	9.96
Non-employment	33.75	33.02	39.87	36.83	37.89
Total	100.00	100.00	100.00	100.00	100.00

Note: Computed at end of spell.

In general, our descriptive results point to an important role of human capital in determining transitions out of low pay: more-educated workers or workers in skill-demanding occupations have a higher likelihood of improving their wage state and also of moving to other companies for better pay. There seem to be three dominant paths presented to young workers in low pay: most unskilled workers may alternate between short periods of low pay and long-term non-employment; some less-skilled workers may break the cycle of low-pay, no-pay by accumulating firm-specific skills, but end up trapped in the low-wage state; or for skilled workers, in knowledge-demanding jobs, low-pay jobs may function as a way to acquire experience and skills that will allow them to rapidly improve their wage situation.

4 Model for low-pay duration and transitions

We apply a discrete-time duration model with multinomial competing risks to understand how transitions of labor market entrants out of low-pay are influenced by general human capital and by a low-pay duration dependence. The competing risks framework allows us to consider several possible transition destinations rather than just modeling transitions from low pay into high pay. Thus, we model transitions from low pay into the following destinations: high pay in the same firm, low pay in a different firm, high pay in a different firm, and into long-term non-employment. Naturally, workers can also remain as low-paid employees in the first firm.

We expect that more-educated workers have a higher probability of leaving low pay, be it either through wage growth inside the firm or by moving to a different firm and get better pay. We anticipate that the accumulation of firm-specific human capital, measured through tenure, increases the likelihood of leaving low pay by getting a higher wage in the same firm. The accumulation of firm-specific human capital also decreases the probability of leaving the company, be it to join another firm with a low-paying job, to join another firm with a high-paying job, or to go to non-employment. Additionally, we expect the relationship between tenure and the probability of getting a higher pay inside the firm to become stronger as the level of education rises, and inversely the relationship between tenure and the likelihood of leaving the firm to become more negative for higher levels of education.

Because our data are yearly, we cannot identify the exact moment of transition. We only know that the transition might have occurred in a one-year interval. This interval-censoring results in ties when determining the moment of transition, which can lead to biased estimates (Jenkins 1995). Allison (1984) suggests that using discrete-time models can help circumvent this problem. For competing risks models with discrete periods of observation, and if the data are arranged so as to have, for each worker, the same number of observations as the number of time-intervals the subject is at risk of transitioning out of the base state (Jenkins 1995), one can either estimate a logit or probit model for each destination separately (similar to Cai 2015), or use a multinomial formulation so as to model all destinations simultaneously (Allison 1984). Our choice is a multinomial logit allowing each destination to be related with the others. Pavlopoulos and Fouarge (2010) use a similar formulation. The duration dependence is modeled as a piecewise-constant function (Meyer 1990), where one assumes that within each interval the hazard rates are constant, allowing it to be as flexible as possible.

With m possible transition destinations, the multinomial logit model specifies that the probability of worker i transitioning from low pay to destination j is given by:

$$p_{ij} = \frac{\exp(\mathbf{x'}_i \boldsymbol{\beta}_j)}{\sum_{l=1}^{m} \exp(\mathbf{x'}_i \boldsymbol{\beta}_l)}, \qquad j = 1, ..., m \tag{1}$$

where $\mathbf{x}_i$ is the vector of regressors, and $\boldsymbol{\beta}_j$ are the parameters to be estimated

for each destination. The model is identified when one of the $\boldsymbol{\beta}_j$ is set to zero for one of the destinations. Our base case is when no transition occurs and the worker stays in the same firm and remains low-paid. The model coefficients are thus interpreted with respect to the no transition state.

Unobserved heterogeneity may influence the transition probabilities as well as the duration dependence (Lancaster 1990). If unobserved heterogeneity is not accounted for, the likely negative duration dependence of staying in low pay is overestimated if more able individuals leave earlier than others, and coefficient estimates are underestimated. Some authors have used random effects models to account for unobserved heterogeneity when estimating low-pay transition models (Phimister and Theodossiou 2009; Pavlopoulos and Fouarge 2010). However, given that a large proportion of the individuals (67.7%) in our sample have spells that only last one period, random effects models are not adequate for our analysis as the parameters of the random effects distribution cannot be determined correctly.

Additionally, the initial selection of labor market entrants into low-wage jobs is not random and is likely to be influenced by observed and unobserved characteristics of the individual. Those same characteristics may also influence transitions out of low pay in subsequent periods (an initial conditions problem — see Heckman 1981). The initial conditions problem in dynamic models of low-pay transition has usually been dealt with by treating it as an endogenous sampling problem in the spirit of Heckman (1979) by estimating simultaneously the transition model and the sample selection model (see Stewart and Swaffield 1999; Cappellari and Jenkins 2008). To our knowledge, however, no solution for sample selection exists for discrete-time multinomial competing risks duration models such as ours. Instead, to account for the initial selection into the low-pay group we estimate the probability of entering this group at the beginning of the spell. The information from the selection model can then be used to mitigate the possible bias, using the reciprocal of the estimated probability as a weight for each observation in the main multinomial model. Solon, Haider, and Wooldridge (2015) suggest that weighting may help in cases where endogenous sampling is present.

5 Results

5.1 Probability of low-wage entry

We obtain the weights for the transition model from a logistic regression for the probability of an individual having a low-wage job at the beginning of a career. The reciprocal of the predicted probability for each individual is used to weight that worker's contribution to the likelihood function of the multinomial low-pay transition model. To estimate the probabilities of entering the labor market with a low wage, we use a sample composed by the first observation (corresponding to the first year of tenure) of all labor market entrants under the age of 30, male and female, including both low-wage and high-wage individuals. The objective is to be as close as possible to the initial conditions that each worker faces when entering the labor market, including the competition from other young workers.

The low-pay probability model has regressors for the worker, the firm, and the economy given that all take part in the determination of wages. On the worker side, we include a control for gender, to account for differences in labor market participation expectations and the gender wage gap. We also control for the usual human capital variables for wage models such as age and education, as well as occupation, hierarchical level, and an indicator for permanent contracts. To incorporate additional pre-labor market characteristics (Heckman 1981), we add the number of elapsed years since an individual finishes school until she finds employment. This variable will function as a (partial) measure for unobserved ability, and search intensity or willingness to participate in the workforce. On the firm side, the model controls for the number of employees and firm age, the presence of foreign-owned equity (at least 5%), and the company's legal structure. Industry effects are captured by two-digit NACE codes, regional effects are controlled by the yearly regional unemployment rate (NUTS II level), and other macroeconomic trends are controlled by the yearly Gross Domestic Product growth rate.

Some firms pay systematically higher wages, even after controlling for observed characteristics (Abowd, Kramarz, and Margolis 1999). These differences may arise from, for example, firm strategy, the quality of management, human resource practices, or company culture. To account for the firms wage paying behavior in our model for the probability of low-wage labor market

entry, we estimated a Mincerian (Mincer 1974) wage regression with firm fixed effects, and several firm and worker controls.[7] This further lets us separate how much of the probability of entering the labor market is due to the workers ability and how much is due to firm characteristics. From this model, we estimate a firm-level residual to be included in the probability model in the form of a categorical variable identifying its quartiles. Following Kramarz, Lollivier, and Pelé (1996), we call it a global firm fixed-effect to measure firm-specific pay policies. It captures the firm "pure" effects — what would come from Abowd, Kramarz, and Margolis (1999) — plus the average of the firm's workers specific effects (weighted by the workers' job duration; see Abowd, Kramarz, and Margolis (1999) for a discussion). It can be interpreted as the compensation policy plus the success of the hiring and retention policy concerning the attraction of high-ability workers. The sample used to estimate this regression is composed of all employees working in the firm in the previous five years before a worker in the entrants sample joined the company. The year the worker joined the company is excluded to avoid simultaneity between the wage estimations and the low-pay transitions estimations. Because of the way the sample is built, the residual cannot be estimated for new firms — a firm that, in the year of its foundation, employs one of the workers in the low-pay entry sample has no history before entry of the low-wage worker. Thus, the categorical variable of the firm-level residual quartiles includes a fifth level identifying such firms for which we could not obtain the firm-fixed effect.

We display the marginal effects for the probability of starting a career in a low-wage job in Table 7. Female labor market entrants are more likely to receive a low wage (by about 12.2 percentage points), confirming the gender-pay gap at the beginning of a career. Age has a negative contribution to the probability of a low wage: each additional year lowers the probability by about four percentage points (p.p. henceforth). Though older labor market entrants are less likely to be low-paid, all else equal, there is a penalty for each year spent between finishing school and entering the labor market of 1.7 p.p. Older entrants may have acquired some labor market experience not previously registered in the data set, but the time needed to enter the labor

[7]Firm's region, industry, log number of employees, log sales, legal structure, presence of foreign equity, worker's gender, years of education, job level, occupation, tenure and years of labor market experience, as well as year dummies.

market may also signal low ability or a lower willingness to participate in the workforce.

While high school graduates appear to have only a small difference compared to those with basic education, workers with a college degree are 15.3 percentage points less likely to be low-paid. Tertiary education positively contributes to avoid low-paying jobs and gives access to better working opportunities. Similarly, those hired to more knowledge-intensive and skill-demanding occupations such as management, or scientific, intellectual and technical jobs have a much lower probability of working in a low-wage job (between 32 p.p. and 28 p.p. lower). Service and sales workers, the most common occupation in this sample, have a smaller advantage in avoiding low-wage, compared to workers in elementary occupations. Workers with permanent contracts have a slightly higher probability of entering the labor market with a low pay of 1.6 p.p. over individuals with fixed-term contracts. A possible explanation can be that workers are trading higher wages for job security, or perhaps firms are offering lower wages initially in return for the promise of wage growth and higher lifetime returns to induce effort.

The probability of getting a low-paid job also decreases with firm size, in line with another stylized fact stating that larger firms pay higher salaries (Brown and Medoff 1989). Working in firms with at least 250 employees decreases the likelihood of getting a low wage by about 14 p.p. High-tech manufacturing, and, to a lesser extent, knowledge-intensive services jobs reduce the probability of getting a low-wage, compared to entrants in less knowledge-intensive services firms. Employment in firms with at least some foreign capital also seems to lower the probability of entering the labor market with a low wage, likely related to the stylized fact that foreign firms pay higher wages. As expected, the likelihood of a low-pay job greatly decreases with the firm's wage paying behavior.

Overall, we find that skilled workers are less likely to join the labor market earning a low wage, and that knowledge-intensive professions offer a clear advantage over elementary occupations. We also find that employment in large firms, firms with some foreign control, and high-paying firms lowers the likelihood of a low-wage. It should be noted that these findings related to firm characteristics may also be linked to unobserved worker ability if such firms hire better workers and select on quality (Idson and Feaster 1990;

Table 7: Average marginal effects for probability of low-wage entry

Female	0.122***
	(0.001)
Age	−0.042***
	(0.001)
High school	−0.011***
	(0.003)
College	−0.153***
	(0.004)
Years from school to labor market	0.017***
	(0.000)
Intellectual and scientific	−0.318***
	(0.004)
Technicians	−0.278***
	(0.003)
Clerical support	−0.176***
	(0.003)
Services and sales workers	−0.069***
	(0.002)
Craft	−0.131***
	(0.003)
Plant and machine operators	−0.121***
	(0.003)
Permanent contract	0.016***
	(0.001)
Firm size (10–49 employees)	−0.105***
	(0.002)
Firm size (50–249 employees)	−0.135***
	(0.002)
Firm size ($\geq$ 250 employees)	−0.160***
	(0.002)
High-tech manufacturing	−0.054***
	(0.004)
Low-tech manufacturing	0.084***
	(0.002)
Knowledge-intensive services	−0.004**
	(0.002)
Foreign-owned equity ($\geq$ 5%)	−0.044***
	(0.002)
2nd Quartile Firm FE	−0.131***
	(0.002)
3rd Quartile Firm FE	−0.250***
	(0.002)
4th Quartile Firm FE	−0.400***
	(0.002)
Young firm	−0.152***
	(0.002)
Number of observations	922,823
Log likelihood	-458,798.3
Wald $\chi^2(42)$	210,888.8
Prob $> \chi^2$	0.000

Note: Dependent variable equals one if the worker enters the labor market with a low pay, and zero otherwise. Average marginal effects for logit model, computed at the means of other variables. Robust standard errors in parenthesis. Regression includes controls for job level, other occupation classes, firm's legal structure, log firm's age, GDP growth rate, and regional unemployment rate. Additional statistics are for the logit model. Base case is a male worker, with a basic level of education, in an elementary occupation in a less knowledge-intensive services firm with fewer than 10 employees.
*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Heyman, Sjöholm, and Tingvall 2007).

5.2 Transitions out of low pay

We estimate the weighted multinomial logit model using maximum likelihood. The competing risk framework includes five possible destinations: stay in the same firm as (1) low-wage or (2) progressing to high-wage; moving to another firm, either as (3) low-wage or as (4) high-wage, or moving to (5) non-employment. Besides the variables of interest at the worker and firm levels, the model controls for other characteristics of the worker and the firm, as well as macroeconomics variables. For the worker we include age at entry (and its square), and other occupation codes. For the firm, we control for the logarithm of the firm's age when the worker joined the firm, the type of legal structure, and a categorical variable for the quartiles of firm-level residual obtained from a wage regression as described below. Finally, the contemporaneous Gross Domestic Product growth rate and the regional rate of unemployment account for variation in macroeconomic trends.

The transition probability of an individual may also be influenced by unobserved firm-level heterogeneity. Indeed, Andersson, Holzer, and Lane (2005) find that workers in firms with a high wage premium are more likely to transition out of low-pay status. As in the model of low-pay entry, we include a categorical variable identifying the quartile of the firm-level residual obtained from a wage regression with firm fixed effects in the transition model to account for unobserved firm characteristics.

Table 8 provides the estimated average marginal effects for the relevant variables in the weighted transition model.[8] The results show that women are significantly more likely than men to remain in the low-wage state: there is a 3.8 p.p. difference in the probability of staying in the firm as low-wage, and a 2.4 p.p. higher probability of moving to a different firm while still being low paid. We also see a small but significant increase in the likelihood of going into non-employment for women. Young women are thus even more at risk of persistent low-wage than men are, with lower prospects of significant increases in wages. Older labor market entrants also have less favorable prospects: entering the labor market at a later age decreases the likelihood

[8]See Table A in the Appendix for the marginal effects of the unweighted model.

of staying in low-wage in the initial firm (by 0.8 p.p. per year), but it seems that mostly this will lead to exits into non-employment, with an increase in probability of 0.9 p.p. for each additional year. Joining the labor market later in life may, all else equal, signal a lack of ability or willingness to work to employers who will be less interested in keeping such workers in their ranks.

Compared to workers with a basic level of education, it is apparent that more education not only decreases the likelihood of staying in the firm as a low-paid employee, it also increases the probability of getting a high-paying job, both in the same firm or in another one. This premium for education is especially high for college educated individuals. Having a college education increases the probability of high-pay in the initial firm by more than it increases the probability of high-pay in a different firm (12 p.p. versus 7.8 p.p.). A higher level of education also decreases the probability of leaving the firm to a low-paying job or to non-employment. It is important to note that the marginal effects of education on transitions to high-wage significantly increase as the educational level increases, revealing a difference between college and high school graduates of around seven percentage points in both high wage destinations. This suggests that firms may be more invested in keeping more educated workers from leaving, but also that these workers are in higher demand in the labor market.

Workers in intellectual and scientific occupations are ten p.p. more likely to experience wage improvement inside the firm than those in elementary occupations, the largest premium in our occupation results. They also have a smaller (two p.p.) but significant increase in the likelihood of transitioning to a high-wage job in a different firm. Technical occupations also increase the probability of leaving the low-wage state, both inside the firm (8.5 p.p.) and outside (3.1 p.p.). It is interesting to note that the marginal effect for moving to another firm with a high-paying job is higher for technicians than for intellectual workers (the difference is statistically significant at the one percent level). Scientific, intellectual, and technical jobs are typically highly skilled and knowledge-intensive. Even though firms may initially hire such workers to a low-paying position, possibly during a training period, they will eventually promote these workers out of the low-wage state so as to secure their investment in training.

As expected, workers with a permanent contract have a lower likelihood of

Table 8: Average marginal effects for low-pay transitions

	Low wage, same firm	High wage, same firm	Low wage, different firm	High wage, different firm	Non-employment
Female	0.038***	−0.040***	0.024***	−0.028***	0.005***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
Age at entry	−0.008***	0.001***	−0.004***	0.001***	0.009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
High school	−0.001	0.036***	−0.012***	0.013***	−0.037***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
College	−0.109***	0.120***	−0.031***	0.078***	−0.058***
	(0.005)	(0.004)	(0.002)	(0.004)	(0.003)
Intellectual and scientific	−0.043***	0.100***	−0.031***	0.021***	−0.048***
	(0.007)	(0.006)	(0.004)	(0.004)	(0.005)
Technicians	−0.040***	0.085***	−0.029***	0.031***	−0.047***
	(0.005)	(0.004)	(0.003)	(0.003)	(0.004)
Clerical support	−0.004	0.054***	−0.022***	0.021***	−0.049***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
Service and sales workers	−0.021***	0.016***	0.007***	0.016***	−0.018***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
Craft	−0.002	0.044***	−0.014***	0.004***	−0.032***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
Plant and machine operators	0.024***	0.016***	−0.012***	−0.003*	−0.025***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
Permanent contract	0.081***	0.011***	−0.020***	−0.018***	−0.055***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Tenure = 2	0.165***	0.009***	−0.032***	−0.023***	−0.119***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
Tenure = 3	0.210***	0.009***	−0.046***	−0.034***	−0.140***
	(0.003)	(0.002)	(0.001)	(0.002)	(0.002)
Tenure = 4	0.251***	0.007**	−0.056***	−0.047***	−0.154***
	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)
Tenure = 5	0.273***	0.017***	−0.065***	−0.053***	−0.172***
	(0.005)	(0.004)	(0.002)	(0.002)	(0.003)
Tenure ≥ 6	0.347***	−0.004	−0.081***	−0.072***	−0.191***
	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)
Firm size (10–49 employees)	−0.069***	0.036***	0.014***	0.013***	0.006***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
Firm size (50–249 employees)	−0.111***	0.041***	0.027***	0.026***	0.018***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Firm size (≥ 250 employees)	−0.191***	0.044***	0.059***	0.050***	0.039***
	(0.004)	(0.003)	(0.002)	(0.003)	(0.003)
Foreign-owned equity (≥ 5%)	−0.051***	0.006*	0.004**	0.023***	0.018***
	(0.005)	(0.004)	(0.002)	(0.003)	(0.004)
High-tech manufacturing	0.018***	0.055***	−0.024***	−0.015***	−0.034***
	(0.006)	(0.005)	(0.003)	(0.004)	(0.005)
Low-tech manufacturing	0.075***	−0.014***	−0.013***	−0.023***	−0.025***
	(0.003)	(0.002)	(0.001)	(0.002)	(0.002)
Knowledge-intensive services	−0.012***	0.001	−0.005**	0.007***	0.009***
	(0.004)	(0.003)	(0.002)	(0.002)	(0.003)
2nd Quartile Firm FE	−0.010***	0.021***	−0.010***	0.004**	−0.005**
	(0.003)	(0.002)	(0.001)	(0.002)	(0.002)
3rd Quartile Firm FE	−0.032***	0.038***	−0.006***	0.011***	−0.010***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
4th Quartile Firm FE	−0.103***	0.097***	−0.008***	0.021***	−0.007***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Young firm	−0.016***	0.019***	−0.006***	−0.005***	0.009***
	(0.003)	(0.002)	(0.001)	(0.002)	(0.002)
Number of observations	780,313				
Log pseudolikelihood	-3,450,207.5				
Wald $\chi^2(156)$	341,626.8				
Prob > χ^2	0.000				

Note: Average marginal effects computed at the means of other variables. Standard errors in parenthesis, adjusted for individual-level clusters. Model is a multinomial logit, weighted by the reciprocal of the probability of low-wage entry. Regression includes controls for other occupation classes, firm's legal structure, log firm's age at worker entry, GDP growth rate, and regional unemployment rate. Base sector is less knowledge-intensive services.

*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

leaving the firm. However, a permanent contract seems to mostly contribute to staying as a low-wage employee (an increase of 8.1 p.p.) and has only a small, but significant, positive contribution to the probability of becoming high-wage in the initial firm. If we consider that a permanent contract also decreases the probability of switching firms to get a high-pay job by 1.8 percentage points, there is a downside in terms of leaving the low-pay state. What a permanent contract brings in job security may come at a cost in career progression.

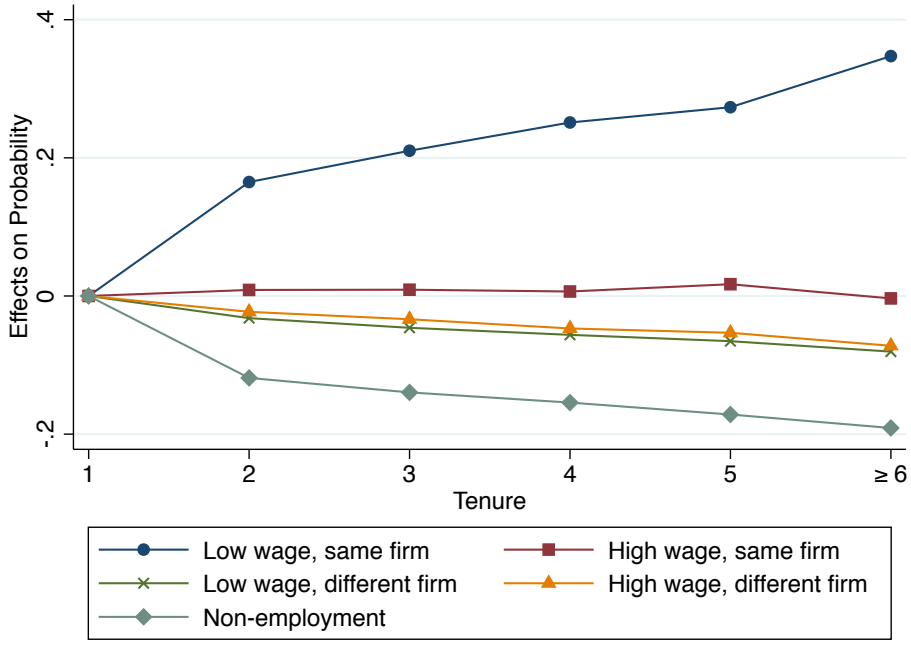

Figure 1: Marginal effects of tenure on transitions out of low pay

To more clearly understand how tenure influences transitions, we plot the marginal effects of tenure in Figure 1. We can see that, in general, more time on the job increases the probability of staying the firm, as a low-paid or a high-paid employee. This result is also evidenced by the negative marginal effects for tenure in transitions to non-employment: during the second year on the job, the probability of going into long-term non-employment drops by 12 p.p. compared to the first year; additional years lead to a smaller yearly decrease of less than two p.p. This is in line with Farber's (1999) stylized fact that the probability of job separation decreases with tenure. However, tenure increases the chance of staying in the firm earning a low wage by much more

than it increases the probability of getting a high wage in the same firm, by more than one order of magnitude. After two years in the firm, the likelihood of a high wage in the firm increases by less than one p.p. but there is no significant increase from the second to the third or fourth year. Only after five years will low-paid workers see another significant increase in the likelihood of getting a high-paid job in the firm, with a marginal effect of 1.7 p.p. compared to the probability in the first year of tenure. We would expect that the accumulation of firm-specific skills would monotonically increase the likelihood of considerable wage growth in the firm, but these results seem to indicate that the accumulation of human capital is not so important in determining transitions into high-pay.

The increasingly positive marginal effects of tenure on staying in the same firm as a low-wage employee denounce a strong negative duration dependence, where low-paid workers increasingly tend to remain in a low-pay state. Conversely, longer tenures as a low-paid worker decrease the probability of switching firms to a better paying job, but nonetheless make switches to low-wage jobs less likely as well. We thus have two paths to escape low pay: either through the buildup of firm-specific human capital with tenure, which might take many years; or by switching firms in the first years on the job, using the low-paid job as a stepping stone into better wage conditions. We analyze the role of tenure in transitions out of low pay in further detail when discussing Table 9.

As firm size increases, we see that low-paid workers are less likely to remain low-wage in the initial employer. Working in a large firm seems to increase the likelihood of exiting low pay through a wage increase in the initial firm by 4.4 p.p., significantly more than in smaller firms. Note also that, workers in large organizations seem to experience a greater propensity for inter-firm mobility, both as high-paid or low-paid (over five p.p. in both cases). Because large firms pay higher wages (Oi and Idson 1999), working in such a firm may increase the chances of leaving low pay. Another possible explanation is that larger firms are more likely to have well established and even formal internal labor markets (Doeringer and Piore 1971), and thus the paths for inner wage mobility are more clearly defined and easier to tread. Idson (1989) indeed finds that larger firms offer workers more opportunities for internal mobility. The internal labor market hypothesis can also help

explain the greater marginal effects for job separation or external mobility exhibited by workers in large firms: if the internal labor market and on-the-job training allows firms to acquire more information about a worker's productivity (Holtmann and Idson 1995), they may be better able to find and terminate bad matches, pushing workers out of the firm either to non-employment or to other firms. This is in contradiction with our finding that workers in large firms are also more likely to leave low-wage by moving to another firm that will pay a higher wage (five p.p. higher than workers in small firms). Nonetheless, this can be reconciled if we consider that large firms hire better workers (Idson and Feaster 1990; Rebitzer and Robinson 1991) but also that young workers tend to engage in job shopping early in their careers looking for better matches (Jovanovic 1979; Viscusi 1980; Farber 1994; Neumark 2002). This may be especially true among the most skilled workers who have more alternatives to choose from. Workers in firms with fewer than ten employees have, however, a different experience: they have considerably lower chances of leaving low-wage, but benefit from lower hazards of non-employment. Tentatively, we may advance that less-skilled workers may find more job stability in small firms than in large firms, leading to a sorting process where low-skill workers are better matched in small firms, and high-skill individuals find better matches in large companies.

Employment in a firm with some presence of foreign capital seems to lower the likelihood of earning a low wage in the initial firm, and brings a small but significant increase to the probability of getting a wage improvement in that same firm. It also increases the probability of upward mobility in another firm by 2.3 percentage points. The literature on the foreign-firm wage premium has presented mixed conclusions, with some authors finding that indeed wages increase with foreign capital (for example, Girma and Görg 2007), while others find that the premium may be spurious, and that the stylized fact might be explained by a selection process of better workers into foreign-owned firms (Heyman, Sjöholm, and Tingvall 2007; Andrews et al. 2009).

We also find that working in a manufacturing company increases retention in the firm compared to workers in less knowledge-intensive services, with significant decreases in the likelihood of transitioning to non-employment or switching employer to a high-paying job. However, while workers in high-tech

manufacturing firms see a significant increase in the likelihood of a change to high-wage in the same firm (5.5 p.p.), low-tech workers are more likely to remain as low-wage (7.5 p.p.). The returns to firm-specific human capital are higher in high-tech manufacturing firms, and thus workers might find more wage-progression opportunities inside the company. However, low-paid workers in knowledge-intensive services firms are less likely to stay in the initial firm, compared to workers in less knowledge-intensive firms, mostly as a result of a small increase in the probability of going to non-employment or to a better-paying firm. Finally, in line with Andersson, Holzer, and Lane (2005), we find that workers in firms that systematically pay higher wages, even after accounting for observed characteristics, are much more likely to obtain a high wage, especially within that firm. Even if such workers do enter with a low pay, employment in a high-paying firm increases the probability of wage growth.

These findings related to firm characteristics raise equity concerns: if knowledge-based firms and large organizations facilitate wage improvements but workers with low skills cannot access such jobs, the labor market segmentation is intensified. The good jobs are reserved for the high-skilled, and the less-skilled are trapped in worse jobs that reinforce their low-wage/low-skilled status.

Using the same specification, we computed the average marginal effects of tenure for each level of education, displayed in Table 9.[9] This allows us to see how the low-wage duration dependence and the accumulation of firm-specific human capital differs with educational attainment.

The first result that stands out is that the negative duration dependence of being in low-wage is present in all three levels of education, as revealed by increasingly positive marginal effects for tenure in the "low wage, same firm" state. However, the intensity of the duration dependence decreases with educational attainment. College graduates are, on average, seven percentage points less likely to remain in the same firm as low-wage employees, compared to workers without high school education; the difference between college graduates and high school graduates is of about five percentage points. Low-paying jobs are then more of a trap for less-educated workers than for college

[9]See Table B in the Appendix for the marginal effects of tenure by education level from the unweighted model.

Table 9: Average marginal effects of tenure computed over groups of education level

		Tenure				
		2	3	4	5	≥ 6
Low wage, same firm	Basic	0.174***	0.221***	0.261***	0.286***	0.356***
		(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
	High school	0.160***	0.204***	0.244***	0.264***	0.339***
		(0.002)	(0.003)	(0.004)	(0.005)	(0.005)
	College	0.118***	0.154***	0.192***	0.204***	0.285***
		(0.003)	(0.004)	(0.005)	(0.006)	(0.007)
High wage, same firm	Basic	0.006***	0.006***	0.003	0.011***	−0.005*
		(0.001)	(0.002)	(0.002)	(0.003)	(0.003)
	High school	0.009***	0.009***	0.006*	0.018***	−0.005
		(0.002)	(0.003)	(0.004)	(0.005)	(0.004)
	College	0.030***	0.036***	0.037***	0.059***	0.030***
		(0.003)	(0.004)	(0.006)	(0.008)	(0.008)
Low wage, different firm	Basic	−0.037***	−0.052***	−0.064***	−0.074***	−0.091***
		(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
	High school	−0.032***	−0.045***	−0.055***	−0.063***	−0.078***
		(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
	College	−0.017***	−0.025***	−0.030***	−0.036***	−0.044***
		(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
High wage, different firm	Basic	−0.019***	−0.028***	−0.039***	−0.044***	−0.059***
		(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
	High school	−0.025***	−0.036***	−0.050***	−0.057***	−0.076***
		(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
	College	−0.034***	−0.051***	−0.073***	−0.085***	−0.116***
		(0.003)	(0.003)	(0.004)	(0.005)	(0.004)
Non-employment	Basic	−0.124***	−0.146***	−0.162***	−0.179***	−0.200***
		(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
	High school	−0.112***	−0.132***	−0.145***	−0.161***	−0.179***
		(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
	College	−0.098***	−0.114***	−0.125***	−0.142***	−0.155***
		(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Number of observations	780,313					
Log pseudolikelihood	-3,450,207.5					
Wald $\chi^2(156)$	341,626.8					
Prob $> \chi^2$	0.000					

Note: Average marginal effects computed at the means of other variables. Standard errors in parenthesis, adjusted for individual-level clusters. Model is a multinomial logit, weighted by the reciprocal of the probability of low-wage entry. Same specification as in Table 8. Regression include controls for worker's age at entry and its square, education, and occupation, firm's legal structure, presence of foreign-owned equity (at least 5%), dummies for categories of number of employees, log firm's age at entry, firm fixed-effects from wage regression, GDP growth rate, and regional unemployment rate.
*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

graduates.

Another noteworthy result is that the higher the education level, the larger the contribution of tenure to internal transitions to high-pay. College educated workers see the likelihood of becoming high-paid in the same firm increase every period up to the fifth year on the job. The transition to high-pay in the firm for college graduates seems to be divided in three stages: an initial increase in probability of three p.p. in the second year of tenure, followed by a period of slower growth until the fifth year where finally the marginal effect grows to about six percentage points. This pattern may be related to the process of employer learning and its speed (Lange 2007). Those with lower education also experience small but significant increases in this probability if they stay in the firm for longer than one year (around 0.6 p.p. for basic education and 0.9 p.p. for workers with a high school diploma compared to the probability of transition in the first year), and another small increase during the fifth year of tenure.

Moreover, the difference between the tenure marginal effects of college graduates and those without a college degree seems to increase with each additional year on the job, widening the gap between more- and less-educated workers. Thus, workers with a college diploma are not only more likely of leaving low pay, but the chances of improving their situation increase faster with every year on the job. More-educated workers may be better at acquiring the specific skills necessary for their jobs, hence the faster track to higher wages inside the firm. Our results suggest that only the college educated workers can have reasonable expectations for significant wage growth in the initial firm. For those workers, an initial low-paying job is not a trap but rather an opportunity to build up skills and labor market experience.

As we saw before, mobility to other firms, both to a high- or low-paying job, or exits to non-employment, also decrease with tenure. Less-educated workers see the largest decreases in the probabilities of switching firms to a low-wage job or to non-employment, indicating that while low-wage jobs may trap most unskilled workers, those who are able to accumulate firm-specific skills may find a way to break the low-pay, no-pay cycle and to reduce precarious employment. As education increases, so does the penalty that additional years of tenure have on the probability of getting a high-wage job in another firm. Because skilled workers are more likely to improve their

wage situation inside the firm with each additional year, they have a lower incentive to look for better alternatives in the labor market, and reveal lower mobility patterns. This shows that firm-switching to improve the pay status often happens in the first years on the job, especially for college graduates.

In conclusion, while skilled low-paid may rapidly switch firms and command a higher wage, using the low-pay job to propel their career, those with less skills are at risk of being trapped in a low-paying job or of ending up in an extended period without work. Though the negative duration dependence exhibited in the low-wage state suggests a low-pay trap may exist, it seems that some skilled workers can nonetheless use low-wage jobs to accumulate skills with tenure that will later on translate to higher wages. The accumulation of firm-specific human capital also gives all workers, but especially those with little education, a means to avoid non-employment.

6 Conclusions

In this work, we analyzed transitions out of low pay among young individuals entering the labor market. We began by studying the determinants for labor market entry as a low-wage worker. The main focus of the analysis, however, was to comprehend how workers' human capital influences the probability of transitioning out of low pay, as well as the role played by duration dependence in determining that probability. We also looked into how firm characteristics such as size and knowledge intensity influence transitions out of low pay. In particular, we studied transitions to high pay via different paths — through wage growth inside the firm, or through inter-firm mobility — to understand if low-paying jobs are a career trap or a stepping stone for young labor market entrants. We used a competing risks framework, with a weighted multinomial logit model to account for the different wage mobility paths.

Because starting a job in a low-pay job is probably not defined exogenously, we attempted to solve the sample selection bias by weighting the transition model with the reciprocal of the predicted low-wage propensities obtained from a model for the likelihood of entering the labor market with a low wage. The weights in the transition model balance the likelihood function contributions of those more likely to start a career as a low-wage employee with the contributions of those more prone to high-wage employment, and

allow for more robust parameter estimates.

From our model for the probability of entering the labor market as a low-wage worker, we found that an individual's human capital greatly contributes to lowering the likelihood of starting a career earning a wage under the low-pay threshold. Namely, college educated workers are less likely to receive a low-wage and so are those employed in more skill- and knowledge-demanding occupations. Furthermore, finding employment in larger firms also results in lower likelihoods of a low wage.

The analysis of low-pay transitions revealed that education largely contributes to wage improvement with the initial employer, but also increases transitions out of low pay by means of moves to other firms. We find that many workers do change firms after just one year of tenure to find higher wages, pointing to a stepping stone role of low-pay jobs. In addition, for more-educated workers, the accumulation of firm-specific human capital plays a larger role in determining moves to high-wage in the initial company than for less-educated individuals. It is nonetheless a relatively small contribution, suggesting that the accumulation of firm-specific skills is not a large driver of moves out of low pay, and that most workers who change to a high wage in the initial firm do so during the first year on the job. Related to this, we find that transitions out of low-wage jobs exhibit a strongly negative duration dependence meaning that, for many workers, longer tenures translate into progressively lower probabilities of leaving the low-wage state. The persistence of low-pay jobs traps low-skilled workers in the low-wage state and greatly diminishes their prospects of wage growth. We should note, however, that our results suggest that even if low-skilled individuals are less likely to break away from the low-pay trap, they can use low-wage employment as a means to avoid unemployment and breach the low-pay, no-pay cycle through the accumulation of firm-specific skills acquired during their tenure.

We believe that studying the duration of low pay across different firm sizes and sectors could yield interesting results for future research. While knowledge-based firms and large organizations offer more opportunities for wage improvements, this also compounds the labor market segmentation. If low-skilled workers cannot find employment with such companies, and the best jobs are only accessible to high-skill individuals, workers in the unprotected side of the labor market will remain trapped in low-quality jobs

that reinforce their low-wage/low-skilled status. Thus, our results strengthen the notion of a segmented labor market, where some workers are trapped in low-wage jobs while others can rapidly improve their situation. The results also suggest that policies promoting skill acquisition, through either schooling or training, may contribute to help the low-skilled find better quality jobs.

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Appendix

Table A: Average marginal effects for low-pay transitions (no weights)

	Low wage, same firm	High wage, same firm	Low wage, different firm	High wage, different firm	Non-employment
Female	0.030***	−0.035***	0.026***	−0.030***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
High school	0.001	0.031***	−0.013***	0.013***	−0.032***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
College	−0.097***	0.088***	−0.026***	0.079***	−0.044***
	(0.004)	(0.003)	(0.002)	(0.003)	(0.003)
Intellectual and scientific	−0.007	0.060***	−0.024***	0.019***	−0.047***
	(0.006)	(0.003)	(0.003)	(0.002)	(0.004)
Technicians	−0.019***	0.061***	−0.025***	0.024***	−0.041***
	(0.004)	(0.002)	(0.002)	(0.002)	(0.003)
Clerical support	0.005*	0.048***	−0.022***	0.017***	−0.047***
	(0.003)	(0.001)	(0.001)	(0.001)	(0.002)
Service and sales workers	−0.020***	0.012***	0.008***	0.015***	−0.015***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Craft	0.017***	0.027***	−0.013***	0.003***	−0.034***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Plant and machine operators	0.040***	0.006***	−0.012***	−0.006***	−0.028***
	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)
Age at entry	−0.008***	0.002***	−0.005***	0.002***	0.009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Permanent contract	0.084***	0.007***	−0.021***	−0.017***	−0.053***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tenure = 2	0.159***	0.018***	−0.038***	−0.018***	−0.120***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Tenure = 3	0.203***	0.021***	−0.055***	−0.026***	−0.143***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Tenure = 4	0.247***	0.018***	−0.066***	−0.037***	−0.163***
	(0.003)	(0.002)	(0.001)	(0.001)	(0.002)
Tenure = 5	0.272***	0.025***	−0.077***	−0.041***	−0.178***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Tenure ≥ 6	0.334***	0.013***	−0.094***	−0.057***	−0.196***
	(0.003)	(0.002)	(0.001)	(0.001)	(0.002)
Firm size (10–49 emp.)	−0.060***	0.024***	0.019***	0.010***	0.007***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Firm size (50–249 emp.)	−0.100***	0.023***	0.033***	0.021***	0.022***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Firm size (≥ 250 emp.)	−0.199***	0.014***	0.079***	0.053***	0.052***
	(0.003)	(0.001)	(0.002)	(0.002)	(0.002)
Foreign-owned equity (≥ 5%)	−0.042***	0.005***	0.007***	0.017***	0.013***
	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)
High-tech manufacturing	0.017***	0.042***	−0.024***	−0.013***	−0.022***
	(0.005)	(0.003)	(0.003)	(0.002)	(0.004)
Low-tech manufacturing	0.076***	−0.013***	−0.017***	−0.020***	−0.026***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Knowledge-intensive services	−0.027***	−0.007***	0.006***	0.012***	0.016***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
2nd Quartile Firm FE	−0.002	0.017***	−0.012***	0.002*	−0.006***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
3rd Quartile Firm FE	−0.022***	0.034***	−0.009***	0.008***	−0.011***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
4th Quartile Firm FE	−0.084***	0.079***	−0.007***	0.017***	−0.006***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Young firm	−0.009***	0.013***	−0.008***	−0.002*	0.006***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Number of observations	780,313				
Log pseudolikelihood	-983,938.8				
Wald $\chi^2(156)$	439,132.1				
Prob > χ^2	0.000				

Note: Average marginal effects computed at the means of other variables. Standard errors in parenthesis, adjusted for individual-level clusters. Model is a multinomial logit. Regression includes controls for other occupation classes, firm's legal structure, log firm's age at worker entry, region, and firm fixed-effects from wage regression, GDP growth rate, and unemployment rate. Base sector is less knowledge-intensive services. Additional statistics are for the multinomial logit model.

*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table B: Average marginal effects of tenure computed over groups of education level (no weights)

		Tenure				
		2	3	4	5	≥ 6
Low wage, same firm	Basic	0.163***	0.208***	0.252***	0.277***	0.338***
		(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
	High school	0.149***	0.191***	0.235***	0.257***	0.322***
		(0.002)	(0.002)	(0.003)	(0.004)	(0.003)
	College	0.119***	0.156***	0.200***	0.218***	0.291***
		(0.002)	(0.002)	(0.003)	(0.004)	(0.004)
High wage, same firm	Basic	0.015***	0.018***	0.015***	0.021***	0.010***
		(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
	High school	0.024***	0.028***	0.024***	0.032***	0.018***
		(0.001)	(0.002)	(0.002)	(0.003)	(0.003)
	College	0.047***	0.057***	0.056***	0.071***	0.055***
		(0.002)	(0.003)	(0.004)	(0.005)	(0.004)
Low wage, different firm	Basic	−0.040***	−0.057***	−0.069***	−0.080***	−0.099***
		(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
	High school	−0.036***	−0.051***	−0.062***	−0.072***	−0.088***
		(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
	College	−0.024***	−0.034***	−0.041***	−0.049***	−0.060***
		(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
High wage, different firm	Basic	−0.016***	−0.023***	−0.033***	−0.036***	−0.051***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	High school	−0.022***	−0.031***	−0.043***	−0.048***	−0.068***
		(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
	College	−0.033***	−0.049***	−0.069***	−0.078***	−0.112***
		(0.002)	(0.002)	(0.003)	(0.004)	(0.003)
Non-employment	Basic	−0.122***	−0.145***	−0.165***	−0.181***	−0.199***
		(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
	High school	−0.114***	−0.136***	−0.154***	−0.169***	−0.184***
		(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
	College	−0.109***	−0.130***	−0.146***	−0.162***	−0.175***
		(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Number of observations	780,313					
Log pseudolikelihood	-983,938.8					
Wald $\chi^2(156)$	439,132.1					
Prob $> \chi^2$	0.000					

Note: Average marginal effects computed at the means of other variables. Standard errors in parenthesis, adjusted for individual-level clusters. Model is a multinomial logit. Same specification as in Table 8. Regression include controls for worker's age at entry and its square, education, and occupation, firm's legal structure, presence of foreign-owned equity (at least 5%), dummies for categories of number of employees, log firm's age at entry, region, and firm fixed-effects from wage regression, GDP growth rate, and unemployment rate. Additional statistics are for the multinomial logit model.
*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.