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## **EMPLOYMENT IN NEW FIRMS FOR JOB SWITCHERS**

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### Abstract

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Previous research shows that new firms pay less wage and provide worse conditions in terms of fringe benefits (Shane, 2008). These results are to some degree surprising since one could expect new firms have to pay more in order to compensate for the risk of being employed in a new firm with a high probability of failure. However, previous studies on firm age-wage differentials unable to control for that the alternative cost may differ across individuals. Depending on their current situation employees may accept a lower wage. Such circumstances may occur for example if their current employee is closing down or need to lay-off. In this paper we investigate if there still exists a wage penalty of being employed in a new firm if we take the prospectus to individual workers? experience and status on the labor market. In order to keep the risk level that individuals face we focus on individuals who make the decision to change job.

According to the job search theory individuals know only the distribution of wages existing in the economy. An optimal strategy for a job seeker is to accept any wage offer higher than his or her reservation wage, which depends on the set of parameters affecting the labour market. Job seekers? current situation whether they are moving involuntarily or voluntarily also affects the reservation wages. In this paper we analyze the firm age-wage relation in real situation where individuals face a decision to accept a current job offer or not. While much of the earlier research uses least-squares regression to predict wage differentials between newly founded and incumbents firms (Brown and Medoff, 2003, Heyman, 2007, Brixy et. al., 2007) we use endogenous switching model to account for possible nonrandom selection into particular type of firm depending on their current situation. We use matched employee-employer data containing detailed information on all firms and employees in Sweden over the period 1998-2010. Our sample consists of all full time employees who works in one firm at time  $t$  and switches to other firm at time  $t+1$ . Preliminary results show the selection into particular type of firm is non-random so that the endogenous switching regression model is relevant and thus OLS underestimate the firm age-wage differentials. Moreover, the effect of the involuntary job switch within each group is smaller for endogenous switching model compared to the ordinary least squares.

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# **New firms as employers: The wage penalty for voluntary and involuntary job switchers**

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## **Abstract**

According to previous research new firms pay less wages and provide worse conditions in terms of fringe benefits (Shane 2009). However, previous studies are unable to control for that the alternative cost of accepting an employment in a new firm may differ across individuals. Depending on their current situation employees may accept the lower wage offered by a newly started company. Such circumstances may occur, for example, if their current employer is closing down or need to lay-off. Furthermore, previous studies have been incomplete with respect to controlling for individual heterogeneity. In this paper we investigate if there still exists a wage penalty of being employed in a new firm if we take the prospectus to individual workers' experience and status in the labor market into consideration. In order to keep the risk level that individuals face we focus on individuals who make the decision to switch job. We use matched employee-employer data containing detailed information on all firms and employees in Sweden over the period 1998-2010. Our results show that there is an endogeneity selection bias, which needs to be considered when estimating the wage penalty of employment in new firms. If the selection bias is not considered we underestimate wage differentials. Our endogenous wage equation estimates indicate that being an involuntary job switcher has an equally negative effect on wages when moving to both new and incumbent firms. However, the positive effect of education on wages is more pronounced for jobs switchers selecting into an incumbent firm.

## **Keywords:**

New firms, wage penalty, job switchers

## 1. Introduction

New firm creation is important for economic dynamics and industrial change. Entrepreneurship research has during recent decades extensively studied and tried to identify which individual characteristics which determine who starts a new firm. However, more recent research has also started to study the role of new firms in the labor market in terms of, for example, their role as employers with respect to which individuals they decide to hire (Nyström, 2011). There is also an interest to study which conditions that new firms offer to their employees. According to previous research new firms pay less wages and provide worse conditions in terms of fringe benefits (e.g. Shane 2009; Winter-Ebmer 2001). Furthermore survival rates of new firms are low, though they differ across industries (Persson 2004; Geroski 1995).

In this paper we intend to contribute to the discussion on the wage penalty of employment in new firms. Although firm-size and firm-age relations are often used interchangeably in wage differential studies the firm age-wage link has been studied by only a few researchers (e.g. Brown & Medoff 2003; Heyman 2007; Brixy et al. 2007). Their findings are in line with firm size-age relation that newly founded firms pay less and offer worse working conditions. However, previous studies are based primarily on the effect of individual and firm characteristics on wages and does not control for that the alternative cost may differ across individuals. Depending on their current situation employees may accept a lower wage offered by a new firm. Such circumstances may occur, for example, if the employee doesn't have a strong position in the labor market such as, for example, in cases when individuals are labor market entrants or job-switchers due to that their current employer is closing down or need to lay-off. Nyström and Zhetibaeva Elvung (2014) study the wage penalty of employment in new firms for Swedish labor market entrants during 1998-2008. They find that an average wage penalty of employment in new firms of 2.9 percent persist when they study individuals who are labor market entrants. In this paper we study the wage penalty of employment in new firms for individuals who are job-switchers. Furthermore, we estimate the wage penalty of employment in new firms between workers who make a voluntary job-switch or an involuntary i.e. a switch initiated by the closure of employee's previous employer's business.

Previous research has studied wage differentials between voluntary and involuntary job-switchers (Wu 2010; Mueller 2000; García-Pérez & Rebollo-Sanz 2005). However, according to our knowledge, the wage penalty of employment in new firms has not been investigated taking into consideration the selection and wage penalty of job-switchers into new or incumbent firms. Our research relates to the studies on the firm age-wage relationship carried out by Brown and Medoff (2003), which find that older firms pay higher wages. Similarly, Brixy et al. (2007) analyze wage setting in newly founded firms compared to other firms employing the German data and find that wages in newly founded establishments are lower on average. By using the Swedish data Heyman (2007) study wage differentials between new and incumbent firms and find that the inclusion of firm age does not affect the impact of firm size on wages. Nevertheless, these results are based on examining wage differentials without considering endogenous selection of workers into new or incumbent firms. To correct for the possible selection issue we rely on a switching regression model. Is there a wage penalty of being employed in a new firm if we take the prospectus to individual workers' experience and status on the labor market focusing on individuals who make the decision to change job into consideration? Furthermore, we hypothesize that the wage penalty of employment in a new firm would be larger if the job switch is caused by an involuntary switch since these individuals face a lower alternative cost.

In order to study the wage penalty of employment in new firms we need to consider that the individuals' selection into new or incumbent firms is based not only individuals' decision but also on firm behavior. Thus, the selection into new and incumbent firms may not be random. In this paper we analyze the firm age-wage relation in a situation where individuals face a decision

to accept a current job offer or not considering both workers and firm heterogeneity. While much of the earlier research uses least-squares regression to predict wage differentials between new and incumbents firms we use an endogenous switching model to account for possible nonrandom selection into new or incumbent firms. Following Garcia-Perez and Rebollo-Sanz (2005) and Sakellariou (2012) we set up an endogenous switching model for the selection of switchers into new or incumbent firms. In our empirical analysis we use an employer-employee matched dataset which covers the Swedish population during the period from 1998-2010.

The paper is organized as follows. In section 2 we present the theoretical background and a review of previous literature in the area. The model used in the analysis is described in section 3, while section 4 presents data description and descriptive analysis. Empirical results are discussed in section 5, and finally in section 6 we discuss our main conclusions and suggestions for future research.

## **2. Theoretical consideration and literature review**

Our focus in this paper is job-switchers and their selection into employment in new or incumbent firms. Why would someone change a job? There are two general cases considered in the literature: a person may move from one job to another job voluntarily or involuntarily. A voluntary job-switch may be induced by individuals who wish pursue new opportunities and may include opportunities of higher wage or other non-pecuniary benefits. Furthermore a voluntary switch may be induced by changes in family situation. For instance marriage and providing care to dependents in the home are strong determinants of early labor force separation (Nooney et al. 2010). At the same time changes in the composition of one's household encourage employees to change their job toward a more family-friendly employer with flexible work environment (Kronenberg & Carree 2012). Another key non-wage determinants of job switch are job security and job satisfaction (Carless & Arnup 2011; Clark 2001). Involuntary job-switches, on the other hand, occur due to layoffs by their current employer or a firm closure. Workers who have a higher risk of layoff are not random workers but may be those with low unobservable human capital who sorted themselves into smaller or more unstable firms (Winter-Ebmer 2001; Winter-Ebmer 1995). Moreover, this selection results in lower wages for involuntary job movers and workers who are subject to greater layoff risk (Kuhn & Sweetman 2013). However, involuntary job movers due to plant closures are generally more likely to get a new job than laid-off workers (Frederiksen & Westergaard-Nielsen 2007).

The situation which we consider in this paper is when individuals move from one job to another job either voluntary or involuntary. In the latter case due the make an involuntary job switch due to firm closure. This situation can be analyzed through the equilibrium search model<sup>1</sup> which looks at the behavior of all agents including the strategic behavior of firms when the wage distribution is endogenous and the wage of an individual employee rises when he or she moves from one job to another. Empirically it has been shown that job-to-job mobility is an important determinant of the individual wage (e.g. Pavlopoulos et al. 2007; García-Pérez & Rebollo-Sanz 2005; Sullivan 2010; Addison & Portugal 1989; Pfeifer & Schneck 2012). Empirical studies supporting this theory show that a worker's relative wage position is an important determinant of a job-to-job transition including both the highest and the lowest levels. For instance, by using German data Pfeifer and Schneck (2012) find that workers with higher relative wage positions within their firms are, on average, more likely to quit their jobs than those with lower relative wage positions. Furthermore, Bachmann et al. (2010) conclude that labor market entrants earning less than the average starting wage are more likely to change jobs. Thus, relative wages are important determinants of job switching for employees to increase their wages in new jobs. However, as mentioned above, the relative wages are not the only determinants of job-to-job mobility. Nonwage benefits are also of importance for the decision to switch jobs and they differ

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<sup>1</sup> See chapter 3 of the textbook by Cahuc & Zylberberg (2004) for detailed explanation of the job search and labor market equilibrium theory, and Burdett (1978) on-the-job-search theory.

across age groups. Bartel (1982) find that young men are less likely to quit jobs with bad working conditions, while older men are more likely to quit jobs with physical requirements.

The distribution of wages in the equilibrium search model depends on the behavior of job seekers and firms. The behavior of firms in the equilibrium search model is to attract workers using wages and workers receive wages equal to their marginal productivity. However, in the presence of unobserved abilities of workers firms are not able to offer wages efficiently. Similarly, job-seeker's current situation such as being involuntary job switcher may affect the wage offer due to signaling. On the other hand, individuals, both changing jobs voluntary and involuntary, face a decision to accept a current job offer or not, which depends on various conditions. The optimal strategy for a job seeker consists of accepting any wage offer higher than his or her reservation wage which is endogenous itself and set by various set of parameters affecting the labor market such as the job destruction rate, the arrival rate of job offers and unemployment insurance benefits. For instance reservation wages are positively associated with the generosity of the unemployment insurance systems (Addison et al. 2004), and lower unemployment (Sestito & Viviano 2011). Brown et al. (2011) find the existence of a gender reservation wage gap. At the same time reservation wages vary between different age groups and status categories of workers (Mohanty 2005). Those who change job voluntarily decide to choose between keeping their old jobs and choosing a new job depending on whether a new job offer is at least as good as their old jobs assuming that the job search costs are negligible. In the case of involuntary job switchers the opportunity cost of the next best alternative for involuntary job switchers is relatively lower since they choose between unemployment and accepting a new job offer. However, unemployment costs are different depending if a person is eligible for unemployment benefits or not. Reservation wages for non-eligible job seekers is lower than reservation wages of eligible workers. If involuntary job switchers are eligible for unemployment insurance benefit then we have a situation similar to the case of voluntary job switchers. Unemployment benefits relative to previous wages is important for determination of reservation wages and there is a positive link between the ratio of unemployment benefits to previous wages and reservation wages (Feldstein & Poterba 1984).<sup>2</sup>

### 3. Selection into new versus incumbent firms and wage equations

In this paper we study the firm age-wage relation by using the endogenous switching model. This model sorts workers into two states, employment in a newly founded firm versus employment in an incumbent firm, with only one being observed. Following García-Pérez and Rebollo-Sanz, (2005) and Sakellariou (2012) we set up the model. We consider a model which describe the behavior of an individual who faces two regimes and a criterion function that determines individual's decision regarding the acceptance of the job offer in a new firm versus in an incumbent firm. For each individual  $i$  the dependent variable, the wages,  $W_i$ , is observed for only one of the regimes, defined as new firms ( $I_i = 1$ ) and incumbent firms ( $I_i = 0$ ). Let  $lnw_{1i}$  and  $lnw_{2i}$  represent the natural logarithms of annual wages of workers in new and incumbent firms, respectively, then the potential wages for a worker in two states are given by:

$$\begin{aligned} lnw_{1i} &= \beta_1 X_{1i} + u_{1i} \text{ if } I_i = 1 && \text{(new firm)} \\ lnw_{2i} &= \beta_2 X_{2i} + u_{2i} \text{ if } I_i = 0 && \text{(incumbent firm)} \end{aligned} \tag{3.1}$$

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<sup>2</sup> The Swedish unemployment insurance has two parts: a basic amount and an income related benefit. To qualify for the basic amount the individual needs to be above 20 years old and fulfil the working requirements. The working requirement implies that the individual must have worked at least 80 hours a month for at least six months during the last twelve months before unemployment. The amount received from this insurance is currently a maximum of 320 SEK per day (5 days a week). In order to qualify for the income related benefit the individual must have been a member of an unemployment insurance fund for at least twelve months. During this period the individual must also have fulfilled the work requirement. The size of the income-related benefit correspond to 80% of the income but set at a maximum level 680 SEK per day (during 5 days a week). The unemployment benefits can be received during 300 days, or 450 days for individuals with children under the age of 18 (The Swedish Federation of Unemployment Insurance Funds, 2013).

where  $X_1$  and  $X_2$  are vectors of weakly exogenous variables that influence wages and  $\beta_1$  and  $\beta_2$  vectors of parameters and  $u_{1i}$ ,  $u_{2i}$  are the error terms. The selection mechanism into new or incumbent firms is defined by a latent variable  $I_i^*$  that describes the probability being selected into new versus incumbent firms:

$$\begin{aligned} I_i &= 1 & \text{if } I_i^* = \gamma Z_i + v_i > 0 \\ I_i &= 0 & \text{if } I_i^* = \gamma Z_i + v_i \leq 0 \end{aligned} \tag{3.2}$$

where  $Z_j$  is a vector of explanatory variables for the selection process which affect the individuals decision,  $\gamma$  is the corresponding vector of unknown parameter to be estimated and  $v_i$  is the random disturbance of the selection process. The endogenous switching regression assumes that the error terms  $u_{1i}$ ,  $u_{2i}$  and  $v_i$  have trivariate normal distribution with mean zero and covariance matrix  $\Sigma$ . In this setting we normalize the variance of the random distribution term in the switching model equating it to one due to lack of information of the error terms  $u_{1i}$  and  $u_{2i}$ .

The use of the least squares to analyze the firm age wage link is biased if the selection into new versus incumbent firms is not random since OLS estimates assume that firm choice is exogenous. We control for this possible bias by using the endogenous switching regression model by estimating wage and selection equations simultaneously. The endogenous switching model is a widely used method to study wage differentials in labor economics between different groups which takes into account a selection of individuals into a particular group. Empirically much research has shown that the selection is not random, but determined through observed and unobserved heterogeneity. For instance García-Pérez & Rebollo Sanz (2005) study wages of voluntary movers compared to stayers and involuntary movers by using a multinomial endogenous switching regression model and find that it is important to control for selectivity. Another paper by Oosterbeek & van Praag (1995) on firm-size-wage differentials that employs such method finds that high IQ-workers are sorted into the largest firms while employed sons of self-employed fathers are more likely to work in small firms. Other studies based on this approach study wage differentials in public and private sectors (van der Gaag & Vijverberg 1988; Dustmann & van Soest 1998; Adamchik & Bedi 2000), industry wage premiums (Kim 1998), spatial wage disparities (Combes et al. 2008) and find in general that selection matters.

In the case of a nonrandom selection we have the correlation coefficients  $\rho_1$  and  $\rho_2$ , between  $u_{1i}$  and  $v_i$  and between  $u_{2i}$  and  $v_i$  respectively, significantly different from zero. To compare the results obtained from the exogenous and endogenous models we provide both estimations. In the exogenous model we use probit estimator for the selection equation to estimate the probabilities of individuals to be selected into new versus incumbent firms and OLS estimator for the wage equation. We estimate the endogenous model that takes into account the endogeneity problem in the selection by using the full information maximum likelihood estimation technique<sup>33</sup>, widely used method in studying wage differentials between different groups (see e.g. Stelcner et al. 1989; Dustmann & van Soest 1998; Lokshin & Beegle 2011). The endogenous switching model involves the use of instruments. The valid instruments are expected to affect directly the selection equation but not the wage equation. We employ previous firm characteristics and variable Moved as instruments so the hypothesis is that the probability of an individual to be selected into a new or incumbent firm is affected by previous job characteristics and willingness to move. By using valid instruments we test for possible endogeneity and thereafter estimate wages accounting for possible nonrandom selection process. After we have estimated wage equations with endogenous switching model we analyze wage differentials based on unconditional and conditional wage predictions obtained from estimates of the endogenous model. Predicted unconditional wages in new and incumbent firms are wages offered prior to firm choice for all individuals in the sample and computed by using the estimated systematic parts of the wage equations and given by  $E\{\ln w_{1i} | X_{1i}\} = X_{1i}\beta_1$  and  $E\{\ln w_{2i} | X_{2i}\} = X_{2i}\beta_2$  respectively. On the other hand, predicted conditional wages are based on simulations. Conditional predicted wages of new firm employees

<sup>33</sup> We use the movestay command by Lokshin and Sajaia (2004)

in new firms is given by  $E\{\ln w_{1i}|I_i = 1, X_{1i}\}$  and conditional predicted wages of incumbent firm workers who choose to work incumbent firms are given by  $E\{\ln w_{2i}|I_i = 0, X_{2i}\}$ . Finally, we are also able to compute counterfactuals, which have no observed counterparts. Potential wages of new firm workers in incumbent firms is  $E\{\ln w_{1i}|I_i = 0, X_{1i}\}$  and the predicted wages that workers who have selected themselves into incumbent firms could have experienced in new firms is computed by  $E\{\ln w_{2i}|I_i = 1, X_{2i}\}$ .

#### 4. Data description and descriptive analysis

Data for this paper was obtained from the unique dataset of matched employee-firm dataset provided by Statistics Sweden. The database consists of detailed information for all employees in Sweden. We use data for the entire private sector for the period 1998-2010. The unit of observation is a job switcher whom we define as a person who worked at time (t-1) and changes his/her job at time (t). We select only job switchers who transit from one firm to another firm, so that we exclude stayers. To select job switchers from the data set we impose a number of conditions. Firstly, we select all individuals who have full time employment both at (t-1) and t. Following Skans et al. (2007) we consider a person to be full-time employed if his or her wage exceeds a minimum wage, which is defined as 75 percent of the mean wage of janitors employed by local municipalities. Unfortunately, we do not have access to information about occupation for some years, so instead we use a definition of 50 percent of the average wage of all employees as the minimum wage because this value is close to the minimum wage defined by Skans et al. (2007). This index is calculated on an annual basis. Furthermore, we restrict our data set to include individuals who are above 18 years of age at time (t-1) and below 60 years of age at time (t). Finally, the sample includes only individuals who are categorized as employees, thus excluding entrepreneur or entrepreneur in own limited companies. Then our sample of job switchers is matched with their current employer as well as with their previous work places. Thus, we have both individual and enterprise characteristics prior to and after the job switch.

The main variable in the dataset is a new firm which we define as a newly established firm that is most three years old. Our new firms include all newly established firms established not as pushed spin-offs or pulled spin-offs (Andersson & Klepper 2013). We exclude divestures as well from the new firm category by the definition following Eriksson and Kuhn (2006) since are assumed to be reorganizations of activities that previously took place at an incumbent firm. Thus our new firm category includes all newly established firms at most three years old since its establishment and with at most 10 employees at the time of its establishment, while incumbents firms include all firms which are not new firms according to our definition.

We select covariates based on previous empirical research on wage differentials which has economic significance. Individual and demographic characteristics such as education level, age which is assumed to as work experience proxy are important wage predictors justified by the theory of human capital. The dependent variable is logarithm of annual wages. Wages are given in Swedish crowns (SEK). Gender, immigrant background and place of birth explaining the individuals' relative situation in the labor market are often included in traditional wage equations as well. The covariates also contain information on the municipality of residence used to proxy locational choices. In Sweden there are 72 labor market regions.<sup>4</sup> We include three dummy variables for the three largest labor market regions, Stockholm, Gothenburg and Malmo. At the same time wages are explained by firm heterogeneity so we include firm characteristics such as firm size and industry sector, and firm performance variables such as sales-per-employee ratio, profit margin and wage costs per employee. Abowd et al. (1999) find that enterprises that pay higher wages are more productive and more profitable. Previous wages are also included as

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<sup>4</sup>The labor market regions are defined based on commuting patterns between the 290 municipalities (Statistics Sweden 2010).

approximation of reservation wages of employees. Another individual characteristic that we include is a dummy variable that shows if an individual has changed his or her residential municipality at the time when he/she moves to another job. As Boman (2012) finds individuals' willingness to move for work has an effect on labor market outcome that increases probability of finding a job of those with extended geographic job search area. Furthermore the variable "Involuntary move" is included in both selection and wage equations and reflects if the individual job-switch is induced by a firm closure.

A detailed description of the definition of each variable used in the analysis is provided in the Appendix A1. Table 1 presents descriptive statistics for the sample used in our analysis sorted by two groups: new versus incumbent firms. Table 1 show that in general the share of demographic and geographical variables are in similar shares between these groups. However, there are important differences between new and incumbent firms as well. The share of workers with tertiary education is larger for incumbent firms compared to new firms. New firm employees are more likely to be involuntary movers and to work in new enterprises before the job switch. New firms are underrepresented in manufacturing sector while overrepresented in service sector. Current and previous wages for employees in new firms are smaller than in incumbent firms.

Table 1 about here

## 5. Estimation results

In our analysis we select, individual, firm and geographical covariates, based on their economic significance for wage and selection equations. In the selection equation we include control variables included in the wage equation that may affect the selection and instrumental variables identified by exclusion restrictions. As instruments we use previous firm characteristics and the variable reflecting if the individual moved which may have effect on the selection, but not on the current wage.

The switching equation

The estimation results for the exogenous and endogenous selection equations are presented in Table 2. The signs of statistically significant variables in both estimates are similar except for service sector variable of current and previous firms. The gender variable is statistically significant and negative, thus more men select new firms than women. It could be related to that women are generally more risk averse than men as substantial literature in economics and finance has concluded (see e.g. Arano et al. 2010; Watson & McNaughton 2007; Charness & Gneezy 2012) since new firms provide risky employment. Individuals who have medium and tertiary education have lower probability of being selected into a new firm compared to those who have only primary education. Individuals born outside of Sweden have higher probabilities to be employed in new firms. These findings are consistent with the findings of Nyström (2011) who find that new firms hire a larger share of immigrants and that the share of employees with post-secondary education are lower in new firms than in incumbent firms. The higher the previous wage, as proxy to reservation wage, is lower the probability of being selected into new firm. Furthermore, those who switch job involuntary are more likely to become employed in new firms. The employment in a new firm is more likely to be in the service sector than in the manufacturing sector. All instrumental variables are significant as we have assumed in line with the first property of a valid instrument. As we expected those who are willing to move have more alternatives to choose from and thus less probability to be selected into a new firm. Those who worked in new firms before the job switch, possibly with higher probabilities of becoming involuntary job mover, have higher probabilities to be employed in new firms again. At the same time those who worked in larger firms before the job switch have lower probability to be selected into new firms.

Table 2 about here

#### The wage equation

The estimates of the wage equations specified in equation 3.1 are presented in Table 3<sup>5</sup>. The log-likelihood test of independence is rejected in favor of joint dependence of the error terms in the system. The correlation coefficients between the error term of the selection equation and the error term of each outcome equation are both positive and significant with larger  $\rho_2$  in magnitude. The model suggests that there is evidence of nonrandom selection into new versus incumbent firms and the OLS estimates, which assume that firm choice is exogenous, may therefore be biased. The signs of the correlation terms,  $\rho_1$  and  $\rho_2$  show positive selection into new and incumbent firms and indicate that individuals who choose to work in new firms earn lower wages in that group than a random individual from the sample would have earned, while individuals in incumbent firms earn higher wages in that group than a random individual from the sample would have earned. Hence our interpretation of the results will be based on the results from the endogenous model.

The estimation results of the endogenous wage equation show that most of the signs of the coefficients are in line with findings of the previous literature. Age has a nonlinear effect on wages with lower wages of younger and older employees. Women and individuals with immigrant background have lower wages in both new firms and incumbent firms. On the other hand individuals with secondary or tertiary education levels compared to primary education, living in Stockholm Gothenburg or Malmo labor market regions and those who are employed in manufacturing or service sector or larger firms have higher wages in both new and incumbent firms. We also observe that the size of the education effect is larger for switchers to incumbent firms compared to new firms. An interesting result to note here is also that involuntary job switchers have lower wages in both new and incumbent firm which was to be expected. However, the size of the effect is identical for incumbent and new firms. Hence, the wage penalty caused by an involuntary job switch is the same for a new employment in a new or incumbent firm. Previous wage variable as a proxy of reservation wages has positive impact on current wages, but this effect is stronger for employees in incumbent firms. It is also interesting to note that employment size has a positive effect on wage and that the size of the effect is larger for switchers to new firms. Somewhat surprisingly, the variables reflecting the profitability of the firms have a negative effect on wage.

Table 3 about here

#### Predicted wage differentials

We use estimation results of the endogenous switching model presented in Table 2 and Table 3 to predict wages and analyze predicted wage gaps between new and incumbent firms. We also investigate the wage penalty in relation to some of the individual characteristics and if the job-switch is voluntary or involuntary. The predicted wages, calculated according to the methodology presented in the last paragraph of section 3, are given in Table 4. Columns 1 and 4 are the unconditional predicted new and incumbent firm worker's annual wages for all individuals in the sample defined as the average predicted value of the new or incumbent firm wage for all individuals in the sample. As we can see from the table unconditional predicted new and incumbent firm average wages for the full sample are 12.55 and 12.56 respectively, which gives a quite small negative wage differential of 1%. This gap is positive only for women and equals 1%. For voluntary job movers, individuals with primary or secondary education this difference is

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<sup>5</sup> We also check robustness by estimating a random sample of employees from the population of incumbent firm workers and obtain similar results.

the same as for the full sample, for individuals with tertiary education it is 2 percent, while for men and involuntary movers the wage differential is about 3 percent in favor to incumbent firm employees. In general unconditional wage differences are small.

Columns 2 and 6 of Table 4 give conditional predicted wages, weighted sample average of the predictions of all individuals in the sample given firm choices. Columns 2 and 6 present average wages of employees in new and incumbent firms who have chosen to work in new and incumbent firms, respectively. The difference between columns 2 and 6 for the full sample is -12 %. The largest differences in this comparison are for men and individuals with immigrant background, which equal -13% and -14%, respectively; while the smallest difference is for involuntary movers and equals -7%. We can observe that for those who actually work in new firms, average wages by observed characteristic are smaller than for those who work in incumbent firms. The conditional wage advantage of employees in incumbent firms also increases by the level of education with higher wage differentials for individuals with secondary or tertiary education compared to those with primary education level.

Columns 3 and 5 present counterfactuals; column 3 presents the potential wage of new firm worker in incumbent firms i.e. what the worker in the new firm could have received if he/she decided to take a position in incumbent firms instead, while column 5 gives the potential new firm wages of incumbent firm workers. The differences between columns 2 and 3 indicate that workers in a new firm would be better off in incumbent firms. On the other hand incumbent firm workers in new firms would potentially earn than those who have selected themselves into incumbent firms (column 5 and 6). Potential wages for new firm workers in incumbent firms are slightly higher than incumbent firm workers in incumbent firms, while potential wages of incumbent firm workers in new firms are higher as compared to new firm workers in new firms associated with larger  $\rho_2$ . To conclude Table 4 shows predicted wage differentials, with and without considering the endogeneity selection bias, give different results indicating that we underestimate wage differentials if we only consider a random selection.

Table 4 about here

## 6. Conclusions

In this paper we study the wage penalty of being employed in a new firm if we take the prospectus to individual workers' experience and status in the labor market into consideration. In order to do so we focus on individuals who make the decision to switch job. In order to study this wage penalty we need to consider if there is a nonrandom selection into employment into new or incumbent firms. Hence, we use an endogenous switching model to account for this possible nonrandom selection. Furthermore, we study if the wage received in an employment after a job switch is affected by if the switch is voluntarily or involuntarily induced. In our analysis we use matched employee-employer data on all firms and employees in Sweden over the period 1998-2010. Firstly, we find evidence of a nonrandom selection into new versus incumbent firms. For instance we find that those who switch job involuntarily are more likely to become employed in new firms. Furthermore, individuals with immigrant background are more likely to be employed in a new firm while individuals with secondary or tertiary education are less likely to take an employment in a new firm.

Our endogenous wage equation estimates indicate that being an involuntary job switcher has an equally negative effect on wages when moving to both new and incumbent firms. Hence, the wage penalty caused by an involuntary job switch is the same for a new employment in a new or incumbent firm. However, we observe that the positive effect of education on wages is more pronounced for job switchers selecting into an incumbent firm. Finally, our analysis of predicted wage differentials, results indicate that we underestimate wage differentials if we only consider a random selection into new firms.

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Table 1. Summary statistics

Variables	Incumbent firm		New firms	
	mean	sd	mean	sd
Age	36.93	10.11	37.00	10.29
Age squared	14.66	7.97	14.75	8.10
Gender	0.30	0.46	0.28	0.45
Immigrant	0.13	0.34	0.14	0.35
Secondary education	0.66	0.47	0.68	0.47
Tertiary education	0.22	0.41	0.17	0.38
Europe and North America	0.06	0.25	0.07	0.25
Non-Europe/North America	0.04	0.18	0.04	0.20
Stockholm	0.35	0.48	0.37	0.48
Gothenburg	0.12	0.33	0.12	0.32
Malmö	0.10	0.30	0.10	0.31
Moved	0.09	0.28	0.08	0.27
Involuntary move	0.14	0.34	0.33	0.47
Current wage	12.56	0.44	12.44	0.46
Manufacturing sector	0.22	0.41	0.07	0.26
Service sector	0.60	0.49	0.68	0.47
Employment size	4.94	2.21	1.33	0.75
Profit per employee	0.01	0.08	0.01	0.65
Wage costs per employee	0.03	0.04	0.02	0.12
Profit margin	-0.00	0.13	-0.00	0.03
Previous wage	12.48	0.43	12.41	0.46
Previous Manufacturing sector	0.21	0.41	0.13	0.34
Previous Service sector	0.60	0.49	0.64	0.48
Previous employment size	4.58	2.25	3.05	2.05
Previous new enterprise	0.06	0.24	0.20	0.40
Observations	2141731		281154	

Table 2. Estimates of the switching equation

Variables	<u>Exogenous model</u> Probit estimation	<u>Endogenous model</u> FIML estimation
Age	0.002 (0.001)	0.002 (0.001)
Age squared	-0.000 (0.001)	0.000 (0.002)
Gender	-0.063*** (0.010)	-0.042*** (0.008)
Immigrant	-0.004 (0.008)	-0.012 (0.008)
Secondary education	-0.041*** (0.004)	-0.035*** (0.004)
Tertiary education	-0.085*** (0.006)	-0.097*** (0.008)
Europe and North America	0.038*** (0.006)	0.025*** (0.008)
Non-Europe/North America	0.067*** (0.012)	0.057*** (0.013)
Stockholm	0.020* (0.010)	0.026** (0.010)
Gothenburg	0.005 (0.010)	0.007 (0.010)
Malmö	0.008 (0.012)	0.009 (0.012)
Previous wage	-0.038** (0.016)	-0.067*** (0.013)
Manufacturing sector	-0.654*** (0.018)	-0.547*** (0.019)
Service sector	-0.070*** (0.006)	0.025*** (0.008)
Involuntary move	0.290*** (0.025)	0.304*** (0.025)
New firm equation instruments for endogenous switching model		
Previous manufacturing sector	0.124*** (0.007)	0.102*** (0.008)
Previous Service sector	0.020*** (0.005)	-0.016*** (0.006)
Previous employment size	-0.132*** (0.002)	-0.129*** (0.002)
Previous new enterprise	0.253*** (0.012)	0.212*** (0.014)
Moved	-0.031*** (0.005)	-0.025*** (0.006)
Constant	-0.187 (0.175)	0.027 (0.135)
N	2415674	2144762

Note: Robust standard errors in parenthesis are clustered at the municipality level. Time dummies are included in the estimation. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01. Pseudo R2=0.10.

Table 3. FIML and OLS estimates of the wage equation

	<u>Exogenous model</u>		<u>Endogenous model</u>	
	OLS estimation		FIML estimation	
	New firms	Incumbent firms	New firms	Incumbent firms
Age	0.009*** (0.001)	0.010*** (0.000)	0.009*** (0.001)	0.010*** (0.000)
Age squared	-0.010*** (0.001)	-0.012*** (0.001)	-0.010*** (0.001)	-0.012*** (0.001)
Gender	-0.039*** (0.003)	-0.053*** (0.002)	-0.041*** (0.003)	-0.055*** (0.002)
Immigrant	-0.011** (0.004)	-0.011*** (0.002)	-0.011*** (0.004)	-0.012*** (0.002)
Secondary education	0.030*** (0.002)	0.040*** (0.001)	0.029*** (0.002)	0.039*** (0.001)
Tertiary education	0.133*** (0.004)	0.148*** (0.002)	0.131*** (0.004)	0.146*** (0.002)
Europe and North America	-0.029*** (0.003)	-0.019*** (0.001)	-0.029*** (0.003)	-0.018*** (0.001)
Non-Europe/North America	-0.055*** (0.004)	-0.035*** (0.002)	-0.054*** (0.004)	-0.035*** (0.003)
Stockholm	0.049*** (0.003)	0.051*** (0.003)	0.049*** (0.003)	0.052*** (0.003)
Gothenburg	0.026*** (0.003)	0.029*** (0.003)	0.026*** (0.003)	0.029*** (0.003)
Malmo	0.027*** (0.003)	0.023*** (0.003)	0.027*** (0.003)	0.023*** (0.003)
Previous wage	0.678*** (0.004)	0.725*** (0.004)	0.675*** (0.004)	0.721*** (0.004)
Manufacturing sector	0.019*** (0.002)	0.025*** (0.002)	0.010*** (0.002)	0.014*** (0.002)
Service sector	0.019*** (0.002)	0.019*** (0.001)	0.019*** (0.002)	0.018*** (0.001)
Involuntary move	-0.018*** (0.002)	-0.025*** (0.001)	-0.008*** (0.001)	-0.008*** (0.002)
Employment size	0.033*** (0.002)	0.006*** (0.000)	0.032*** (0.002)	0.005*** (0.000)
Profit per employee	-0.003 (0.004)	-0.017*** (0.005)	-0.003 (0.004)	-0.018*** (0.005)
Wage costs per employee	0.082 (0.068)	0.457*** (0.105)	0.081 (0.068)	0.465*** (0.107)
Profit margin	-0.109*** (0.033)	-0.004*** (0.001)	-0.108*** (0.033)	-0.004*** (0.001)
Constant	3.697*** (0.054)	3.172*** (0.048)	3.693*** (0.055)	3.241*** (0.053)
N	215064	1929698	2,144,762	2,144,762
R <sup>2</sup>	0.60	0.68		
Adjusted R <sup>2</sup>	0.60	0.68		
Wald test [p-value]			531.78[0.000]	
$\sigma_j^2$ [p-value]			0.275[0.007]	0.246[0.002]
$\rho_j$ [p-value]			0.076[0.008]	0.413[0.019]

Note: Robust standard errors in parenthesis are clustered at the municipality level. Time dummies are included in the estimation. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

Table 4 Predicted wage differentials

Observables	New firm workers			Incumbent firm workers		
	Unconditional	Conditional		Unconditional	Conditional	
	(1)	New firm (2)	Incumbent firm (3)	(4)	New firm (5)	Incumbent firm (6)
Full sample	12.55 (0.34)	12.43 (0.33)	12.56 (0.34)	12.56 (0.35)	12.65 (0.37)	12.55 (0.35)
Women	12.46 (0.32)	12.33 (0.30)	12.47 (0.32)	12.45 (0.33)	12.54 (0.34)	12.44 (0.33)
Men	12.58 (0.34)	12.47 (0.34)	12.60 (0.34)	12.61 (0.35)	12.69 (0.37)	12.60 (0.35)
Involuntary move	12.42 (0.32)	12.36 (0.31)	12.44 (0.32)	12.45 (0.33)	12.55 (0.33)	12.43 (0.33)
Voluntary move	12.57 (0.34)	12.46 (0.34)	12.58 (0.34)	12.58 (0.35)	12.70 (0.38)	12.57 (0.35)
Primary education	12.40 (0.26)	12.30 (0.25)	12.42 (0.27)	12.41 (0.26)	12.50 (0.27)	12.39 (0.26)
Secondary education	12.49 (0.30)	12.38 (0.29)	12.50 (0.29)	12.50 (0.30)	12.60 (0.32)	12.49 (0.30)
Tertiary education	12.83 (0.36)	12.73 (0.40)	12.84 (0.36)	12.85 (0.38)	12.99 (0.44)	12.84 (0.38)
Immigrant	12.49 (0.32)	12.36 (0.31)	12.51 (0.32)	12.50 (0.33)	12.58 (0.35)	12.50 (0.33)
Non-immigrant	12.56 (0.34)	12.44 (0.34)	12.57 (0.32)	12.57 (0.35)	12.66 (0.37)	12.56 (0.35)

All other characteristics are set at the sample mean and the standard errors in parenthesis. Wages are predicted on the basis of the FIML estimates reported in Table 2 and Table 3

## Appendix

**Table A1. Variable definitions**

<b>Variables</b>	<b>Definition</b>
<b>Individual characteristics</b>	
Age	Current age of the worker (years)
Age squared	Age squared/100
Gender	Dummy; 1 if women
Immigrant	Dummy; 1 if with immigrant background (foreign born or domestic born with two foreign-born parents)
Primary education	Dummy; 1 if highest education attained is lower secondary education 9 (10) years
Secondary education	Dummy; 1 if highest education attained is upper secondary 3 years, secondary education or post-secondary education less than two years
Tertiary education	Dummy; 1 if highest education attained is post-secondary education 3 years or more or graduate
Sweden	Dummy; 1 if born in Sweden
Europe and North America (d)	Dummy; 1 if born in Europe or North America
Non-Europe/North America (d)	Dummy; 1 if born in a country outside of Europe or North America
Stockholm	Dummy; 1 if residence municipality in Stockholm labor market region
Gothenburg	Dummy; 1 if residence municipality is Gothenburg labor market region
Malmö	Dummy; 1 if residence municipality in Malmö labor market region
Moved	Dummy; 1 if moved to another municipality
Current wage	Annual wage in the current job (logarithm of wages)
Previous wage	Annual wage in the previous job (logarithm of wages)
Involuntary move	Dummy; 1 if switched job involuntary or job-to-job transitions through firm closure
<b>Current enterprise characteristics</b>	
Manufacturing sector	Dummy; 1 if the current enterprise is in a manufacturing sector <sup>6</sup>
Service sector	Dummy; 1 if the current enterprise is in a service sector <sup>7</sup>
Employment size	Current enterprise's employment size (logarithms of the number of employees)
Profit per employee	Sales (revenue)-per-employee ratio of the current enterprise (SEK/10000).
Wage costs per employee	Wage costs per employee ratio of the current enterprise (SEK/10000)
Profit margin	Profit margin of the current enterprise, the net profit as a share of the revenue (SEK/10000)
New enterprise	Dummy; 1 if the current enterprise is a new firm according to our definition
<b>Previous enterprise characteristics</b>	
Previous manufacturing sector	Dummy; 1 if the previous enterprise was in a manufacturing sector
Previous service sector	Dummy; 1 if the previous enterprise was in a service sector
Previous employment size	Previous enterprise's employment size (logarithms of the number of employees)
Previous new enterprise	Dummy; 1=Previous enterprise was new (0-3 years old since its establishment)

<sup>6</sup> Based on SNI2002, category D. See: SNI 2002 Swedish Standard Industrial Classification, Statistics Sweden 2003.

<sup>7</sup> Based on SNI2002, categories G-K. See: SNI 2002 Swedish Standard Industrial Classification, Statistics Sweden 2003.