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WORKER FLOWS, JOB FLOWS AND ESTABLISHMENT WAGE DIFFERENTIALS: ANALYZING THE CASE OF FRANCE

Richard Duhautois[1], Fabrice Gilles[2] and Héloïse Petit[3]

Abstract – We address the relation between establishment wage differentials and worker flows, *i.e.,* the churning rate and the quit rate. Our analysis is based on a linked employer-employee dataset covering the French private non-farm sector from 2002 to 2005. Our estimations support the hypothesis that wage premium is an efficient human resource management tool to stabilize workers: churning rates are lower in high-paying firms due to lower quit rates. We further show that the relation is not linear, and it differs among skill groups and according to establishment size: it is strongest for low-wage levels, for low-skilled workers and in large establishments.

Keywords: *establishment wage effects, worker flows, churning rate, quit rate, linked employer-employee panel data, France.*

JEL* Classification*: J31, J63, C23.

FLUX DE MAIN-D'ŒUVRE ET SALAIRES : UNE ANALYSE EMPIRIQUE À PARTIR DE DONNÉES APPARIÉES INDIVIDUS-ÉTABLISSEMENTS

Résumé – Dans cet article, nous étudions la relation entre salaires et flux de main d'œuvre au niveau établissement. L'analyse empirique se fonde sur un large échantillon d'établissements français constitué à partir de l'appariement de données administratives (DADS et Ficus) et de données d'enquêtes (EMMO-DMMO) entre 2002 et 2005. Nous montrons que les taux de mobilité sont plus faibles dans les établissements qui distribuent des salaires plus élevés et cela s'accompagne de taux de démissions plus bas. En outre, nous montrons que la relation entre les salaires et les flux de main-d'œuvre n'est pas monotone et dépend de la qualification des salariés et de la taille des établissements : elle est particulièrement forte pour les établissements qui distribuent des très bas salaires, parmi les salariés les moins qualifiées et dans les grands établissements. Ces résultats sont cohérents avec l'hypothèse que la politique salariale d'un établissement est un moyen efficace de stabiliser la main-d'œuvre.

Mots clés : *salaire, flux de main-d'œuvre, taux de démission, taux de churning, données appariées employeurs-salariés, France.*

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I. Introduction

In this paper, we address the influence of establishment wage differentials on worker flows and job flows. The term worker flows refers to all movements of workers in and out of jobs, whereas job flows measures the gross creation and destruction of jobs. Our research stands at the junction of two diverse strains of economic literature. The first strain focuses on the employer effect on wages. The second strain analyzes job and worker flows. The diffusion of matched employer-employee data has enabled the development of both literature fields since the 1990s, but the connection between the two has only recently been made. We construct a unique data set that links complete establishment-level information on job and worker flows with wage information to study in detail the empirical relations between job flows, worker flows and wages. Our data concern France between 2002 and 2005.

Seminal publications by Davis and Haltiwanger (1990, 1992) on gross job flows statistics led the way to several analyses in the US and other countries. A sizeable literature has developed in the fields of labor and macro economics to measure and explain the various statistical and economic relations among the levels of gross job creation and destruction and worker flows. Better access to detailed microeconomic data has played a crucial role in this movement. One of the main results is the importance of idiosyncratic firm-level characteristics in explaining both job and worker flows (Davis and Haltiwanger, 1999). Studying the relative magnitudes of job and worker flows, Burgess, Lane and Stevens (2000, 2001) propose the useful notion of "churning flow" as the worker turnover in excess of job flows. One main result identified by these authors is that churning is not randomly distributed across employers but is highly persistent in particular employers. They consider churning profiles as an equilibrium phenomenon that is associated with a particular set of optimal personnel policies. The literature yields a series of results regarding the correlation between wages and mobility rates.

In their article, Burgess, Lane and Stevens (2000) use Maryland administrative data (all industries, from 1985 to 1994) to show the relationship between hires and separations varies with average wages. Similarly, with Finnish data (all industries, 1991 to 1997), Ilmakunnas and Maliranta (2007) find that wages explain the churning rates, inflows and outflows. Some studies are directly focused on analyzing the effect of wage levels on mobility.[4] For the US, authors often focus on the links between fringe benefits and mobility. Reviewing empirical literature on the relations between health insurance, labor supply and mobility, Gruber and Madrian (2002) conclude that fringe benefits play an important role in job mobility decisions. Combining five data sources, Decressin, Hill, McCue and Stinson (2009) construct a longitudinal matched employer-employee database over the period 1997-2003.

In all specifications, they estimate that benefits are negatively related to churning rates in the US. Rather, in the European context, compensation schemes are considered as a whole. For instance, Barth and Dale-Olsen (1999), using data for Norway (1990, all sectors), find that establishment-specific wage premiums have a significant negative impact on excess turnover, but this is only true for establishments with at least 25 employees. In a later study, Dale-Olsen (2006), still using Norwegian data (1996-1997, all sectors), considers the combined influence of fringe benefits and wages on mobility. He concludes that there is a relationship between high fringe benefits and high wages and both reduce the worker turnover rate. Haltiwanger and Vodopivec (2003) use administrative Slovenian data (all business sectors, 1997-1999) to show that idiosyncratic wage policies of firms are closely related to

[4] Note that we focus on establishment effects and therefore exclude studies analyzing the link between wage and mobility at the individual level (Farber, 1999, Altonji, Smith and Vidangos, 2009). These studies consider the impact of worker wage profile on his/her mobility.

observed patterns of worker and job flows at the firm level. Using Portuguese data (1986 to 2000, all sectors), Martins (2008) similarly shows that churning is negatively related to average wages at the firm level. In a comparative study, Lazear and Shaw (2008) show that a negative correlation between worker flows and wage levels is common to the ten OECD countries studied.

Considering the French case, Kramarz and Pérez-Duarte (2008) use a matched employer-employee dataset from 1977 to 1996 to show that the correlation between the average firm wage and exit and entry rates is consistently negative throughout the years studied. Abowd, Kramarz and Roux (2006) use a longitudinally linked employer-employee dataset that includes complete information about firms and workers for the 1976-1996 period of time. The sample is restricted to firms with 200 worker-observations or more so that firm-specific mobility and wage process can be estimated. They study the connections among firm-level compensation, promotion, retention policies and firm-level performance. Modeling the joint distribution of these characteristics in the populations of individuals and firms, the authors contrast high-wage and low-mobility firms with those that pay low wages and are high-mobility firms. They infer some hypotheses from their results regarding who initiates the separation, but their database does not enable them to test such questions.

The studies reviewed above all find a strong negative link between mobility and compensation. They are grounded on diverse methodologies, and the way in which wages are taken into account is particularly unstable. Our study proposes a new definition of an establishment's impact on wages to specify the outline and limits of the relation between wage and mobility at the establishment level: do we have a linear relation, and does it hold for all types of workers?

We also question the channel through which the relation runs: do workers in firms paying higher wages actually have a lower probability of quitting? The question of who initiates the separation has not been addressed in previous analyses of the link between establishment wage premium and mobility, even though it emerges as a crucial one in the literature (Abowd, Kramarz and Roux, 2006). Some early works focus on quit rates at the industry level and show its positive link with industry-level average wages (Stoikov and Raimon, 1968, Burton and Parker 1969, Pencavel, 1969). More recently, the question has been raised in management literature. Following the exit-voice framework (Hirschman, 1970), some studies try to identify the human resource practices favoring voice and lowering the predicted quit rate. Among these practices, they point out the negative impact of pay on quit rates (Batt, Colvin and Keefe, 2002, Haines, Jalette and Larose, 2010). Yet, these studies consider wage levels as part of a set of complementary human resource management (HRM) practices and are based on relatively basic definitions of the level of pay[5].

Our database is built as the matching of three different datasets (two administrative databases and a survey). Our final sample comprises about 45,000 establishments per year with ten employees or more. It links information on workers, their mobility patterns, and establishment level characteristics. We have information on each worker inflow or outflow; worker and job characteristics are described, as are the legal nature of the movement. We are then able to isolate quits among outflows. All of our estimations are run over the entire sample and are run separately for different skill groups, enabling us to estimate the link between churning rates and pay policy by skill groups. We are then able to follow up on the questions raised in Lane, Salmon and Spletzer (2007) when they showed establishment wage differentials are common to all individuals in an establishment. We also differentiate our estimations by establishment size, suspecting that wage policy does not have the same

[5] Moreover, papers mostly refer to the individual level, linking individual wages to the propensity to quit, whereas we focus on the establishment or organizational-level.

influence for each establishment size. Throughout our analysis, spline regressions are used to investigate for potential nonlinearity.

Our results support the hypothesis of wage policy as an efficient HRM tool to stabilize employees: churning rates are lower in high-paying firms and this is notably due to lower quit rates. Our estimations show that the link between establishment wage effects and the churning rate is not linear: the negative correlation is particularly strong for establishments in the lower quintiles of the wage premium distribution. Moreover, the correlation is stronger for low-skilled workers and in large establishments. The pattern is similar for the relation between establishment wage premium and quit rate, implying that the decision to quit was influenced by the employer's wage policy.

The paper is organized as follows. In Section II, we describe the data. In Section III, we investigate the wage policy issue. Section IV displays the variable definitions and the econometric strategy. Section V shows our estimation results. Section VI concludes.

II. Variables, definition and measures

In this section, we describe our empirical strategy to estimate the establishment wage effects and their link to worker mobility. Our empirical strategy includes two stages: *first,* estimate establishment wage effects, and *second,* estimate their relationship with labor mobility patterns. We will start with a rapid review of the literature on estimating an establishment's impact on wage because the methodology we used in the first stage constitutes an original contribution.

1. Estimating an establishment's impact on wages

Since the 1980s, empirical studies have accumulated evidence that the driving forces behind wages include labor demand. Analyzing a firm's impact on wage started with the estimation of industry wage differentials. Dickens and Katz (1987) and Krueger and Summers (1988) show a large difference in wages across industries (controlling for individual characteristics). Since the 1990s, access to more detailed establishment statistics has opened the way to more direct estimation of establishment wage differentials. For instance, Groshen (1991) describes an establishment wage effect based on an analysis of the variance of wages (data from the Bureau of Labor Statistics Industry Occupational Wage Surveys for six manufacturing industries in the mid-1970s). She shows intra-industry wage differentials to be almost as large as inter-industry wage variations. With a similar methodology and using more recent data (the Bureau of Labor Statistics White Collar Pay Survey for 1989 and 1990), Bronars and Famulari (1997) estimate that nearly one fifth of individual wage variation is due to establishment wage differentials. More recently, Lane, Salmon and Spletzer (2007) use the 1996 and 1997 Occupational Employment Statistics to estimate establishment wage differentials and their variation among occupations. The key finding of their article is that the establishment accounts for about 20% of wage variation without controlling for observable employer characteristics, and about 10% after controlling. Kaplan and Pierce (2005) utilize a similar method to investigate the question of how establishment wage effects combine at the firm level. Controlling for industry and occupation effects, they find that wage levels, but not wage changes, are correlated across establishments within a firm. Using a similar methodology, Martins (2003) analyzes Portuguese data for the clothing industry over the 1991-1994 period and show there is a sizeable and persistent dispersion of firm effects.

In a parallel manner, other studies utilize descriptive statistics to decompose wage variance into within and between components. Davis and Haltiwanger (1991), for instance,

use industry data associated with establishment-level information in the manufacturing industries (Longitudinal Research Database) and individual worker information (Current Population Survey) over the period 1963-1986. They find that observable establishment characteristics more successfully account for inter-industry wage differentials than observable worker characteristics. Lazear and Shaw (2008) propose an international comparison with a longitudinal perspective on wages. The publication consists of ten national studies referring to the structure of wages in the US, Denmark, Sweden, Finland, Norway, West-Germany, the Netherlands, Belgium, France and Italy. In the first chapter, they use data from all ten countries to outline general patterns in wage structure. One of the empirical regularities they find is that between-firms variance in wages appears to be increasing over time. In addition to obvious differences in skills, the authors argue that these differences in wages are the consequence of differences in wage policy. Over the past decades, the existence of establishment wage effects has remained as a consistent result of studies based on variance analyses.

Another estimation method used in the literature takes advantage of the panel dimension of the data. Using matched person and firm longitudinal data for France over the period 1976-1987, Abowd, Kramarz and Margolis (1999) estimate wages controlling for both observable and unobservable heterogeneity in workers and their employing firms. They find that person effects are statistically more important than firm effects in explaining compensation and performance outcomes. Even though the authors underline that firm effects are second to person effects, their study importantly shows that firm effects remain robust despite controlling for individual observable and unobservable characteristics. Abowd, Karmarz, Margolis (1999) further point out the potential role of assortative matching in understanding wage levels. Over the last decade, an empirical literature emerged with the goal of assessing the existence and sign of assortative matching in the labor market. Some studies point out a small or negative correlation between worker and firm wage effects (Abowd, Kramarz and Margolis, 1999, Barth and Dale-Olsen, 2003). At the industry level, Martins (2004) also shows that industry wage differentials are not caused by the over-representation of high-ability workers. In fact, recent studies mostly insist on the difficulties inherent in the joint estimation of person and firm effects on wages. For instance, Woodcock (2008) raises the need to estimate a match effect in parallel to firm and worker effects. Mendes, van den Berg and Lindeboom (2010) point out the difficulty in identifying assortative matching from wage data and turn to productivity estimations. Andrews, Gill, Schank and Upward (2008) show that the estimated correlation is biased downwards and this bias is bigger the fewer movers there are in the data. In the same vein, Abowd, Kramarz, Pérez-Duarte and Schmutte (2010) stress the lack of heterogeneity in the workforce and available jobs undermine the relevance of empirical estimation of assortative matching. One needs movers to disentangle firm and person effects, which imposes quite strict restrictions on the full use of the data. On a theoretical basis, it is also difficult to dissociate what is due to the firm or the individual in selection bias (Eeckout and Kircher, 2009). In this context, we choose to focus on estimating establishment unobservable characteristics as that establishment's wage effect, controlling for observable individual characteristics. The literature suggests that this may lead to an underestimation of establishment wage effects but, at the same time, it enables us to take full advantage of the wide scope of our data.

2. First step. Estimating a wage equation

Consider a wage determination model of the form:

$$Log(Wage_{it}) = a + bZ_i + cX_{it} + \lambda_t + \Phi_{it}, \text{ with } \Phi_{it} = \Delta_i + \varepsilon_{it} \qquad (1)$$

where the subscripts *i* and *t* denote establishment and time, respectively. The vector Z_i describes the non-time-varying explanatory variables (industry, region and the legal status of the establishment) and X_{it} the time-varying explanatory variables (establishment size, the share of skilled and unskilled workers, the age structure of the labor force, the establishment labor productivity, profit and the value-added variation rate). λ_t is a time dummy for each t, and ε_{it} is an error term with standard properties. Δ_i is the establishment fixed-effect.

We define an establishment's effect on wage as its specific contribution to the total variance of wages, *i.e.,* Φ_{it}. Φ_{it} estimates the extent to which an establishment *i*'s average wage at time *t* differs from what would be expected given its observable characteristics and that of its workforce. By construction, we are unable to test what is involved in the determination of Φ_{it}. To downplay this problem, we use the panel dimension of our data, *i.e.,* we refer to the establishment's fixed effect Δ_i (thereby excluding the yearly error term ε_{it} from Φ_{it}). Doing so, we make the hypothesis that a given establishment tends to have a stable position in the distribution of wage effects. In the next section, we utilize yearly estimations of *(1)* to illustrate the validity of such a hypothesis.

We use our panel data to run FE-OLS estimation of equation *(1)* and obtain $\hat{c}_w$, the within estimates. This is done using the Mundlack (1978) method to take into account the fact that we have an unbalanced panel (more than forty percent of establishments only appear in one year, whereas 17% of the establishments are followed over the four years). We calculate the fixed-establishment effect by the expression: $\hat{\Delta}_i = \overline{\log(wage)}_i - \hat{c}_w \overline{x_i}$ where $\overline{x_i}$ is the temporal mean of X_{it}. Finally, $\hat{\Delta}_i$ is estimated for every establishment in the sample. In line with the literature on an establishment's impact on wages, our hypothesis is that the establishment fixed-effect, Δ_i, represents establishment *i*'s specific influence on wage, its *wage premium*. We refer to an establishment's persistent effect on wage dispersion as its wage policy.

3. Questioning the stability of establishment wage effects

Given our longitudinal database, we are able to estimate our wage determination model *(1)* for each year. Using pooled-OLS, we estimate Φ_{it} as $\hat{\Phi}_{it} = \log(Wage_{it}) - E[\log(Wage_{it})/Z_i, X_{it}]$ and consider it as a proxy for $\hat{\Delta}_i$. Estimates of the temporal mean of $\hat{\Phi}_{it}$ over the four years and $\hat{\Delta}_i$ are highly correlated at the establishment level (0.64).

For each establishment, we obtain four estimations of yearly-defined wage effects. We use transition matrices to test whether or not the wage policy of the employer varies throughout the four year time period. We calculate the following indicator:

$$P_i(t,t+k) = \frac{n_{i,j-1}(t,t+k) + n_{i,j}(t,t+k) + n_{i,j+1}(t,t+k)}{n_{i\bullet}(t)} \text{ for } i=j,\ \forall t, \forall k$$

where $n_{i,j}(t,t+k)$ is the number of establishments whose $\hat{\Phi}_{it}$ changes from decile *i* to decile *j* between the years *t* and *t+k,* and $n_{i\bullet}(t)$ is the number of establishments whose $\hat{\Phi}_{it}$ is in the

decile *i* at time *t*. $P_i(t,t+k)$ estimates the share of establishments whose position in the wage premium distribution is unchanged (in the same decile) or little changed (in the next or previous deciles). Table 1 presents the $P_i(t,t+k)$ value for each decile (*i= 1* to *10*), for both the whole time period and for year-to-year during the period 2002-2005. The table shows that the distribution of $\hat{\Phi}_{it}$ is quite stable over time. For instance, 75.1% of the establishments that were in the second decile (D2) in 2002 are in the first (D1), in the second (D2) or in the third (D3) in 2003. Of course, the $P_i(t,t+k)$ values for the transition between the years 2002 and 2005 are smaller than yearly probability of transitions. The wage policy of the employer evolves slowly, staying quite stable over the 2002-2005 period of time. This stability justifies the utilization of the estimated fixed effect $\hat{\Delta}_i$ as a proxy for an establishment's wage policy over this period.

4. Second Step. Estimation of the labor mobility equation

In the second step, we turn to the estimation of labor mobility equations. Consider a labor mobility determination model of the form:

$$Log(Rate_{it}) = \alpha + \beta Z_i + \gamma X_{it} + \rho\hat{\Delta}_i + \lambda_t + \varepsilon_{it} \qquad (2)$$

where $Rate_{it}$ refers either to the churning rate or the quit rate. Z_i describes the non-time-varying explanatory variables and X_{it} the time-varying explanatory variables, λ_t are time dummies and ε_{it} is an error term with standard properties. $\hat{\Delta}_i$ is the estimated wage establishment effect. As $\hat{\Delta}_i$ does not depend on time (ρ is our parameter of interest) and there are many zeros for each rate, we estimate this equation with Tobit models on the pooled sample.

We also run an alternative estimation method to investigate nonlinearities in the relation between the wage premium and mobility ratios. A Spline Regression Model (SRM) breaks the regression line into segments, and the regression lines of each segment are joined by knots, thus avoiding discontinuity (Marsh and Cormier, 2002). Because we do not know in advance the locations of the different knots, we divide the establishment wage policies into quintiles (Q_1, Q_2, Q_3, Q_4). Thus, we have five segments: 0 to 20%, 20% to 40%, 40% to 60%, 60% to 80% and 80% to 100%. Equation *(2)* becomes the following equation *(2'):*

$$Log(Rate_{it}) = \alpha + \rho_0\hat{\Delta}_i + \rho_1\delta_{1i} + \rho_2\delta_{2i} + \rho_3\delta_{3i} + \rho_4\delta_{4i} + \beta Z_i + \gamma X_{it} + \lambda_t + \varepsilon_{it} \quad (2')$$

where $\delta_{1i} = D_1(\hat{\Delta}_i - Q_1)$, $\delta_{2i} = D_2(\hat{\Delta}_i - Q_2)$, $\delta_{3i} = D_3(\hat{\Delta}_i - Q_3)$, $\delta_{4i} = D_4(\hat{\Delta}_i - Q_4)$.

D_1, D_2, D_3, D_4 are dummy variables based on the value of $\hat{\Delta}_i$ such that for each $k = 1,2,3,4$, $D_k = 0$ when $\hat{\Delta}_i \le Q_k$ and $D_k = 1$ when $\hat{\Delta}_k > Q_1$. By substituting for δ_{1i}, δ_{2i}, δ_{3i} and δ_{4i}, equation *(2')* becomes

$$Log(Rate_{it}) = \alpha + \rho_0\hat{\Delta}_i + \rho_1 D_1(\hat{\Delta}_i - Q_1) + \rho_2 D_2(\hat{\Delta}_i - Q_2) + \rho_3 D_3(\hat{\Delta}_i - Q_3) + \rho_4 D_4(\hat{\Delta}_i - Q_4) + \beta Z_i + \gamma X_{it} + \lambda_t + \varepsilon_{it}. \qquad (2'')$$

OLS is used to estimate the equation *(2'')*, which can be divided into five segments according to the value of $\hat{\Delta}_i$:

From 0 to Q_1 :

$$Log(Rate_{it}) = \alpha + \rho_0 \hat{\Delta}_i + \beta Z_i + \gamma X_{it} + \lambda_t + \mu_i + \varepsilon_{it}$$

From Q_1 to Q_2 :

$$Log(Rate_{it}) = (\alpha - Q_1\rho_1) + (\rho_0 + \rho_1)\hat{\Delta}_i + \beta Z_i + \gamma X_{it} + \lambda_t + \mu_i + \varepsilon_{it}$$

From Q_2 to Q_3 :

$$Log(Rate_{it}) = (\alpha - Q_1\rho_1 - Q_2\rho_2) + (\rho_0 + \rho_1 + \rho_2)\hat{\Delta}_i + \beta Z_i + \gamma X_{it} + \lambda_t + \mu_i + \varepsilon_{it}$$

From Q_3 to Q_4 :

$$Log(Rate_{it}) = (\alpha - Q_1\rho_1 - Q_2\rho_2 - Q_3\rho_3) + (\rho_0 + \rho_1 + \rho_2 + \rho_3)\hat{\Delta}_i + \beta Z_i + \gamma X_{it} + \lambda_t + \mu_i + \varepsilon_{it}$$

From Q_4 to the highest value of $\hat{\Delta}_i$:

$$Log(Rate_{it}) = (\alpha - Q_1\rho_1 - Q_2\rho_2 - Q_3\rho_3 - Q_4\rho_4) + (\rho_0 + \rho_1 + \rho_2 + \rho_3 + \rho_4)\hat{\Delta}_i + \beta Z_i + \gamma X_{it} + \lambda_t + \mu_i + \varepsilon_{it}$$

5. Mobility indicators

We incorporate concepts from the literature on job and worker flows to analyze the effect of the employer's wage policy on worker turnover (see, for instance, Burgess, Lane and Stevens, 2000 and 2001 or Davis, Haltiwanger and Schuh, 1996). We use the churning rate of the establishment as a measure of excess turnover. For each establishment, we calculate the employment change during one year (ΔEMP_{it}). It can be either positive or negative, alternatively constituting a job creation or job destruction rate. We also calculate the worker flow as the sum of hires and separations during the year (WF_{it}). The *churning flow* is then defined as worker flow minus the absolute value of variation in employment. We divide the churning flow by the average stock of workers (ASW_{it}) between *t-1* and *t* to obtain the *churning rate* (CR_{it}):

$$CR_{it} = \frac{WF_{it} - |\Delta EMP_{it}|}{ASW_{it}}$$

The churning rate is an indicator of worker excess turnover, but it does not enable us to distinguish voluntary movements from involuntary ones. To analyze the kind of job flows at play, we further estimate quit rates at the establishment level, *i.e.,* the share of quits out of total employment.[6]

III. The data

1. Data sources

[6] Such an indicator simultaneously grasps information on the level of outflows and their nature. Given our data, we were able to test distinguishing the two by considering the churning flow and a different definition of the quit rate, *i.e.,* the share of quits among outflows. Our estimations results were very similar to those reported below, so we chose to keep the indicator most used in the literature for comparability reasons.

We use data from two different administrative sources available at the INSEE (the French national statistical agency) and a survey from the Ministry of Labor (DARES). The first data source is the DADS (*Déclarations Annuelles de Données sociales),* which is a matched employer-employee longitudinal data source, constructed from firm reports to the tax authority. The second source is another administrative source called FICUS (*Fichiers unifiés de SUSE, Système Unifié de Statistiques d'Entreprises*), which gives measures of employment, value-added and other economic outcomes for most French firms. The third source is a survey called DMMO-EMMO (*Déclarations sur les Mouvements de Main d'Œuvre - Enquête sur les Mouvements de Main d'Œuvre*), which reports information about workers' entry and exit. Below, we describe both the methods used for extracting variables and the matching process.

The DADS data source includes data on all wage earners employed in private and semi-public establishments. The INSEE receives information from the tax authority to produce statistics about employment and wages. They compute an exhaustive dataset in which all workers and establishments are followed for two years. For each establishment, individual wages, employment periods, age, sex and the skill level of the workers are measured very precisely. In this article, we use the data for years 2002 to 2005. Each year, the data include more than 1.5 million establishments.

The DMMO-EMMO survey has two components: an exhaustive section for establishments with 50 employees or more and a survey for establishments employing between 10 and 49 employees. The *"Déclarations des Mouvements de Main-d'Œuvre" (DMMO)* is a monthly survey, whereas the *"Enquête sur les Mouvements de Main-d'Œuvre" (EMMO)* is a quarterly survey. Both surveys measure all workforce movements (entry and exit) for a given establishment. For each movement, we know the legal form of the contract (fixed-term or open-ended contract), the legal form of the separation (layoffs, quits, retirements, *etc.*) and worker characteristics (sex, qualification, age and tenure). There are about 80,000 establishments each quarter, and half of them have 50 employees or more. Each quarter, about 900,000 movements take place in and out of these establishments.

The FICUS dataset (run by the INSEE) computes economic and financial information at the firm level. It consists of various economic situation indicators: value-added, capital investment, firm's profits, *etc.* The data are based on tax report and survey information. Their sample encompasses all firms that are subject to the two major tax regimes, *i.e.,* almost the entire productive system. The data were collected for the period 2000-2005. For each year, we have a sample of approximately 1.5 million firms (with at least one salaried employee).

2. The merging process

We first group the number of worker entries and exits by type of contract at the annual level in DMMO-EMMO files. We check that the sum of employment at the beginning of the year plus the difference between total entries and total exits by year equals the sum of employment at the end of the year. When this is not the case (for 47% of establishments), we keep the recalculated variable. The difference between the recalculated variable and the value in the data is usually 1 employee. We only use establishments with all 4 quarters available (we lose 16% of our sample). The yearly aggregated DMMO-EMMO files contain 65,000 establishments on average. The data concern only the private non-farm sector.

As the DADS files contain information on all workers employed in private and semi public establishments in France, the files are grouped by region (there are 22 regions). For each year, we aggregate all the workers' information by establishment, and we merge the grouped data with aggregated DMMO-EMMO year by year, imposing the presence of

establishments in DMMO-EMMO. After merging these two files, we have 56,748 establishments in 2002, 59,353 in 2003, 60,601 in 2004 and 57,625 in 2005. Then, among DMMO, we control for continuous presence by eliminating all establishments missing information for one year and present again in the next year: for instance, establishments that are present in 2002 and 2004 but not in 2003 are eliminated. We have an unbalanced panel of 228,511 establishment-years. These establishments correspond to 175,645 firm-years. Last, we use FICUS to get firm economic and financial variables. We introduce information about the economic health of the firm to which the establishment belongs. We use information from the years 2000 to 2005 to lag these variables. We eliminate extreme values on log wage. After these restrictions, the panel contains 184,075 establishment-years, *i.e.,* for each year, we use information approximately corresponding to 45,000 establishments with 10 employees or more.

3. Control and dependant variables

The dependant variables are taken from the DADS and the DMMO-EMMO. First, the DADS data provide information about mean net hourly wages at the establishment level and among each skill group. The DMMO-EMMO provides complete information on worker in- and out-flows. Combining the two, we calculate the churning rates and the quit rates.

X_{it} is a matrix of covariates that can control for compositional changes. We take into account three types of covariates: standard characteristics of establishments, economic health indicators and workforce structure indicators. The first group of variables encompasses the following: a dummy variable indicating the class size of the establishment in terms of the number of employees ([1,19], [20,49], [50,249], [250,499], [500 and more]); a dummy variable indicating whether the establishment belongs to a financial group; three indicators of the economic health of the firm to which the establishment belongs, *i.e.,* the value-added variation rate, the apparent labor productivity ratio and a profits rate, calculated as Gross Operating Surplus (GOS) divided by the amount of capital investment. We lag these three variables by one year and construct dummies for each quintile of their distribution. When estimating mobility ratios (churning rate or quit rate), we further control for total employment change at the establishment level. We introduce a dummy differentiating the states of stable employment, growing and reducing workforce.

The set of non-time-varying explanatory variables (Z_i matrix) includes the industry (captured by dummy variables at two digit levels, NAF16); the region (captured by 22 dummy variables) and a dummy variable for firm legal status. Concerning the workforce structure indicators, we include, at the establishment level, the share of women, the share of part-time workers, the share of unskilled and skilled workers (3 levels), the share of young workers (younger than 30) and the share of old workers (50 years old and more).

All estimations are run on the whole sample and also run separately for different skill groups. Consistently with results presented by Martins (2004), Lazear and Shaw (2008) and Lane, Salmon and Spletzer (2007), our estimations of wage effect show that wage premiums are coherent among different skill groups: inside an establishment, skill groups' wage-effects are significantly positively correlated. Unsurprisingly, we also see that the closest skill groups exhibit the highest correlation coefficients. Studying the link to mobility patterns, we will see this similarity in wage premiums among skill groups does not entirely hold in terms of the link between wage and excess turnover.

IV. Estimation results

1. The magnitude of churning flows and its link to the wage effect

For 2005, the median churning rate is 0.33 over the whole sample. Considering different skill groups, the median churning rate decreases with the skill level (0.27 for low-skilled, 0.17 for medium-skilled and 0.09 for high-skilled workers). These estimations are in line with those reported in the literature for France and other countries. Bassanini and Marianna (2009) actually point out that churning flows are similar across countries, whereas worker flows display much more variation.

Table 2 presents estimations of the link between the wage premium and the churning rate for the whole sample.[7] The first column presents the conditional correlation as estimated by equation *(2)* and the second column presents the estimated coefficient for each segment of equation *(2')*. The second column, showing spline regression estimations, allows potential nonlinearities to appear. Most tables in this article have the same format. The estimation for the whole sample shows that firms paying high wages have a low churning rate: the estimated ρ is - 0.299. This result upholds the hypothesis that firms utilize their wage policy as a HRM tool to stabilize employees.

The spline regression estimation further shows that this relation is not linear. Figure 1 shows a straight line illustrating the relation as estimated with OLS, and a curve based on the five gradients estimated for each segment with the spline regression. For the first segment, *i.e.,* the very low paying firms, the slope is -1.212, indicating that the correlation is very strong for these firms. The higher the wage premium, the weaker the relation between the wage premium and the churning rate is. The relation is most intense for establishments with wage premiums in the first quintile; for the upper quintile, this relation is even positive. Our hypothesis is that from a certain level of compensation, wages are no longer a stabilizing device. At this point, stabilizing workers may imply the use of different HRM tools. It is as if paying more could even become counter-productive, *i.e.,* associated with higher churning rates.

2. The link between wages and churning flows by establishment size

We further address the impact of establishment size on the link between wage premium and excess turn-over. We distinguish establishments with fewer than 50 employees from those with 50 employees or more. Such a threshold is logical for our dataset (*cf*. the distinction between EMMO and DMMO), but it is also, and more fundamentally, an important threshold in French labor law: numerous obligations only apply to firms with over 50 workers. Tables 3a and 3b present the estimation of the conditional correlation of wage effect and churning rates separately for small and large establishments respectively.

For both types of establishments, the relation is negative and strongly significant (-0.321 and -0.169 respectively). The OLS estimated coefficient for small establishments is greater in magnitude than that for large establishments. Partitioning the relation according to wage premium quintiles, we show that this result is actually due to the linearity imposed in OLS regressions. In fact, the relation is close to linear for small establishments, whereas it is clearly nonlinear for large establishments. Consequently, if the coefficient for the OLS estimation in large establishments is small, it is because the correlation is intensely negative for low paying firms (with a -2.628 coefficient for the first quintile) and becomes positive in the upper part of the distribution (up to 0.434 for the upper quintile). Ultimately, whereas the OLS estimation showed a smaller coefficient in large establishments than in small ones, the link between wage effect and churning is more intense as we distribute it all along the wage

[7] Full specifications are available upon request.

distribution. Churning seems more strongly linked to the level of wage premium in large establishments, whereas excess turnover has less to do with the wage policy in small ones. One interpretation of these results is that there is less scope for wage policy in small establishments and workers know it. In large establishments, the threshold at which the coefficients are positive and significant is relatively low, *i.e.,* for wage premiums over the medium quintile. This result might be the consequence of higher expectations of workers in large establishments. These establishments are expected to provide *at least* meaningful wage premiums: if this is not the case, workers will be hard to retain, and when it is the case, it may not be enough to retain them. In large establishments, paying relatively high wages is not enough to prevent churning.

3. The link between wages and churning flows for different skill groups

We now turn to the estimation of the relation between establishment wage effects and churning among different skill groups. The relation between wage effect and turnover is estimated for the restricted sample of establishments that actually employ each of the three types of skill levels (107,975 establishments), as well as for each skill group taken separately.[8] Estimations for the restricted sample are quite close to those for the whole sample (as presented in Table 2).[9] The spline regression estimation confirms the shape of the relation between wage effect and churning rate is an inverted J-curve, yet the relation is closer to a linear relation than the previous estimation.

Tables 4a to 4c show estimation results for the different skill groups. The tables show that the negative relation between wages and churning holds for each subgroup taken separately. The negative relation between wages and excess turnover appears to be particularly strong for low-skilled workers (-1.229) and medium-skilled workers (-0.820), and weaker for high skilled ones (-0.121). For the latter, we suspect the range of potential HRM tools aiming at stabilizing workers is wider: there is the span of responsibility, and they also have more frequent access to training, for example.

The separate spline regression estimations show that the relation is more intense in high paying firms for medium and low-skilled workers, whereas it is more intense in low paying firms for high-skilled workers. The estimated coefficients are again systematically lower for high-skilled workers – except for firms with very low wage premiums. Estimations are as if paying high wages was a necessary and sufficient policy to preserve low- or medium-skilled workers inside the establishment but was not enough to stabilize high-skilled workers. For the latter, paying low wages exposes the establishment to excess churning, but paying high wages is not a guarantee to keeping them.

4. The link between establishment wage effects and the quit rate

Our panel includes information on the legal nature of worker movements. We use this information to question the channel through which a firm's wage policy is associated with particular levels of churning rates. Is it the employer's or the employee's initiative? Do workers leave an establishment more or less frequently depending on its wage policy? This leads us to focus on exits and, more specifically, on quits. Table 5 presents the share of different types of exits in France over the period 2002-2005. Each year, 16% to 19% of exits are attributable to quits. Tables 6 to 8 present estimation results for the link between wage

[8] Wage effects for each skill group are calculated over the whole sample (108,972 establishments). Estimations have also been run with wage-effect separately estimated on each skill sub-sample and results are similar.

[9] Results are not reported here but are available upon request.

policy and quit rates, for the whole sample and for different sub-samples (according to establishment size and workers' skill groups).

The estimations first show that paying relatively high wages is constantly associated with lower quit rates (for example, -0.623 for the whole sample). The conditional correlation is negative and significant in almost every specification tested. Employees' voluntary exit moves seem to be linked to the establishment's wage policy, as if employees do react as expected to the employer's wage stabilization policy. The link between wage premium and quit rates is consistent with the hypothesis that workers do act in response to a firm's stabilization policy based on pay levels. As for churning regressions, spline estimations show the relation is not linear but takes the shape of an inverted J. Once again, the relation is most intense in low-paying establishments, and it is even positive in those paying well over average.

Regarding the differences among establishments of different size, the same gap appears as for churning rate. The relation is more intense for large establishments than for small ones, and it is more intense for low levels of wage premiums. This result bolters the argument put forward when interpreting the link between wage effect and churning according to establishment size, *i.e.,* the hypothesis that employees in large establishments expect more than wage premiums to be stabilized.

For all skill groups, the relation is estimated to be negative. For churning rates, the relation is more intense the lower the skill.

Ultimately, we find quite symmetric results for the relation between wage effect and churning rates and that between wage effect and quit rates. Our empirical analysis then establishes the hypothesis that pay levels constitute an HRM stabilizing policy and that the relation involves changes in quit rates. One may argue that quits are the expression of the employer's will as much as the worker's will; this may be true in some cases. In such cases, we could say the employer is multiplying the tools to favor workers' exits: low pay and motivation to quit. Overall, there is still a high correlation between low-wage premiums and high quit rates.

V. Conclusion

We show that at the establishment level, higher wage premiums are associated with lower employee churning rates and quit rates. Our analysis is based on an original longitudinal matched employer-employee dataset, which enables us to control for a large set of standard characteristics of establishments, economic health indicators and workforce structure indicators. Our estimations support the hypothesis that paying higher wages constitutes an efficient human resource stabilization policy and that the relation runs through the diminution of quit rates.

More precisely, our findings can be summarized as follows:

- The relation between wage premium and churning rate or quit rate is not linear along the distribution of wage effects. Its shape is an inverted J curve: the relation is important and negative for low paying establishments, but it is weaker and even becomes positive in the highest paying establishments. This result suggests wages were a necessary but not sufficient condition to retain workers.
- Disaggregating at the level of establishment size, we show such a relation actually exists mainly in establishments with 50 workers or more. In the smallest establishments (with 10 to 50 workers), the relation is more linear and less intense.
- The negative relation holds for all skill groups taken separately, but the link is less intense as the qualification level increases.

- The relation between quit rate and wage premium is symmetric to that with churning rate: i.e., negative and taking the shape of an inverted J. This result is true for all subsamples studied. The statistical relations suggest that workers did react to the establishment's wage policy in their decision to quit.

Our estimation method cannot rule out the hypothesis that the correlation is the consequence of a selection bias rather than a wage policy. High wage premiums may also be the consequence of a bias in workers' unobservable characteristics. We may imagine a particular type of worker, those with high-paying unobserved characteristics, would group into some firms and be less mobile. Yet, the existing empirical literature on the 'assortative matching' of firms and workers casts doubts on the validity of the selection bias hypothesis. As far as firm and worker wages effects can be disentangled, the literature finds a small or negative correlation between the two, meaning that in fact, our establishment wage effects are potentially underestimated. In this context, our interpretation in terms of stabilization policy is particularly plausible.

In many aspects, our analysis opens the way to future research. First, it would be interesting to develop a parallel analysis for establishments with fewer than 10 employees. There are thousands of small establishments (in which the turnover rate is high), and we would like to know whether the wage policy of the employer affects worker mobility in the same way. Using Finnish data, Barth and Dale-Olsen (1999) find there is no effect of wage policy on the turnover in very small establishments, but such results still have to be tested in the French case. Second, in recent years, better access to international databases has opened the way to cross-national comparison of job flows, worker flows and the way they interact (Bartelsman, Haltiwanger and Scarpetta, 2009, Haltiwanger, Schweiger and Scarpetta, 2010, Bassanini and Marianna, 2009, Centeno, Machado and Novo, 2009). This may allow a comparative analysis of the link between these flows and the wage policies of firms. Such an analysis would address the question of the role of an establishment's characteristics in explaining national specificities.

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TABLES AND FIGURES

TABLE 1. – Transition matrix for establishment wage effects

	Base year decile									
	1st	2nd	3rd	4th	5th	6st	7th	8th	9th	10th
2002 to 2005	76.8	66.8	60.4	53.2	49.2	51.2	52.6	60.3	71.3	78.8
2002 to 2003	84.0	75.1	66.7	63.4	59.7	62.7	66.1	70.8	79.7	87.3
2003 to 2004	87.9	79.7	72.5	68.4	66.2	65.9	68.9	74.4	81.7	84.4
2004 to 2005	86.3	79.9	72.2	64.9	63.0	62.1	68.0	72.3	78.8	84.3

Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.

TABLE 2. – Wage premium and churning rate

Dependant variable: log (churning rate)		
	OLS regression	Spline regression
Wage premium	-0.299 ***	
	(0.014)	
Wage premium quintiles		
1st		-1,212 ***
2nd		-1,215
3rd		-0.785 **
4th		-0.224 ***
5th		0.358 ***
Observations	151,361	151,361
Censored observations	14,558	14,558

Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.

Notes: numbers in parentheses are standard errors. Stars indicate statistical significance at the 1% (***), 5% (**) and 10% (*) levels. Coefficients of the spline regression are calculated as the gradient of each segment. Significance level refers to the estimated coefficient. Only the first estimate corresponds to the significance of the gradient; for all succeeding estimates, it tests the significance of the difference between the gradient of a segment and that of the previous one.

TABLE 3a. – Wage premium and churning rate by establishment size: small establishments (10 to 50 workers)

Dependant variable: log (churning rate)		
	OLS regression	Spline regression
Wage premium	-0.321 ***	
	(0.018)	
Wage premium quintiles		
1st		-0.507 ***
2nd		-0.690
3rd		-0.381
4th		-0.184
5th		0.312 ***
Observations	80,607	80,607
Censored observations	13,503	13,503

Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.

TABLE 3b. – Wage premium and churning rate by establishment size: large establishments (more than 50 workers)

Dependant variable: log (churning rate)		
	OLS regression	Spline regression
Wage premium	-0.169 ***	
	(0.020)	
Wage premium quintiles		
1st		-2.628 ***
2nd		-0.816 ***
3rd		-0.739
4th		0.375 ***
5th		0.434
Observations	70,754	70,754
Censored observations	1,055	1,055

Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.

TABLE 4a. – Wage premium and churning rate by skill level: low-skilled workers

Dependant variable: log (churning rate)		
	OLS regression	Spline regression
Wage premium	-1.229 ***	
	(0.034)	
Wage premium quintiles		
1st		-1.113 ***
2nd		-1.866 **
3rd		-2.597 *
4th		-1.527 ***
5th		0.103 ***
Observations	107,975	107,975
Censored observations	45,645	45,645

Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.

TABLE 4b. – Wage premium and the churning rate by skill level: medium-skilled workers

Dependant variable: log (churning rate)		
	OLS regression	Spline regression
Wage premium	-0.820 ***	
	(0.027)	
Wage premium quintiles		
1st		-1.751 ***
2nd		-1.426
3rd		-1.136
4th		-2.132 ***
5th		1.037 ***
Observations	107,975	107,975
Censored observations	33,236	33,236

Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.

TABLE 4c. – Wage premium and churning rate by skill level: high-skilled workers

Dependant variable: log (churning rate)		
	OLS regression	Spline regression
Wage premium	-0.121 ***	
	(0.015)	
Wage premium quintiles		
1st		-2.005 ***
2nd		-0.344 ***
3rd		-0.861 ***
4th		-0.392 ***
5th		0.657 ***
Observations	107,975	107,975
Censored observations	50,252	50,252

Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.

TABLE 5. – Legal forms of exits

	2002	2003	2004	2005
Ending fixed term contract	0.53	0.54	0.56	0.56
Layoffs	0.09	0.09	0.09	0.09
Quits	0.19	0.17	0.16	0.16
Other	0.19	0.20	0.20	0.20

Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.

TABLE 6. – Wage premium and quit rate

Dependant variable: log (quit rate)		
	OLS regression	Spline regression
Wage premium	-0.623 ***	
	(0.014)	
Wage premium quintiles		
1st		-2.178 ***
2nd		-1.734 ***
3rd		-1.479
4th		-0.718 ***
5th		0.474 ***
Observations	151,361	151,361
Censored observations	33,611	33,611

Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.

TABLE 7a. – Wage premium and quit rate by establishment size: small establishments (10 to 50 workers)

Dependant variable: log (quit rate)		
	OLS regression	Spline regression
Wage premium	-0.300 ***	
	(0.017)	
Wage premium quintiles		
1st		-0.541 ***
2nd		-0.478
3rd		-0.662
4th		-0.382
5th		0.006 ***
Observations	80,607	80,607
Censored observations	27,031	27,031

Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.

TABLE 7b. – Wage premium and quit rate by establishment size: large establishments (more than 50 workers)

Dependant variable: log (quit rate)		
	OLS regression	Spline regression
Wage premium	-0.519 ***	
	(0.019)	
Wage premium quintiles		
1st		-2.761 ***
2nd		-1.650 ***
3rd		-0.589
4th		-0,586
5th		0.289 ***
Observations	70,754	70,754
Censored observations	6,580	6,580

Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.

TABLE 8a. – Wage premium and quit rate by skill level: low-skilled workers

Dependant variable: log (quit rate)		
	OLS Regression	Spline regression
Wage premium	-1.270 ***	
	(0.037)	
Wage premium quintiles		
1st		-1.681 ***
2nd		-3.716 ***
3rd		-1.635 ***
4th		-2.198
5th		1.733 ***
Observations	108,997	108,997
Censored observations	64,284	64,284

Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.

TABLE 8b. – Wage premium and quit rate by skill level: medium-skilled workers

Dependant variable: log (quit rate)		
	OLS regression	Spline regression
Wage premium	-1.191 ***	
	(0.029)	
Wage premium quintiles		
1st		-3.209 ***
2nd		-1.874 ***
3rd		-1.171 **
4th		-2.961 ***
5th		1.420 ***
Observations	108,997	108,997
Censored observations	52,199	52,199

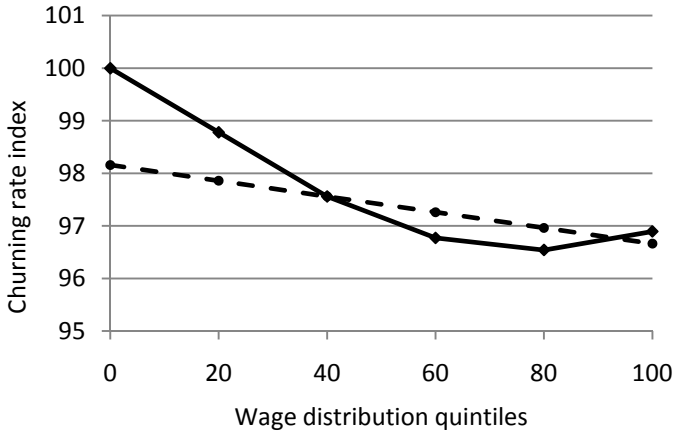
Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.

TABLE 8c. – Wage premium and quit rate by skill level: high-skilled workers

Dependant variable: log (quit rate)		
	OLS regression	Spline regression
Wage premium	-0.275 ***	
	(0.017)	
Wage premium quintiles		
1st		-2.457 ***
2nd		-0.382 ***
3rd		-1.070 ***
4th		-1.099
5th		0.674 ***
Observations	108,997	108,997
Censored observations	64,806	64,806

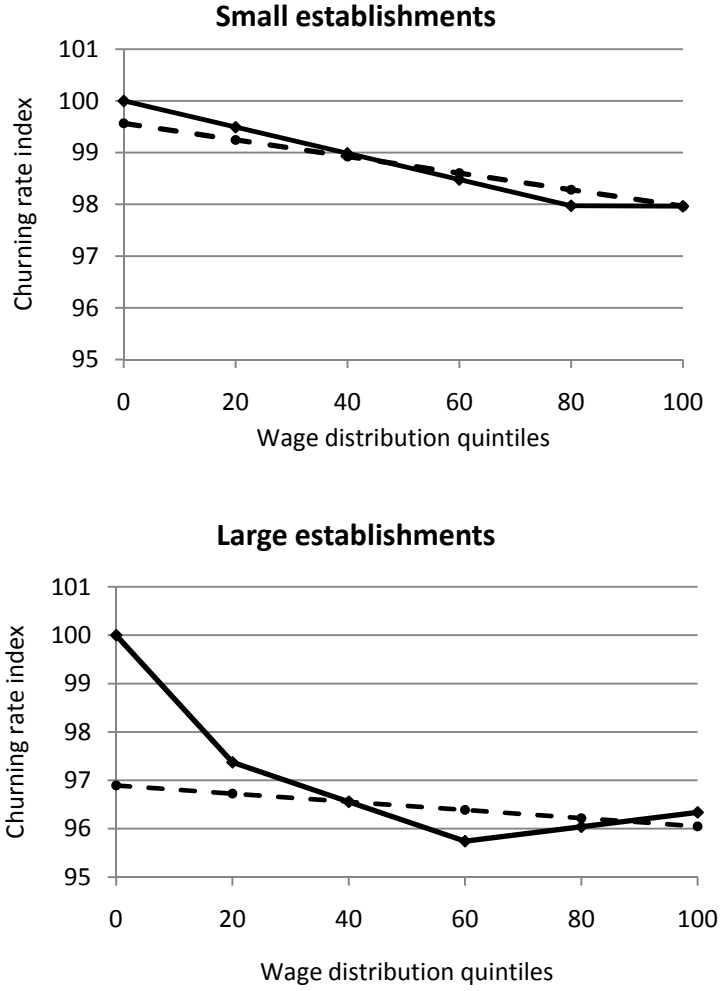
Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.

FIGURE 1. – Wage premium and churning rate.
OLS (straight line) and Spline Regression (curve)



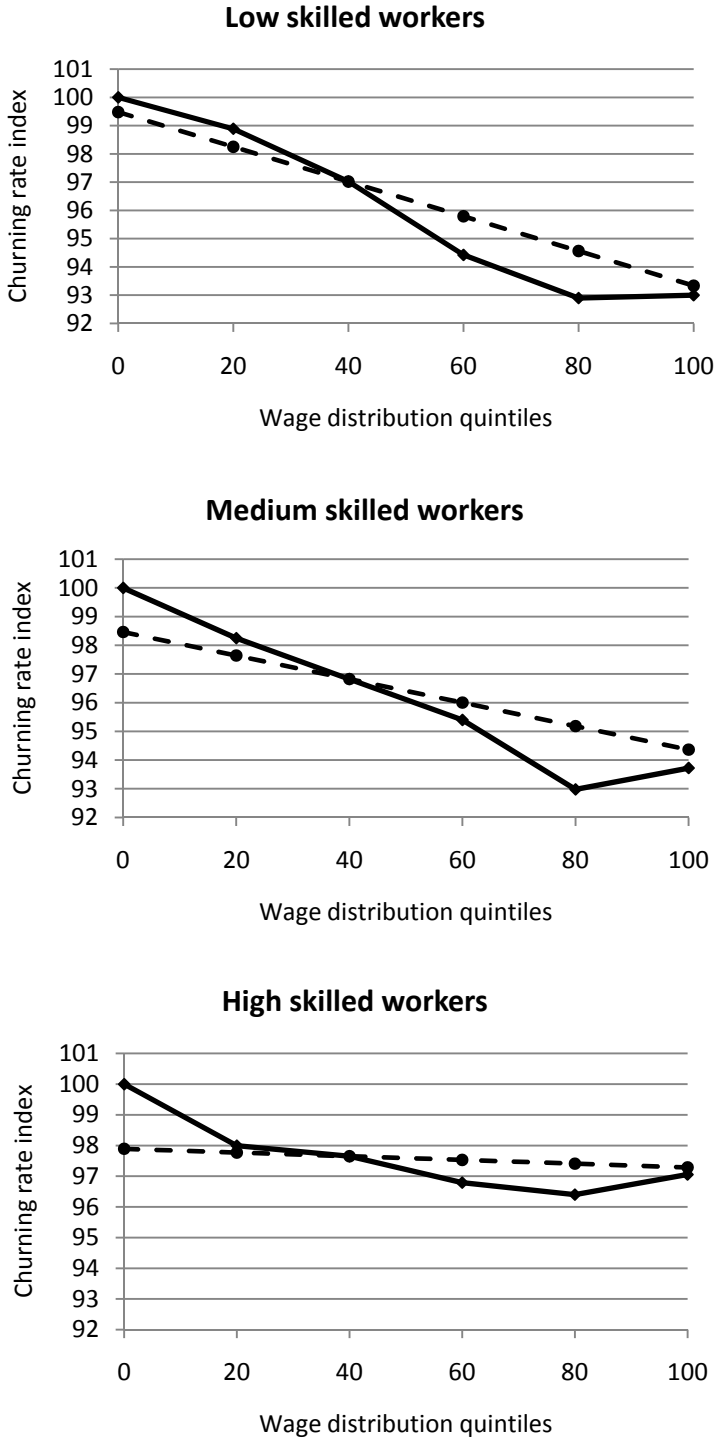
Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.
Notes: the plain curve illustrates the spline regression estimation. In the figure, the intercept is forced to take the value of 100. The spotted line illustrates the OLS estimation. In the figure, the line is forced to cross the spline curve at the second quintile.

FIGURE 2 – Wage premium and churning rate by establishment size.
OLS (straight line) and Spline Regression (curve)



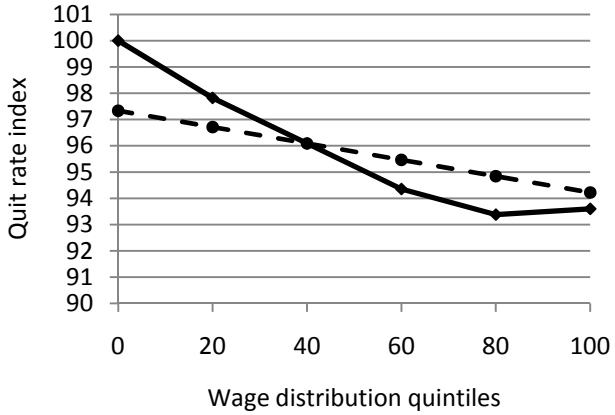
Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.
Notes: the plain curve illustrates the spline regression estimation. In the figure, the intercept is forced to take the value of 100. The spotted line illustrates the OLS estimation. In the figure, the line is forced to cross the spline curve at the second quintile.

FIGURE 3. – Wage premium and churning rate by skill level: a graphic representation
Simple OLS (straight line) and Spline Regression (curve)



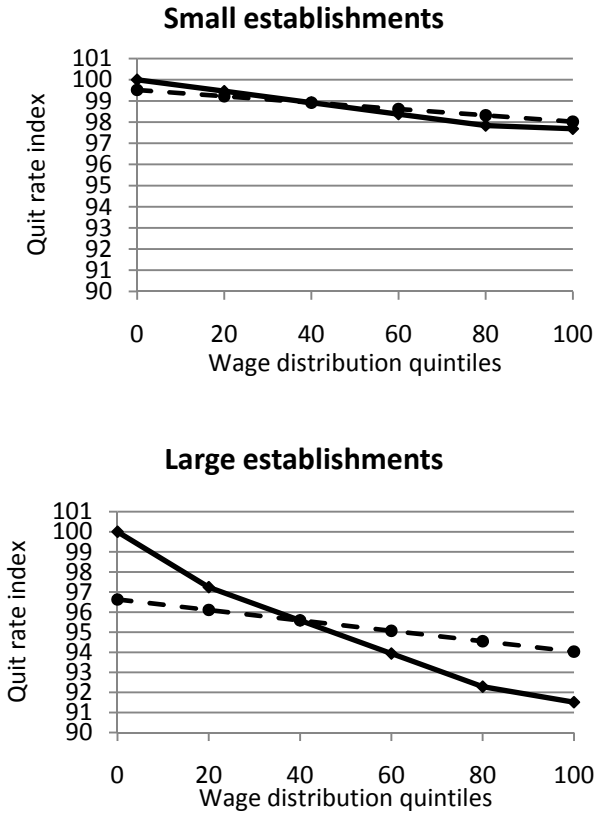
Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.
Notes: the plain curve illustrates the spline regression estimation. In the figure, the intercept is forced to take the value of 100. The spotted line illustrates the OLS estimation. In the figure, the line is forced to cross the spline curve at the second quintile.

FIGURE 4. – Wage premium and quit rate
OLS (straight line) and Spline Regression (curve)



Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.
Notes: the plain curve illustrates the spline regression estimation. In the figure, the intercept is forced to take the value of 100. The spotted line illustrates the OLS estimation. In the figure, the line is forced to cross the spline curve at the second quintile.

FIGURE 5. – Wage premium and quit rate by establishment size.
OLS (straight line) and Spline Regression (curve)



Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.
Notes: the plain curve illustrates the spline regression estimation. In the figure, the intercept is forced to take the value of 100. The spotted line illustrates the OLS estimation. In the figure, the line is forced to cross the spline curve at the second quintile.

FIGURE 6. – Wage premium and quit rate by skill level.
OLS (straight line) and Spline Regression (curve)

Source: DMMO-EMMO (Dares), DADS and FICUS (Insee), 2002 to 2005.
Notes: the plain curve illustrates the spline regression estimation. In the figure, the intercept is forced to take the value of 100. The spotted line illustrates the OLS estimation. In the figure, the line is forced to cross the spline curve at the second quintile.