

For Whom are Permanent Jobs off Limits? A Markov-Chain-Based Analysis of Individual Labor Market Dynamics

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How many workers are confined indefinitely in a labor cycle, moving back and forth from temporary jobs to nonemployment periods without the potential to secure a steady job? To answer this question, we develop a mixture of four Markov chains, each of them modeling a specific type of labor market dynamics: stayers in steady jobs, stayers out of the labor market, unconfined movers who move between states and eventually enter a permanent job, and confined movers who do not. This model is estimated using data from the French Labor Force Surveys from 2005 to 2009 for eight groups defined by gender and age to account for age-related life cycle periods. Education is included as an explanatory variable for the dynamics type. Confined movers represent 5% of the 20- to 59-year-old individuals who have finished their studies but 12% of 20- to 29-year-olds, and more than 25% of 20- to 29-year-olds with less education – up to junior high school completion. Confined movers experience far more frequent periods of unemployment than movers who can access stable jobs. Furthermore, confined movers are more likely to have less favored social backgrounds, have immigrant parents, and live in deprived areas (“Zones Urbaines Sensibles”). These empirical findings may be related to the economic mechanisms responsible for the duality of the French labor market.*

I. Introduction

Many European countries are characterized by a high proportion of temporary jobs and a high unemployment rate. In France, over the period 2005-2009, 8% of 20- to 59-year-old individuals who had completed their education held temporary jobs, an additional 7% were unemployed, while 16% were out of the labor force (11% of men and 22% of women). This paper assesses how many of these targeted individuals are trapped, moving back and forth from temporary jobs to nonemployment periods without the potential to secure a steady job. We believe that this assessment is a key dynamic-based indicator that is complementary to those usually used in labor market analyses. Furthermore, we quantify and characterize this segment of the workforce.

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Why should some workers be confined to short-term jobs and nonemployment periods in the first place? Fixed-term contracts and temping work were introduced in the early 1980s in France, Spain and Italy to boost labor market flexibility with easier job termination procedures – BENTOLILA and BERTOLA [1990], BENTOLILA and SAINT PAUL [1992], CAHUC and POSTEL-VINAY [2002], BLANCHARD and LANDIER [2002].¹ Fixed-term jobs may in theory lead to long-term jobs for some workers, but they may also trap others in a cyclical pattern of temporary jobs, unemployment and nonparticipation. On the one hand, temporary jobs may provide workers with the opportunity to accumulate some experience and to improve their match quality with firms. On the other hand, they may induce poor on-the-job training – compared to long-term jobs, see ARULAMPALAM and BOOTH [1998] – or may limit access to long-term jobs by signaling low productivity levels. This may result eventually in a dual labor market. Long-term job owners accumulate more experience and signal high productivity, which gives them access to other long-term jobs, whereas the reverse occurs for the confined workers. Which effect dominates depends on demand-side mechanisms linked to labor market institutions and firm-driven choices about their production functions. The role that fixed-term jobs ultimately play is thus context-dependent and is an empirical question.² A few recent empirical economic papers put the emphasis on temporary worker heterogeneity. GÜELL and PETRONGOLO [2007] study conversion rates from temporary to permanent work and highlight the heterogeneity of the population with respect to outside options. GAGLIARDUCCI [2005] finds that the longer the contract, the higher the probability of securing a permanent job. He further observes that several intermittent short-term contracts decrease the probability of accessing a stable job.

This paper provides a bird's eye picture of labor market heterogeneity by studying the dynamic processes of transition. To do this, we construct a mover-stayer-type model – BLUMEN, KOGAN, and MACCARTHY [1955], KAMIONKA [1992, 1996], which classifies workers into four types: *stayers in steady jobs* are those who, from the outset and continuously thereafter, hold stable jobs. *Stayers out of the labor market* are those who, from the outset and continuously thereafter, stay out of the labor market. *Unconfined movers* are those who move between states and eventually obtain permanent jobs. *Confined or trapped movers* are those who move across states but never obtain stable jobs. Because the data only consist of observations of individuals over a fixed period of six quarters, it is impossible to determine with certainty whether individuals will remain trapped or will obtain permanent jobs later, *i.e.* whether they are confined or unconfined movers. This model overcomes the censoring issue by assigning each individual a probability of being of a given type, based on the observed labor market history and some covariates. More precisely, we use a mixture of Markov chains in which individual type probabilities constitute the mixture coefficients. These type probabilities depend on covariates, namely the education level, and then allow for conditional heterogeneity. In the end, we derive

1. See LJUNGQVIST [2002] for a review of partial and general equilibrium model implications.

2. The evaluation literature of fixed-term jobs displays evidence in favor of a stepping-stone effect. An increased average probability of obtaining a regular job through a fixed-term contract job is found in most European countries: BOOTH, FRANCESCONI, and FRANK [2002] in the UK; ZIJL, BERG, and HEYMA [2004] in the Netherlands; GÜELL [2003] in Spain. However, short-term effects may be compensated by more nuanced long-term ones: permanent earnings loss, lack of training, and lower job satisfaction: BOOTH et al [2012] for the UK and PEREZ and THOMAS [2006] for France. For France, see also HAVET [2006] and GIVORD and WILNER [2009] for recent evidence on temporary jobs, and FOUGÈRE, KRAMARZ, and MAGNAC [2000] for a review of results on short-term subsidized jobs.

indicators of the duality of the labor market and compute the proportion of trapped workers in the economy.

The discrete-time mover-stayer model was first introduced by BLUMEN et al [1955] to study industrial mobility in the labor market.³ The basic version assumes that two types of workers coexist in the labor market: *movers*, who can move between unemployment and employment, and *stayers*, who remain indefinitely in the state they initially occupy. KAMIONKA [1992] extends this seminal model by taking into account partially observed heterogeneity between movers. He considers more states in the labor market and two types of movers: the confined and the unconfined. The model we propose relies on the same partition between stayers, confined and unconfined movers. However, we explicitly allow the type probabilities – of being a confined mover, an unconfined mover, or a stayer – to depend on observed characteristics. This allows us to investigate which individual characteristics are correlated with specific dynamic patterns in the labor market – in other words, to highlight who the stayers, the unconfined movers and the confined movers are.

We use this model to investigate the duality of the French labor market. As was made clear by CAHUC *et al.* [2011], the French labor market tends to be particularly dual. The authors stress three interesting features. First, the institutions in the labor market may split the working population into two groups: insiders who stay in well-paid stable jobs, and outsiders who have no access to these jobs. Second, education matters a great deal in the determination of who is more likely to be an insider and who is more likely to be an outsider. Third, the young suffer the most from such a division in the labor market, as education is the only signal they can provide. Other factors may also determine who the confined workers will be. If ethnic or gender discrimination is at work, it might be more difficult for minority members to obtain stable jobs. If social networks play an important role in job-finding, individuals from less favored social backgrounds might also be disadvantaged. Living in deprived areas or far from active local labor markets may play a similar role. Our model, estimated using data from the French Labor Force Surveys (LFS) from 2005 to 2009, appears to be well suited to tackling these issues. The sample is restricted to 20- to 59-year-old individuals who had completed their education and is stratified by gender and age group to account for age-related life cycle periods. Type probabilities also depend on education.

Our findings are the following. The type probabilities depend largely on age and gender. The stayer-in-stable-jobs type is the most frequent and is the norm in mid-career. Conversely, the stayer-in-nonparticipation type is more frequent among older workers who have left the labor market. The unconfined-mover type captures transitions in accordance with life cycle periods – labor market integration for the young and retirement for the old. The confined-mover type, who does not access stable jobs, represents 5% of the 20- to 59-year-olds, and 12% of the 20- to 29-year-olds. Among the 20- to 29-year-olds, this proportion is as high as 25% for those with less education – up to junior high school completion. In this age group, confined movers also display high probabilities of transitioning from employment to nonparticipation, which

3. See also ANDERSON and GOODMAN [1957]; FRYDMAN [1984]; GOODMAN [1961]; SAMPSON [1990]; SINGER and SPILERMAN [1976]; SPILERMAN [1972] for discrete time mover-stayer models; FOUGÈRE and KAMIONKA [1992a; 1992b; 2003; 2008]; KALBFLEISCH and LAWLESS [1985] for adaptation in continuous time, and GEWEKE, MARSHALL, and ZARKIN [1986a; 1986b] for other Markov-chain models.

illustrates a long and nonlinear process of integration into the labor market. More generally, confined movers are much more likely to be unemployed than confined ones. An *a posteriori* analysis, in which predicted type probabilities are regressed on additional covariates, suggests that individuals with foreign parents, individuals from less favored social backgrounds, and individuals who live in deprived areas (ZUS) are more likely to be confined movers. These empirical findings may be related to the economic mechanisms that produce duality in the French labor market and are consistent with the views of CAHUC *et al.* [2011].

This paper is organized as follows. SECTION II presents the data used and some descriptive statistics. The model is developed in SECTION III. The results are presented in SECTION IV. SECTION V contains a discussion about the specification robustness of the model. SECTION VI concludes the paper.

II. The Data and Descriptive Statistics

II.1. *The Data*

The data come from the French Labor Force Survey (LFS), 2005-2009, undertaken by the National Statistics Institute (INSEE). The LFS is a rolling panel in which individuals are interviewed about their labor market status once per quarter for six quarters in a row. We construct individual labor market histories over the six quarters of observation. The LFS provides information on labor market status – employment, unemployment and nonparticipation – as well as detailed descriptions of the jobs held by the employed. In what follows, we consider four labor market states: nonparticipation (NP); unemployment (U);⁴ unstable jobs (UJ); which include public and private fixed-term contracts, temping jobs, and seasonal jobs; and stable jobs (SJ), which include private long-term contracts, self-employment, and civil-service positions. Lastly, the LFS contains information on individual characteristics, such as age, gender, educational level, individual's and parents' nationalities at birth, residential location and family characteristics. We select individuals who are between 20 and 59 years old at the time of the first interview, who had completed their studies, who entered the survey from 2005Q1 to 2008Q3, and who were interviewed six times. The balanced panel data set consists of 73,741 individuals.

We first describe the balanced panel sample in terms of labor market and socio-demographic characteristics (TABLE I, first and second columns). The sample is well balanced in terms of gender. It contains fewer individuals aged between 20 and 34 because it is restricted to those who had completed their education at the date of panel entrance. The most frequent situation is holding an indefinite-term contract: 77% of men and 64% of women were in that position. Non-participation is the second most frequent category, with a proportion twice as high for women as for men (23% vs. 11%). The French labor market is characterized by weak participation of the youngest and oldest individuals, compared to other European countries. This feature is often linked to the fact that in the 1980s and 1990s, the government and the unions promoted early retirements and longer studies as an answer to increasing unemployment rates.

4. Unemployment refers to the ILO definition: unemployed are nonemployed, available to work within two weeks, who are actively seeking a job. The non-employed who are seeking a job are classified as nonparticipants if they do not meet the availability criterion. See JONES and RIDDEL [2006] for an in-depth analysis of the frontiers between nonparticipation and ILO unemployment; see also FLINN and HECKMAN [1983].

Approximately 7% of women and 6% of men hold temporary jobs. Among these jobs, a substantial proportion are temping contracts, nearly three times more so for men than for women (36 % vs. 13%). It is worth noting that only 20% of temporary-job female workers and 25% of temporary-job male workers declare that they have chosen such a contract. 5% of the individuals in the panel do not have French citizenship and 7% have at least one immigrant parent from North Africa, Sub-saharan Africa or the Middle East.⁵ Slightly more than 20% of the individuals' fathers are executives or intermediate professionals. Lastly, 15% live in the Paris area and 7% live in *Zones Urbaines Sensibles* (deprived areas in the suburbs of metropolitan areas). Approximately 60% are married, 50% have no children at home.

Because we only consider individuals who are observed six times in a row, attrition is likely to be an issue. We also report in the third and the fourth columns of TABLE I the same descriptive statistics for the unbalanced panel, which is composed of all respondents, without the restriction that they respond six times. Selecting respondents to all six waves leads us to drop approximately half of the sample. However, balanced-panel individuals do not seem very different from those in the complete sample. They are somewhat older and more likely to be married. On the labor-market side, unemployed and contingent-job workers are slightly less represented in the balanced panel than they should be: 5.8% vs. 6.7% , and 6.7% vs. 7.3%, respectively. Overall, this suggests that our analysis may not be much affected by restricting it to the balanced panel sample (respondents to all six waves). If anything, the estimate of the proportion of confined movers is likely to be slightly underestimated.

II.2. *Labor Market Transitions*

TABLE II reports some preliminary patterns in the transitions observed in the panel between nonparticipation, unemployment, unstable jobs, and stable jobs. Among the selected individuals, 65% (47,808) held long-term jobs during the 6 quarters, 13% (9,477) did not participate in the labor market during the whole observation period, while 23% (16,656) experienced in-sample transitions. Half of the latter obtain a long-term contract, while half did not. Overall, 10% of the men and 14% of the women alternated between fixed-term jobs and periods of nonemployment during the observation period. Some of them (and some of the nonparticipants) may be indefinitely trapped in a labor cycle, moving back and forth between temporary jobs to nonemployment without the likelihood of securing a steady job.

We seek to measure how many people are trapped in those “insecure” situations by analyzing the transition dynamics. The simplest way to model transition dynamics is to assume a unique time-homogenous Markov chain model. The results are reported in TABLE III. The persistence of stable jobs and of nonparticipation is striking: around 98% persistence within three months for both women and men. As stressed previously, a majority of the individuals who occupy stable jobs or do not participate do not shift category at all.

Differences in transition dynamics by gender are rather small, according to this model. The most sizeable difference is a 3-percentage-point difference in the probability of staying in unstable jobs, versus moving to unemployment: women tend to stay longer in unstable jobs

5. We focus on these minority groups who have been shown to face more issues than others on the labor market; see *e.g.* AEBERHARDT, COUDIN, and RATHELOT [2010].

TABLE I. – Descriptive Statistics

	Balanced panel: 6-wave respondents		All respondents	
	Women	Men	Women	Men
Nb of obs	38,188	35,553	78,177	74,086
<i>Age (%)</i>				
20-24	4.2	5.6	6.7	7.8
25-29	8.6	8.6	11.2	11.0
30-34	11.2	10.7	11.8	11.7
35-39	13.6	13.3	13.4	13.5
40-44	15.5	15.0	14.5	14.0
45-49	15.6	15.6	14.5	14.2
50-54	15.5	15.3	14.0	13.7
55-59	15.7	16.0	13.9	14.0
<i>Labor-market situation (%)</i>				
Indefinite-term contracts	64.0	77.0	63.0	75.4
Short-term contracts	7.4	5.9	7.9	6.7
Unemployed	5.8	5.7	6.6	6.8
Non-participation	22.8	11.4	22.4	11.2
Temping over short-term	12.8	36.4	12.6	35.7
Chosen short-term	19.6	25.3	19.2	27.8
<i>Social/national background (%)</i>				
Foreign nationality	5.4	5.1	6.4	6.3
Immigrant parents	7.3	7.0	8.8	8.6
Father: executive	21.3	20.6	22.3	21.7
<i>Residence location (%)</i>				
Île de France	15.3	14.5	16.7	16.0
Deprived areas (ZUS)	7.6	6.7	7.3	6.7
<i>Family situation (%)</i>				
Married	59.0	57.3	53.7	51.7
No children	51.5	54.4	52.0	56.0
One child	21.6	19.5	21.8	19.2
Two children	18.8	18.2	18.2	17.1
Three and more	8.1	7.9	8.0	7.6
Children less than 3	9.9	9.9	10.8	10.5
Children between 3 and 5	9.2	8.8	9.5	8.7

Source: French Labor Force Survey (Enquête emploi) 2005-2009. Sample: Columns 1 and 2: 20- to 59-year-old individuals whose education is finished and who responded to all six waves of the survey. Columns 2 and 3: 20- to 59-year-old individuals whose education is finished and who responded to at least one of the surveys. Note: All variables are measured the first time the individual is interviewed, except for the labor-market situation for which all waves are pooled. *Immigrant parents* is a dummy for having at least one parent immigrant from North Africa, Sub-saharan Africa or the Middle East. *Father: executive* is a dummy equal to one if one's father's occupation is 'executive' or 'intermediary professions'.

TABLE II. – Spell Description

	Men		Women	
Individuals...	35,553	100%	38,188	100%
staying in long-term jobs	25,507	72%	22,301	58%
staying nonparticipants	2856	8%	6621	17%
moving between long-term, fixed-term jobs and no-employment	3475	10%	4090	11%
moving between fixed-term jobs and no-employment	3715	10%	5176	14%

Source: French Labor Force Survey (Enquête emploi) 2005-2009.

Sample: 20- to 59-year-old individuals whose education is finished and who responded to all six waves of the survey.

TABLE III. – Four-State Markov Transition Matrices

$T \rightarrow T+1$	Men				Women			
	SJ	UJ	U	NP	SJ	UJ	U	NP
SJ	0.981 (0.004)	0.003 (0.001)	0.005 (0.002)	0.011 (0.005)	0.978 (0.004)	0.003 (0.002)	0.005 (0.002)	0.014 (0.005)
UJ	0.080 (0.025)	0.750 (0.036)	0.121 (0.028)	0.049 (0.055)	0.071 (0.020)	0.782 (0.035)	0.095 (0.023)	0.052 (0.049)
U	0.059 (0.025)	0.159 (0.036)	0.654 (0.045)	0.128 (0.067)	0.065 (0.021)	0.155 (0.033)	0.610 (0.055)	0.170 (0.063)
NP	0.006 (0.002)	0.005 (0.002)	0.014 (0.004)	0.976 (0.006)	0.006 (0.002)	0.005 (0.002)	0.015 (0.003)	0.974 (0.004)

Source: French Labor Force Survey (Enquête emploi) 2005-2009.

Sample: 20- to 59-year-old individuals whose education is finished and who responded to all six waves of the survey.

Note: the table reports the probabilities of transition between the four labor market states : SJ stands for *stable jobs*, UJ, for *unstable jobs*, U, for *unemployment*, and NP, for *nonparticipation*. Bootstrapped standard errors are reported in parentheses (100 replicates).

while more men are more likely to move from unstable jobs to unemployment. This difference could reflect the fact that men hold more temping contracts than women. Unemployed people accede to unstable jobs more frequently than to stable jobs. 70% of the unemployed who find a job find a temporary job. This stresses the potentially integrating nature of short-term contracts and temping jobs, but it may also suggest a dual labor market: only 30% of these workers eventually obtain stable positions.

A unique time-homogenous Markov-chain model assumes that labor market transitions are generated by the same underlying process for all individuals. The high degree of persistence, especially in stable jobs and nonparticipation, suggests that some heterogeneity is not properly taken into account by a single Markov chain. This approach is misleading if, in the data-generating process, several dynamic processes coexist. To adress potential labor market heterogeneity, we turn to mover-stayer-type models.

III. Methodology

Mover-stayer models rely on a mixture of Markov chains; see BLUMEN et al [1955], GOODMAN [1961], SPILERMAN [1972], SINGER and SPILERMAN [1976], FRYDMAN [1984]. The model developed in this article extends the model presented in KAMIONKA [1992]. We consider a mixture of four Markov chains in which the mixture probabilities depend on covariates (in our case, the education level) and the initial state. Two chains capture the dynamics of individuals who stay in the same state indefinitely. The other two chains allow for transitions between states.

III.1. The Conditional Confined-Unconfined Worker Model (CCUW)

Consider N individuals, $i = 1, \dots, N$, observed at dates $t = 0, \dots, T - 1$. These individuals can move between four states that describe their current labor market situation: *stable jobs* (SJ), *fixed-term jobs* (UJ), *unemployment* (UN), and *nonparticipation* (NP). Individual i , endowed with fixed characteristics X_i , experiences a sequence of states denoted by the T -vector $I_0, \dots, I_{T-1}$.

The sequence of states experienced by individual i is generated by a dynamic process of type θ . There are four possible dynamic processes that generate labor market histories: *stable-job stayers* (S1), *nonparticipant stayers* (S4), *unconfined movers* (M) and *confined movers* (C). Θ_i

denotes the type of dynamic process that generates the labor market history of individual i and is an unobserved random variable that can take four values: $S1$, $S4$, M , or C . Each dynamic process is assumed to be time-homogeneous. The two *stayer* processes generate histories of remaining indefinitely in the same state, and the two *mover* processes generate histories with transitions. Formally, the *unconfined-mover* process corresponds to the labor-market histories of individuals who can access any of the 4 states and, in particular, stable jobs. This process is formally represented by an unconstrained Markov chain with transition matrix $M^M = \{m_{ij}^M\}$. The *confined-mover* process corresponds to the labor-market histories of workers who cannot access stable jobs. The underlying stochastic process is a degenerate Markov chain with transition matrix $M^C = \{m_{ij}^C\}$, in which the row and column components related to the stable-job state are set to zero. The *stable-job stayer* process (resp. *nonparticipant stayer* process) is represented by a degenerate Markov chain with transition matrix $M^{S1} = \{m_{ij}^{S1}\}$, in which $m_{ij}^{S1} = 0$, $\forall i, j \neq 1$ and $m_{11}^{S1} = 1$, (resp. $M^{S4} = \{m_{ij}^{S4}\}$, in which $m_{ij}^{S4} = 0$, $\forall i, j \neq 4$ and $m_{44}^{S4} = 1$). Furthermore, the individual likelihood function of $I_0, \dots, I_{T-1}$ can be expressed as a function of the transition parameters $\{m_{ij}^M\}$, $\{m_{ij}^C\}$, $\{m_{ij}^{S1}\}$, $\{m_{ij}^{S4}\}$, and mixture probabilities. The mixture probabilities are $P(\Theta = \theta | X, I_0)$, the probabilities of having a type- θ history-generating process conditional on the initial state and the characteristics X . They are modeled as multinomial logits.

The individual contribution to the likelihood conditional on X and the initial state I_0 is then

$$L(\{I_0, \dots, I_{T-1}\} | X, I_0; \alpha) = \sum_{\theta_k \in \{S1, S4, C, M\}} P(\Theta = \theta_k | I_0, X; \alpha) \times L(\{I_0, \dots, I_{T-1}\} | \Theta = \theta_k, I_0; \alpha),$$

where α stands for all parameters to be estimated, *i.e.*, transition matrix components γ , and the parameters reflecting the effects of X on the type variable, β . Exploiting the Markov assumption and assuming that once the type of process is determined, transitions do not present heterogeneity according to the characteristics X , one can rewrite the likelihood as

$$\begin{aligned} L(\{I_0, \dots, I_{T-1}\} | X, I_0; \alpha) &= \sum_{\theta_k \in \{S1, S4, C, M\}} P(\Theta = \theta_k | I_0, X; \beta) \\ &\quad \times \prod_{j=1}^{T-1} L(I_j | I_{j-1}, \Theta = \theta_k, X; \gamma) \\ &= \sum_{\theta_k \in \{S1, S4, C, M\}} P(\Theta = \theta_k | I_0, X; \beta) \prod_{j=1}^{T-1} m_{I_{j-1}, I_j}^{\theta_k}, \end{aligned}$$

where, depending on the value of the initial state i_0 , $P(\Theta = \theta_k | I_0 = i_0, X; \beta)$ are modeled by multinomial logits, and are restricted to sum to one when reporting to the same initial state, or are set to 0 for the degenerate processes:

— if $i_0 = SJ$,

$$P(\Theta = \theta_k | I_0 = i_0, X; \beta) = 0, \text{ for } \theta_k \in \{C, S4\}$$

$$P(\Theta = S1 | I_0 = i_0, X; \beta) = \frac{e^{X\beta_{S1}^{i_0}}}{1 + e^{X\beta_{S1}^{i_0}}}$$

$$P(\Theta = M | I_0 = i_0, X; \beta) = \frac{1}{1 + e^{X\beta_{S1}^{i_0}}},$$

— if $i_0 \in \{UJ, UN\}$,

$$P(\Theta = \theta_k | I_0 = i_0, X; \beta) = 0, \text{ for } \theta_k \in \{S1, S4\}$$

$$P(\Theta = C | I_0 = i_0, X; \beta) = \frac{e^{X\beta_C^{i_0}}}{1 + e^{X\beta_C^{i_0}}}$$

$$P(\Theta = M | I_0 = i_0, X; \beta) = \frac{1}{1 + e^{X\beta_C^{i_0}}},$$

— if $i_0 = NP$,

$$P(\Theta = S1 | I_0 = i_0, X; \beta) = 0$$

$$P(\Theta = \theta_k | I_0 = i_0, X; \beta) = \frac{e^{X\beta_{\theta_k}^{i_0}}}{1 + \sum_{\theta_l \in \{C, S4\}} e^{X\beta_{\theta_l}^{i_0}}}, \text{ for } \theta_k \in \{C, S4\}$$

$$P(\Theta = M | I_0 = i_0, X; \beta) = \frac{1}{1 + \sum_{\theta_l \in \{C, S4\}} e^{X\beta_{\theta_l}^{i_0}}}.$$

Lastly, the total likelihood is the product of the N individual contributions. The model is identified if the number of periods of observation is at least three. The model is estimated using a standard maximum likelihood method. The parameter identification and consistency of ML estimators for mover-stayer models are proved in FRYDMAN [1984] and KAMIONKA [1992].

III.2. *Some Remarks on Interpreting the Model*

The CCUW model provides a simple way to describe individual labor market histories by underlining some of them through the two stayer processes and the confined mover process. In this section, we set out the role of covariates in the CCUW model and compare this model to other commonly used models in which transition probabilities are functions of covariates.

Time-homogeneous transition probabilities: how do labor market histories depend on X in the CCUW model? The transition probabilities conditional on the type and the initial state are assumed to be time-homogenous, *i.e.* constant over time, and independent of the covariates. It is possible to let the transition probabilities depend on X , but this would greatly increase the number of coefficients to estimate. This is left for further research, using data with more observations. The time-homogenous assumption is relevant in the middle of a career but may be more difficult to defend at the early and end stages of a career. One should keep this limitation in mind when interpreting the results.

The transition probabilities for individual i depend on his/her characteristics X_i through the type probabilities, which are the mixture coefficients. Hence, the X -dependence of types allows us to account for behavioral differences between individuals according to observable characteristics. The effects of covariates on type probabilities are not to be interpreted as causal effects. Observable or unobservable characteristics of individuals may indeed affect both the covariates included in the model and the type. For instance, motivation may affect both educational and labor market outcomes.

Which variables can one include among the type covariates X ? In the model specification, types are correlated with some covariates observed at the individual's entrance into the panel. Due to these characteristics, an individual is more or less likely to have a labor market history completely generated by a process of a given type. The type of this individual is fixed – for at least the duration of the panel. Hence, the model is not adapted to include among the type covariates decision-making or time-varying variables. Changes in such variables are indeed likely to be correlated with major changes in an individual's labor market history, and the assumption of a fixed type can be expected to be violated. Consider, for instance, the relation between a child's birth and the subsequent labor market states of the mother. Consequently, variables that can be included in the type covariates should be constant over the panel observation period. In the empirical analysis, we use the education level (but the analysis is also stratified by gender and age).

Which observations contribute to the likelihood? Although every observation contributes to the likelihood in multinomial logit models *without fixed effects*, these models suffer from a serious drawback: they only capture the *observed heterogeneity* driven by the covariates. In contrast, the CCUW model captures *both observed heterogeneity* (driven by X) and *partially unobserved heterogeneity* (driven by observed histories and the different types). Another way to address *unobserved heterogeneity* would be to use a multinomial logit model with *fixed effects* – MAGNAC [2000], GIVORD and WILNER [2009]. These models rely only on *movers* to estimate transition matrices. That is, neither the stayers nor the movers who do not transition during a given observation period contribute to the likelihood in this model. In contrast, the CCUW model makes all observations contribute and provides a more complete picture of the labor market dynamics.

III.3. Tools for the Analysis

In this section, we present several statistics to describe the labor market processes. Some of them describe transition dynamics, others describe steady states, and some focus on type distributions and their relations with covariates. Their construction is summarized below.

Dynamics and transition matrices. To analyze the transition dynamics, we report and interpret the *transition matrix components* of the confined- and unconfined-mover processes.

Steady-state and stationary occupation probabilities. For each dynamic process, we compute the corresponding *stationary occupation probabilities*, i.e., stationary distributions that describe the labor market steady state entailed by this dynamic. For a time-homogenous Markov chain process, the stationary occupation probability vector, also called the invariant measure, is defined as the vector of probabilities of presence in each different state once the process has converged to the steady state. Formally, the stationary occupation probability vector is invariant by application of the transition matrix: let A denote the Markov chain transition matrix and a^* the stationary occupation probability vector; a^* is such that $A'a^* = a^*$. This can easily be extended to mixtures of Markov chains. The stationary occupation probabilities of the whole economy are obtained as follows. We first compute the weighted average of the stationary occupation probabilities of the four dynamic processes weighted by the type probabilities conditional on the initial states. Second, we integrate out initial states. Note that these stationary probabilities do not correspond to an economic equilibrium but they do provide an indication of the extent to which labor market histories are confined in some states, when labor market conditions similar to those prevailing on average during the observation period hold.

Type probabilities. To stress the relationship between covariates and types, we compute *type probability estimates conditional on the X covariates* by integrating out the initial states. The probability of being of type θ_i conditional on X is obtained by

$$P(\Theta = \theta_i|X) = \sum_{i_0=1}^4 P(\Theta = \theta_i|X, I_0 = i_0)P(I_0 = i_0|X), \quad i = 1, \dots, 4, \quad (1)$$

where $P(I_0 = i_0|X)$ are estimated by empirical percentiles. We compute in a similar way the *type probabilities conditional on the initial state*:

$$P(\Theta = \theta_i|I_0) = \sum_{X=x} P(\Theta = \theta_i|I_0, X = x)P(X = x|I_0), \quad i = 1, \dots, 4. \quad (2)$$

Finally, the *unconditional type probabilities* are obtained as

$$P(\Theta = \theta_i) = \sum_{X=x} P(\Theta = \theta_i|X = x)P(X = x), \quad i = 1, \dots, 4. \quad (3)$$

IV. Results

The CCUW model is estimated separately for eight groups defined by age and gender to account for different life-cycle periods – labor market integration, retirement, etc. – and the potential gender heterogeneity of the labor market dynamics. The eight groups correspond to the men and the women in each of four age categories: 20-29, 30-39, 40-49, and 50-59, which correspond to the age at the first period.⁶ The type probabilities depend on a precise measure of education that reflects the interaction of the level of education (highest degree obtained) and the field of study. Students are excluded from the sample so education is predetermined and time-invariant.

We first describe the labor market dynamics and steady states. We then describe how the type probabilities of being confined movers, unconfined movers, stayers in stable jobs, and nonparticipant stayers, depend on age, gender, and education. Lastly, to better characterize the populations of each type, we relate, in a complementary analysis, the type probability estimates to additional covariates, namely, the place of residence and the family situation upon entrance into the panel. As explained above in the methodology section, these decision-making and time-varying variables could not be directly included in the model as determinants of the type probabilities.

IV.1. *Dynamics on the Labor Market*

Stayers remain indefinitely in their initial state, *i.e.* out of the labor force or occupying long-term jobs. The unconfined-mover process generates histories in which individuals can access the four states without restriction. The confined-mover process generates histories in which individuals cannot access stable jobs.

Steady state. TABLE IV reports the *stationary occupation probabilities* at the steady state of each underlying process and those prevailing on average in the economy, which accounts for the mixture equilibrium. The results are reported separately for the eight gender/age groups.

Three main differences between the confined and the unconfined mover processes can be emphasized. First, the unconfined-mover process generates more frequent periods of employment than the confined-mover process. At steady state, 52.8% to 86.1% of the unconfined movers are employed, combining stable and unstable jobs – depending on the group considered, versus 12.5% to 59.7% of the confined movers. This feature generally holds regardless of age and gender, except for the group of 50- to 59-year-old women. Second, confined movers experience dramatically more frequent periods of unemployment than unconfined movers. Between 27.9% and 63% of the former are unemployed at steady state, versus between 6.8% and 13.5% of unconfined movers. Third, the frequency of periods of nonparticipation of confined and unconfined movers depends on the life cycle. Periods of nonparticipation are more frequent among 20- to 39-year-old confined movers than among their unconfined counterparts, whereas the opposite holds true for men and women aged between 40 and 59. The proportions of confined movers in nonparticipation at stationary equilibrium for the younger groups are likely to reflect the difficulty of entering the labor market, whereas similar proportions among the older unconfined movers reflect some “chosen” labor market exits (retirement, etc.).

6. Someone who is 29 in the first period will count in the 20-29 age group for his/her whole trajectory.

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TABLE IV. – Dynamic Process Stationary Equilibria: Confined, Unconfined, and Total Mixture Processes

Women	SJ	UJ	U	NP	Men	SJ	UJ	U	NP
Age: 20-29					Age: 20-29				
Unconfined	0.597*** (0.025)	0.228*** (0.015)	0.083*** (0.008)	0.093*** (0.008)	Unconfined	0.575*** (0.027)	0.261*** (0.018)	0.114*** (0.010)	0.050*** (0.005)
Confined	0.000 (0.000)	0.125*** (0.035)	0.484*** (0.029)	0.391*** (0.031)	Confined	0.000 (0.000)	0.159*** (0.037)	0.610*** (0.036)	0.231*** (0.026)
Total eq.	0.585*** (0.008)	0.131*** (0.006)	0.102*** (0.003)	0.181*** (0.005)	Total eq.	0.684*** (0.008)	0.131*** (0.006)	0.118*** (0.004)	0.067*** (0.003)
30-39					30-39				
Unconfined	0.630*** (0.028)	0.148*** (0.016)	0.068*** (0.007)	0.154*** (0.018)	Unconfined	0.660*** (0.029)	0.203*** (0.018)	0.088*** (0.009)	0.050*** (0.008)
Confined	0.000 (0.000)	0.189*** (0.061)	0.535*** (0.036)	0.275*** (0.056)	Confined	0.000 (0.000)	0.179*** (0.050)	0.630*** (0.047)	0.191*** (0.032)
Total eq.	0.690*** (0.005)	0.068*** (0.003)	0.062*** (0.002)	0.179*** (0.004)	Total eq.	0.845*** (0.004)	0.061*** (0.003)	0.055*** (0.002)	0.039*** (0.002)
40-49					40-49				
Unconfined	0.569*** (0.028)	0.140*** (0.013)	0.135*** (0.011)	0.157*** (0.015)	Unconfined	0.612*** (0.033)	0.156*** (0.025)	0.119*** (0.015)	0.113*** (0.011)
Confined	0.000 (0.000)	0.667*** (0.151)	0.279** (0.130)	0.055** (0.025)	Confined	0.000 (0.000)	0.337*** (0.097)	0.622*** (0.085)	0.041* (0.021)
Total eq.	0.740*** (0.004)	0.062*** (0.008)	0.043*** (0.005)	0.155*** (0.004)	Total eq.	0.864*** (0.004)	0.040*** (0.002)	0.043*** (0.002)	0.054*** (0.002)
50-59					50-59				
Unconfined	0.451*** (0.028)	0.077*** (0.016)	0.095*** (0.011)	0.377*** (0.028)	Unconfined	0.477*** (0.039)	0.054*** (0.007)	0.075*** (0.009)	0.394*** (0.034)
Confined	0.000 (0.000)	0.597*** (0.081)	0.336*** (0.065)	0.066** (0.031)	Confined	0.000 (0.000)	0.340*** (0.095)	0.482*** (0.080)	0.178*** (0.066)
Total eq.	0.540*** (0.006)	0.045*** (0.004)	0.038*** (0.003)	0.377*** (0.006)	Total eq.	0.604*** (0.010)	0.031*** (0.004)	0.043*** (0.003)	0.323*** (0.009)

Source: French Labor Force Survey (Enquête emploi) 2005-2009.

Sample: 20- to 59-year-old individuals whose education is finished and who responded to all six waves of the survey.

Note: SJ stands for *stable jobs*, UJ, for *unstable jobs*, U, for *unemployment*, and NP, for *nonparticipation*. pvalue<.01:***, pvalue<.05:**, pvalue<.10:*. Bootstrapped standard errors in parentheses (100 replicates).

Dynamics. The detailed *transition matrices* of the unconfined and confined mover processes are reported in Tables V and VI. Their components confirm the differences noted above between the confined- and unconfined-mover processes. They stress, for instance, the longer unemployment risk faced by confined movers. Between 71% and 95.5% of the confined movers who are initially unemployed are still unemployed three months later, versus between 44.1% and 55.6% of the unconfined movers. The initially unemployed unconfined movers move more frequently to employment, either with long-term or short-term jobs.

The dynamics of unconfined and confined movers differ with age and gender. In accordance with the life cycle theory, the proportion of ascending transitions (*i.e.* access to employment after unemployment or nonparticipation) for unconfined movers is the highest among those in the 20-29 age groups and decreases for older people. The reverse occurs for descending transitions (*i.e.* move to nonparticipation from participation states). These features are less clear for the confined movers. In particular, the 20- to 29-year-old confined movers exhibit quite high probabilities of moving from unstable jobs to nonparticipation – more than 20% for women and approximately 12-13% for men, compared to other age groups, and compared to unconfined movers in the same age groups. This may illustrate again a long and nonlinear labor market integration process. Lastly, for both mover processes, men tend to be slightly more mobile than women.

Persistence. If the estimated unconfined mover process were to display high persistence, some unconfined movers who did not initially have long-term jobs might alternate short-term jobs,

TABLE V. – Unconfined Mover Transition Matrix

Women	SJ	UJ	U	NP	Men	SJ	UJ	U	NP
Age: 20-29					Age: 20-29				
SJ	0.925*** (0.007)	0.020*** (0.003)	0.021*** (0.002)	0.035*** (0.004)	SJ	0.918*** (0.007)	0.030*** (0.003)	0.033*** (0.003)	0.020*** (0.002)
UJ	0.091*** (0.006)	0.789*** (0.009)	0.090*** (0.007)	0.031*** (0.006)	UJ	0.096*** (0.006)	0.773*** (0.012)	0.100*** (0.010)	0.031*** (0.006)
U	0.146*** (0.014)	0.326*** (0.017)	0.441*** (0.024)	0.092*** (0.013)	U	0.127*** (0.014)	0.288*** (0.020)	0.505*** (0.023)	0.080*** (0.009)
NP	0.137*** (0.014)	0.101*** (0.015)	0.141*** (0.014)	0.621*** (0.023)	NP	0.155*** (0.025)	0.188*** (0.027)	0.228*** (0.029)	0.429*** (0.036)
30-39					30-39				
SJ	0.936*** (0.007)	0.011*** (0.002)	0.017*** (0.002)	0.037*** (0.004)	SJ	0.931*** (0.008)	0.019*** (0.003)	0.028*** (0.004)	0.021*** (0.003)
UJ	0.096*** (0.008)	0.820*** (0.010)	0.059*** (0.013)	0.025*** (0.006)	UJ	0.107*** (0.008)	0.797*** (0.012)	0.079*** (0.013)	0.018*** (0.004)
U	0.162*** (0.015)	0.211*** (0.035)	0.467*** (0.027)	0.159*** (0.028)	U	0.154*** (0.015)	0.264*** (0.031)	0.488*** (0.027)	0.094*** (0.017)
NP	0.100*** (0.012)	0.036*** (0.008)	0.110*** (0.010)	0.754*** (0.019)	NP	0.202*** (0.031)	0.116*** (0.023)	0.203*** (0.026)	0.478*** (0.046)
40-49					40-49				
SJ	0.927*** (0.007)	0.016*** (0.002)	0.023*** (0.003)	0.034*** (0.004)	SJ	0.925*** (0.009)	0.013*** (0.002)	0.030*** (0.004)	0.032*** (0.004)
UJ	0.115*** (0.013)	0.675*** (0.017)	0.157*** (0.011)	0.054*** (0.005)	UJ	0.094*** (0.016)	0.815*** (0.024)	0.058*** (0.014)	0.033*** (0.007)
U	0.089*** (0.008)	0.195*** (0.014)	0.545*** (0.022)	0.171*** (0.019)	U	0.140*** (0.018)	0.119*** (0.028)	0.560*** (0.040)	0.182*** (0.019)
NP	0.086*** (0.009)	0.066*** (0.007)	0.166*** (0.012)	0.682*** (0.019)	NP	0.132*** (0.013)	0.057*** (0.009)	0.221*** (0.020)	0.590*** (0.022)
50-59					50-59				
SJ	0.918*** (0.008)	0.005*** (0.001)	0.012*** (0.002)	0.064*** (0.007)	SJ	0.928*** (0.008)	0.003*** (0.001)	0.010*** (0.001)	0.059*** (0.006)
UJ	0.116*** (0.028)	0.633*** (0.032)	0.154*** (0.030)	0.097*** (0.023)	UJ	0.124*** (0.016)	0.612*** (0.032)	0.174*** (0.024)	0.090*** (0.021)
U	0.094*** (0.012)	0.154*** (0.036)	0.483*** (0.032)	0.269*** (0.033)	U	0.095*** (0.013)	0.163*** (0.019)	0.556*** (0.030)	0.185*** (0.035)
NP	0.050*** (0.006)	0.030*** (0.007)	0.084*** (0.010)	0.836*** (0.013)	NP	0.053*** (0.010)	0.018*** (0.005)	0.049*** (0.009)	0.881*** (0.012)

Source: French Labor Force Survey (Enquête emploi) 2005-2009.

Sample: 20- to 59-year-old individuals whose education is finished and who responded to all six waves of the survey.

Note: the table reports the probabilities of transition between the four labor market states : SJ stands for *stable jobs*, UJ, for *unstable jobs*, U, for *unemployment*, and NP, for *nonparticipation*. pvalue<.01:***, pvalue<.05:**, pvalue<.10:*. Bootstrapped standard errors in parentheses (100 replicates).

nonparticipation, and unemployment for a long period before eventually obtaining long-term jobs. If this were to happen, the distinction between unconfined movers and confined movers, despite existing over an infinite horizon,⁷ would have no interpretable meaning over a finite one. Thus, one of our concerns is to check in the data for the degrees of persistence of the unconfined mover processes estimated. Do the degrees of persistence of the unconfined mover processes differ enough from those of the confined mover processes to ensure that the trapped histories over, say, 5 or 10 years, are encompassed only by the confined mover processes and not by the unconfined mover processes? To check this, we use the model estimates to simulate labor market histories and evaluate the proportion of individuals who do not access stable positions over a fixed period of 2, 5, 8 or 10 years. The simulation relies on the initial state, education level, age and gender distributions observed in the data. For each worker, we draw a type according to his/her predicted individual type probabilities conditional on education, sex, age and the initial state he/she occupies. Conditional on this type and the initial state he/she occupies, we simulate

7. Because the unconfined mover process is ergodic by construction, all unconfined movers eventually access a long-term job, while confined movers never do.

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TABLE VI. – Confined Mover Transition Matrix

Women	SJ	UJ	U	NP	Men	SJ	UJ	U	NP
Age: 20-29					Age: 20-29				
SJ	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	SJ	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
UJ	0.000 (0.000)	0.446*** (0.086)	0.293*** (0.057)	0.261*** (0.057)	UJ	0.000 (0.000)	0.413*** (0.069)	0.454*** (0.062)	0.132*** (0.046)
U	0.000 (0.000)	0.087*** (0.020)	0.714*** (0.023)	0.199*** (0.017)	U	0.000 (0.000)	0.120*** (0.024)	0.752*** (0.026)	0.129*** (0.011)
NP	0.000 (0.000)	0.070*** (0.017)	0.260*** (0.022)	0.670*** (0.030)	NP	0.000 (0.000)	0.087*** (0.028)	0.343*** (0.040)	0.570*** (0.040)
30-39					30-39				
SJ	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	SJ	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
UJ	0.000 (0.000)	0.497*** (0.086)	0.299*** (0.062)	0.205*** (0.063)	UJ	0.000 (0.000)	0.514*** (0.079)	0.394*** (0.080)	0.092*** (0.033)
U	0.000 (0.000)	0.123*** (0.034)	0.710*** (0.027)	0.166*** (0.028)	U	0.000 (0.000)	0.119*** (0.031)	0.763*** (0.031)	0.118*** (0.016)
NP	0.000 (0.000)	0.106*** (0.031)	0.358*** (0.041)	0.536*** (0.063)	NP	0.000 (0.000)	0.065*** (0.025)	0.411*** (0.066)	0.523*** (0.072)
40-49					40-49				
SJ	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	SJ	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
UJ	0.000 (0.000)	0.983*** (0.016)	0.011 (0.013)	0.007 (0.005)	UJ	0.000 (0.000)	0.668*** (0.116)	0.309*** (0.102)	0.023 (0.021)
U	0.000 (0.000)	0.016 (0.025)	0.816*** (0.041)	0.168*** (0.042)	U	0.000 (0.000)	0.172*** (0.063)	0.777*** (0.055)	0.052*** (0.016)
NP	0.000 (0.000)	0.130** (0.065)	0.804*** (0.107)	0.066 (0.125)	NP	0.000 (0.000)	0.128 (0.111)	0.858*** (0.136)	0.014 (0.086)
50-59					50-59				
SJ	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	SJ	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
UJ	0.000 (0.000)	0.962*** (0.024)	0.010 (0.021)	0.028** (0.012)	UJ	0.000 (0.000)	0.945*** (0.026)	0.013 (0.013)	0.042** (0.021)
U	0.000 (0.000)	0.033 (0.055)	0.854*** (0.054)	0.113*** (0.033)	U	0.000 (0.000)	0.018* (0.011)	0.810*** (0.034)	0.172*** (0.032)
NP	0.000 (0.000)	0.179 (0.120)	0.650*** (0.098)	0.171 (0.142)	NP	0.000 (0.000)	0.058** (0.028)	0.487*** (0.119)	0.455*** (0.130)

Source: French Labor Force Survey (Enquête emploi) 2005-2009.

Sample: 20- to 59-year-old individuals whose education is finished and who responded to all six waves of the survey.

Note: the table reports the probabilities of transition between the four labor market states: SJ stands for *stable jobs*, UJ, for *unstable jobs*, U, for *unemployment*, and NP, for *nonparticipation*. pvalue<.01:***, pvalue<.05:**, pvalue<.10:*. Bootstrapped standard errors in parentheses (100 replicates).

a labor market trajectory of 2, 5, 8 or 10 years. We lastly compute the proportions of individuals who do not obtain a stable position during this period, and decompose these proportions by type: nonparticipant stayers, confined movers and unconfined movers. TABLE VII reports the simulation results. The first column reports the simulation period duration in quarters. The second and third column present the simulated shares of individuals and unconfined movers, respectively, who do not obtain long-term jobs during the time period. Columns 4 to 6 report the simulated proportions of confined movers, of individuals who remain in nonparticipation during the whole period, and of stayers in nonparticipation, respectively. Note that we do not account for the fact that workers may change from one age group to another during the period simulated.

The proportions of unconfined movers who do not obtain long-term jobs diminish rapidly (third column). After five to eight years, depending on the gender/age group, they are always negligible. Thus, the unconfined mover processes are not very persistent.⁸ Similarly, individuals remaining in nonparticipation for two to five years are composed exclusively of nonparticipant

8. Computing formal Markov chain speeds of convergence leads to similar conclusions.

TABLE VII. – Model Simulation: Shares of Individuals who do not Access Stable Jobs over a Fixed Period of Time

	<i>T</i> duration (quarters)	% ind. no stable jobs over <i>T</i>	% unconf. mov. no stable jobs over <i>T</i>	% conf. mov.	% ind. nonpart. over <i>T</i>	% nonpart. stay.
Men						
Age: 20-29	8	0.247	0.112	0.119	0.017	0.016
	20	0.164	0.029	0.119	0.016	0.016
	32	0.143	0.008	0.119	0.016	0.016
	40	0.137	0.002	0.119	0.016	0.016
30-39	8	0.108	0.042	0.050	0.016	0.016
	20	0.074	0.008	0.050	0.016	0.016
	32	0.068	0.001	0.050	0.016	0.016
	40	0.067	0.000	0.050	0.016	0.016
40-49	8	0.095	0.029	0.034	0.033	0.032
	20	0.074	0.008	0.034	0.032	0.032
	32	0.068	0.002	0.034	0.032	0.032
	40	0.067	0.000	0.034	0.032	0.032
50-59	8	0.263	0.036	0.038	0.199	0.188
	20	0.241	0.015	0.038	0.190	0.188
	32	0.234	0.007	0.038	0.189	0.188
	40	0.231	0.005	0.038	0.188	0.188
Women						
Age: 20-29	8	0.330	0.118	0.125	0.091	0.086
	20	0.243	0.032	0.125	0.086	0.086
	32	0.221	0.009	0.125	0.086	0.086
	40	0.215	0.003	0.125	0.086	0.086
30-39	8	0.256	0.079	0.077	0.111	0.100
	20	0.199	0.022	0.077	0.101	0.100
	32	0.183	0.006	0.077	0.100	0.100
	40	0.179	0.003	0.077	0.100	0.100
40-49	8	0.221	0.063	0.042	0.121	0.117
	20	0.175	0.016	0.042	0.117	0.117
	32	0.164	0.005	0.042	0.117	0.117
	40	0.161	0.003	0.042	0.117	0.117
50-59	8	0.371	0.048	0.040	0.295	0.283
	20	0.343	0.020	0.040	0.284	0.283
	32	0.331	0.008	0.040	0.283	0.283
	40	0.327	0.004	0.040	0.283	0.283

Note: the first column reports the period duration in quarters. The second column presents the simulated shares of individuals who do not access a long-term job during the whole period. The third column presents the simulated shares of unconfined movers who do not access a long term job during the period. The fourth column reports the simulated shares of confined movers. The fifth column presents the simulated shares of individuals who remain in nonparticipation during the whole period. Finally, column six reports the simulated shares of nonparticipant stayers.

stayers (columns 5 and 6). Consequently, the model predicts that individuals who remain trapped out of long-term positions for five to eight years, without remaining in nonparticipation, should be nearly exclusively confined movers. That is, the confined mover definition entailed by the model appears to be compatible with a horizon of at least five years.

IV.2. *Duality of the Labor Market*

Types and age. TABLE VIII reports the unconditional type probabilities for the different gender/age groups (see equation 3). The proportion of confined movers is the highest for the young: 11-13% of the 20- to 29-year-olds. For older individuals, the proportion is quite stable, between 4 and 7%. Other types exhibit more variation with age.

For the 40-49 age groups (men and women), the most frequent type is the “stayer in stable jobs” type: 61.2% of women and 75.3% of men. This type is far less frequent upon entrance into the labor market (28.3% of the 20- to 29-year-old women and 43.4% of the 20- to 29-year-old men) and among the 50- to 59-year-olds (42.6% of women and 44.9% of men), reflecting retirement and labor market exits. Conversely, the nonparticipant stayer type is more frequent among older workers who have definitely left the labor market (27.9% of 50- to 59-year-old women and 18.8% of men). For other age groups, stayers in nonparticipation are quite rare among men but they represent 10% of women, which illustrates the fact that some French women are further from the labor market than are men.

The proportion of unconfined movers also varies considerably with age. The unconfined-mover type is the most likely type among the 20- to 29-year-olds, with a proportion close to one half, which illustrates the labor market entrance process. The proportion of unconfined movers decreases with age up to 40 to 49, at which it represents 22.5% of women and 18.2% of men, and increases again for 50- to 59-year-olds, who are likely to exhibit state transitions when leaving the labor market.

Types and education. Tables IX and X show how the type probabilities vary with education (see equation 1). Both tables illustrate the same patterns. As previously noted, these variations are merely correlations and cannot be interpreted as causal effects of education on type probabilities. In general, stayers in stable jobs are more likely to be educated and, for similar levels of education, are more likely to hold vocational and technical degrees than general degrees. For instance, for the 40- to 49-year-olds, the probability of university graduates being stayers in stable jobs is 20 (for men) to 30 (for women) percentage points higher than for those with no qualifications, but 5 to 8 percentage points lower than for those with a vocational or a technical qualification. Conversely, nonparticipant stayers, male or female, are more likely to have no qualifications at all.

For the 20- to 29-year-olds, the highest probabilities of being confined movers are found among those with no qualifications (26-28% for men and women) and among women with general junior high school diplomas (28%). As age increases, the probability of being a confined mover decreases, as does its correlation with education level. For older groups, the relationship between the confined-mover type and education is generally weaker and in some cases is not significant. The correlation between the unconfined-mover type and education also depends

TABLE VIII. – Unconditional Type Probabilities

	Unconfined Movers	Confined. Movers	Stable-Job Stayers	Nonparticipant Stayers
Women				
Age: 20-29	0.507*** (0.024)	0.125*** (0.012)	0.283*** (0.021)	0.085*** (0.005)
30-39	0.373*** (0.023)	0.069*** (0.006)	0.455*** (0.022)	0.102*** (0.005)
40-49	0.225*** (0.012)	0.045*** (0.005)	0.612*** (0.011)	0.118*** (0.003)
50-59	0.253*** (0.018)	0.042*** (0.005)	0.426*** (0.017)	0.279*** (0.005)
Men				
Age: 20-29	0.436*** (0.022)	0.112*** (0.013)	0.434*** (0.016)	0.019*** (0.002)
30-39	0.255*** (0.019)	0.052*** (0.006)	0.677*** (0.018)	0.017*** (0.001)
40-49	0.182*** (0.014)	0.034*** (0.005)	0.753*** (0.014)	0.032*** (0.002)
50-59	0.325*** (0.027)	0.039*** (0.005)	0.449*** (0.025)	0.188*** (0.005)

Source: French Labor Force Survey (Enquête emploi) 2005-2009.

Sample: 20- to 59-year-old individuals whose education is finished and who responded to all six waves of the survey.

Note: pvalue<.01:***, pvalue<.05:**, pvalue<.10:*. Bootstrapped standard errors in parentheses (100 replicates).

on age and gender. Among the 20-to 29-year-olds, unconfined movers are overrepresented among both men and women with vocational and technical junior high school and general high school diplomas, and undergraduate degrees, and among men with general junior high school diplomas. Among the 30-to 39-year-olds, unconfined movers are overrepresented among those with no qualifications. These features may be related to differences in the duration of schooling, which bring individuals into the labor market at different ages, and to differences in the time required for integration into the labor market. Moreover, the probability of vocational diploma holders being unconfined movers is similar to that of university graduates. This may be related to the fact that higher-education-vocational programs train for a particular – and usually stable – career, *e.g.* nursing, for which integration into the labor market is very rapid. As for confined movers, the relationship between the unconfined-mover type and education is generally weaker for the 50- to 59-year-olds, except for male university graduates. In this age range, the unconfined-mover type is likely to reflect retirement patterns. TABLE A.1 in the Appendix shows how the type probabilities vary with the initial state (see equation 2).

IV.3. A Posteriori Type Analysis

So far, types have been characterized by age, gender and education. Policy makers might also be interested in characterizing these groups with respect to other socio-demographic dimensions, such as place of residence, family status, nationality or ethnic group.

To enrich the interpretation of types, we perform the following exercise. For each individual, we predict the probabilities enhanced by the model estimates that he/she is of type θ_k .⁹ Then,

9. For an individual with characteristics X and a path $\{I_0, \dots, I_{T-1}\}$, $P(\Theta = \theta_k | I_0, \dots, I_{T-1}, X)$ is computed by Bayes law as $P(\{I_1, \dots, I_{T-1}\} | \Theta = \theta, I_0, X) P(\Theta = \theta | I_0, X) / [\sum_t P(\{I_1, \dots, I_{T-1}\} | \Theta = t, I_0, X) P(\Theta = t | I_0, X)]$.

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TABLE IX. – Type-Probabilities Conditional on Education: Women

	No qual	Grad.	Under grad.	Voc.- Tech. dip	Gen. HS	Voc.- Tech. HS	Prod. Voc. -Tech. JHS	Serv. Voc. -Tech. JHS	Gen. JHS
Age: 20-29									
Unconf. Mov.	0.354*** (0.034)	0.482*** (0.035)	0.524*** (0.047)	0.418*** (0.028)	0.621*** (0.057)	0.589*** (0.045)	0.584*** (0.084)	0.619*** (0.044)	0.413*** (0.052)
Conf. Mov.	0.262*** (0.023)	0.025** (0.010)	0.049*** (0.015)	0.034*** (0.011)	0.103*** (0.028)	0.101*** (0.019)	0.227*** (0.055)	0.168*** (0.021)	0.283*** (0.034)
Stable-Job St.	0.054** (0.027)	0.481*** (0.034)	0.410*** (0.047)	0.535*** (0.026)	0.194*** (0.051)	0.272*** (0.042)	0.129* (0.069)	0.137*** (0.038)	0.150*** (0.041)
Nonpart. St.	0.330*** (0.019)	0.012* (0.006)	0.017** (0.009)	0.013*** (0.005)	0.082*** (0.015)	0.038*** (0.008)	0.060** (0.024)	0.075*** (0.010)	0.154*** (0.020)
30-39									
Unconf. Mov.	0.388*** (0.034)	0.310*** (0.027)	0.298*** (0.037)	0.295*** (0.029)	0.427*** (0.046)	0.380*** (0.035)	0.371*** (0.050)	0.462*** (0.033)	0.417*** (0.044)
Conf. Mov.	0.153*** (0.015)	0.027*** (0.007)	0.052*** (0.013)	0.031*** (0.007)	0.049*** (0.014)	0.058*** (0.011)	0.104*** (0.020)	0.061*** (0.010)	0.105*** (0.020)
Stable-Job St.	0.193*** (0.029)	0.633*** (0.027)	0.607*** (0.036)	0.635*** (0.028)	0.436*** (0.042)	0.494*** (0.033)	0.400*** (0.049)	0.386*** (0.034)	0.320*** (0.039)
Nonpart. St.	0.267*** (0.012)	0.030*** (0.006)	0.042*** (0.010)	0.039*** (0.006)	0.088*** (0.014)	0.068*** (0.009)	0.125*** (0.019)	0.091*** (0.009)	0.157*** (0.018)
40-49									
Unconf. Mov.	0.296*** (0.020)	0.161*** (0.022)	0.176*** (0.025)	0.137*** (0.017)	0.201*** (0.021)	0.194*** (0.023)	0.316*** (0.032)	0.227*** (0.016)	0.230*** (0.023)
Conf. Mov.	0.067*** (0.010)	0.045*** (0.009)	0.033*** (0.009)	0.020*** (0.005)	0.032*** (0.008)	0.027*** (0.008)	0.045*** (0.012)	0.042*** (0.007)	0.058*** (0.009)
Stable-Job St.	0.414*** (0.019)	0.728*** (0.022)	0.692*** (0.027)	0.777*** (0.018)	0.674*** (0.022)	0.701*** (0.022)	0.526*** (0.030)	0.646*** (0.016)	0.599*** (0.023)
Nonpart. St.	0.223*** (0.008)	0.067*** (0.009)	0.099*** (0.013)	0.066*** (0.007)	0.093*** (0.009)	0.078*** (0.010)	0.113*** (0.014)	0.084*** (0.006)	0.113*** (0.009)
50-59									
Unconf. Mov.	0.259*** (0.021)	0.202*** (0.026)	0.216*** (0.033)	0.203*** (0.026)	0.255*** (0.033)	0.297*** (0.041)	0.269*** (0.038)	0.257*** (0.023)	0.272*** (0.031)
Conf. Mov.	0.050*** (0.007)	0.023*** (0.008)	0.029*** (0.008)	0.034*** (0.009)	0.042*** (0.008)	0.031*** (0.009)	0.050*** (0.012)	0.042*** (0.007)	0.036*** (0.007)
Stable-Job St.	0.368*** (0.019)	0.629*** (0.028)	0.525*** (0.033)	0.580*** (0.026)	0.471*** (0.032)	0.492*** (0.045)	0.413*** (0.040)	0.478*** (0.023)	0.429*** (0.029)
Nonpart. St.	0.382*** (0.008)	0.146*** (0.016)	0.229*** (0.018)	0.183*** (0.014)	0.231*** (0.014)	0.180*** (0.016)	0.268*** (0.022)	0.223*** (0.010)	0.263*** (0.014)

Source: French Labor Force Survey (Enquête emploi) 2005-2009.

Sample: 20- to 59-year-old individuals whose education is finished and who responded to all six waves of the survey.

Note: pvalue<.01:***, pvalue<.05:**, pvalue<.10:*. Bootstrapped standard errors in parentheses (100 replicates).

pooling all individuals in a single sample, we conduct ordinary least squares regressions of the predicted individual type probabilities as functions of a larger set of characteristics than those previously included in the model, except education. Some of those characteristics (foreign citizenship, father's occupation) were not included in the model estimation because of a trade-off between the number of type covariates and the feasibility and stability of estimation. We also add some decision-making variables, the inclusion of which was irrelevant in the CCUW model. Those variables, namely the place of residence and family status, are evaluated at the entrance panel date. No causal effects are to be inferred from this analysis. Table XI presents the results of these regressions. Note that because the four type probabilities sum to one, the fourth column can be deduced from the first three; we report it to facilitate interpretation. Moreover, the reported standard deviations may be too small because they do not account for the fact that the dependent variables are predicted in the first step. Assessments of significance should be taken with a grain of salt.

Who are the confined movers? The first column shows which characteristics correlate with the confined-mover type. In accordance with the results reported in the previous section, the probability of being a confined mover is the highest for the young, especially the 20- to

TABLE X. – Type-Probabilities Conditional on Education: Men

	No qual	Grad.	Under grad.	Voc.- Tech. dip	Gen. HS	Voc.- Tech. HS	Prod. Voc. -Tech. JHS	Serv. Voc. -Tech. JHS	Gen. JHS
Age: 20-29									
Unconf. Mov.	0.417*** (0.036)	0.369*** (0.037)	0.574*** (0.064)	0.374*** (0.034)	0.374*** (0.050)	0.423*** (0.029)	0.468*** (0.031)	0.483*** (0.061)	0.528*** (0.053)
Conf. Mov.	0.281*** (0.023)	0.028** (0.012)	0.063*** (0.023)	0.051*** (0.013)	0.141*** (0.034)	0.054*** (0.017)	0.073*** (0.016)	0.152*** (0.034)	0.187*** (0.030)
Stable-Job St.	0.233*** (0.028)	0.602*** (0.036)	0.359*** (0.058)	0.572*** (0.031)	0.469*** (0.044)	0.517*** (0.023)	0.445*** (0.026)	0.357*** (0.056)	0.259*** (0.043)
Nonpart. St.	0.069*** (0.008)	0.002 (0.002)	0.004 (0.004)	0.004 (0.002)	0.017* (0.009)	0.006** (0.003)	0.014*** (0.003)	0.008 (0.007)	0.025*** (0.008)
30-39									
Unconf. Mov.	0.323*** (0.031)	0.200*** (0.023)	0.292*** (0.042)	0.197*** (0.022)	0.274*** (0.040)	0.209*** (0.026)	0.265*** (0.027)	0.284*** (0.048)	0.317*** (0.043)
Conf. Mov.	0.135*** (0.016)	0.021*** (0.006)	0.064*** (0.018)	0.013*** (0.005)	0.063*** (0.013)	0.026*** (0.007)	0.034*** (0.008)	0.064*** (0.019)	0.081*** (0.017)
Stable-Job St.	0.478*** (0.028)	0.776*** (0.023)	0.643*** (0.040)	0.877*** (0.022)	0.651*** (0.042)	0.756*** (0.026)	0.693*** (0.026)	0.649*** (0.049)	0.583*** (0.040)
Nonpart. St.	0.065*** (0.007)	0.004** (0.002)	0.002 (0.002)	0.003** (0.002)	0.013*** (0.005)	0.009*** (0.003)	0.008*** (0.002)	0.002 (0.003)	0.019*** (0.006)
40-49									
Unconf. Mov.	0.234*** (0.021)	0.183*** (0.024)	0.182*** (0.036)	0.095*** (0.016)	0.205*** (0.028)	0.141*** (0.025)	0.154*** (0.016)	0.222*** (0.034)	0.231*** (0.035)
Conf. Mov.	0.067*** (0.009)	0.012*** (0.005)	0.027** (0.013)	0.019*** (0.006)	0.031*** (0.010)	0.011 (0.007)	0.026*** (0.006)	0.046*** (0.014)	0.029*** (0.008)
Stable-Job St.	0.630*** (0.020)	0.798*** (0.024)	0.765*** (0.037)	0.876*** (0.015)	0.740*** (0.028)	0.830*** (0.025)	0.795*** (0.015)	0.711*** (0.035)	0.713*** (0.034)
Nonpart. St.	0.069*** (0.005)	0.007** (0.003)	0.026*** (0.009)	0.010*** (0.004)	0.024*** (0.006)	0.018*** (0.005)	0.025*** (0.003)	0.021*** (0.006)	0.027*** (0.006)
50-59									
Unconf. Mov.	0.356*** (0.032)	0.178*** (0.026)	0.331*** (0.059)	0.238*** (0.037)	0.265*** (0.037)	0.296*** (0.047)	0.354*** (0.033)	0.373*** (0.054)	0.357*** (0.043)
Conf. Mov.	0.057*** (0.008)	0.029*** (0.006)	0.049*** (0.012)	0.023*** (0.008)	0.036*** (0.009)	0.033*** (0.013)	0.027*** (0.005)	0.031*** (0.011)	0.035*** (0.009)
Stable-Job St.	0.322*** (0.029)	0.754*** (0.025)	0.505*** (0.059)	0.615*** (0.036)	0.565*** (0.035)	0.530*** (0.044)	0.419*** (0.031)	0.484*** (0.055)	0.422*** (0.042)
Nonpart. St.	0.265*** (0.010)	0.038*** (0.009)	0.116*** (0.018)	0.124*** (0.014)	0.134*** (0.016)	0.141*** (0.016)	0.201*** (0.007)	0.112*** (0.018)	0.186*** (0.014)

Source: French Labor Force Survey (Enquête emploi) 2005-2009.

Sample: 20- to 59-year-old individuals whose education is finished and who responded to all six waves of the survey.

Note: pvalue<.01:***, pvalue<.05:**, pvalue<.10:*. Bootstrapped standard errors in parentheses (100 replicates).

24-year-olds, decreases with age until 35 and remains rather stable therefore. Men are slightly overrepresented among confined movers. Having a foreign nationality or immigrants parents (from North Africa, Sub-saharan Africa or the Middle East) increases one's probability of being a confined mover. Social background matters too, to a lesser extent: having a father who is in an executive position is associated with a lower probability of being a confined mover. Confined movers are more likely to live in deprived areas, and slightly less likely to live in the Paris area. For women, the presence of children over the age of 3 in the household is associated with a higher probability of being a confined mover, and being married is associated with a slightly lower probability. Conversely, for men, having children is associated with a lower probability of being a confined mover, only when the children are less than 5 years old. Married men are also less likely to be confined movers. Lastly, the very small R-squared (5%) shows that characterizing confined movers based on these sole variables is difficult.

What are the main patterns for the other three types? As stressed previously, women are more likely to be stayers in nonparticipation and unconfined movers, and are less likely to be stayers in stable jobs; and age is the most important determinant. Increasing age is associated with higher probabilities of staying in nonparticipation. For the unconfined movers, the pattern of the effect of age is U-shaped, with a reversal at the age of approximately 50, while for stayers

in stable jobs, the pattern is hump-shaped with the peak probability occurring between the ages of 40 and 50. Stayers in stable jobs are less likely to be foreign citizens, to have immigrant parents from North Africa, Sub-saharan Africa or the Middle East or to live in a deprived area, in contrast to both confined and unconfined movers. Having a father who is an executive is associated with the exact opposite, with coefficients of lower magnitude. Stayers in stable jobs are more likely to live in the Paris area, unlike the other three types. The family situation is more difficult to interpret. In general, having children and being married are associated with stable labor-market situations for men, who are less likely to be movers and more likely to be stayers in stable jobs. For women, being married and having young children are associated with staying in nonparticipation.

V. Robustness Discussion

The CCUW model focuses on four labor market dynamic processes: stayers in either of two states (in stable jobs or in nonparticipation), unconfined movers, and confined movers. These dynamics are selected *a priori* to describe the labor market duality, and in particular to estimate the proportion of confined movers.

However, the CCUW model captures unconfined-mover behaviors via a single dynamic process. If the true underlying data-generating process included no confined movers but several types of unconfined movers, one of which had very few moves to stable jobs, this latter type might be mistakenly assigned by the estimation to the confined mover process. This issue, which would lead to overestimation of the proportion of confined movers, may be all the more acute as we only have a small window of observation. To assess the extent of this potential overestimation, we could compare the CCUW model with a more flexible mixture of Markov chains, such as a mixture of several unconfined mover-stayer processes.

The approach we have adopted is to compare predictions from different models. We estimate an alternative model that is made up of a mixture of less constrained Markov chains. This competing model is precisely a mixture of four stayer processes and two unconfined mover processes. We use estimates from this model to simulate the proportion of individuals who do not obtain stable jobs over periods of 2, 5, 8, and 10 years. TABLE XII compares these simulated proportions with those simulated by the CCUW model.

The proportion of individuals trapped for 5 to 8 years as predicted by this competing model is similar to that predicted by the CCUW model. From the results shown in TABLE VII, we know that it is nearly exclusively confined movers who alternate between unstable jobs and periods of nonemployment for 5 to 8 years. These findings support our model and justify the types we have selected *a priori*. Again, it must be pointed that, unlike our model, this alternative model is not able to isolate the confined mover type. The CCUW model focusses on a specific segment of the labor market, the confined movers. Though they make up a small group, they may constitute workers in more precarious situations. Our model helps to characterize them, provides information to support policy-makers's decisions, and provides a stylized yet consistent way to illustrate the facts summarized in, for instance, in CAHUC *et al.* [2011] .

Another concern about the CCUW model is the implicit assumption of time homogeneity. The transition probabilities and the type probabilities are assumed to be constant over time. So,

TABLE XI. – A Posteriori Analysis: a Correlation Analysis between Types and Ancillary Characteristics

	Confined Movers	Unconfined Movers	Stable Jobs Stayers	Nonparticipant Stayers
Women	−0.008*** (0.002)	0.021*** (0.004)	−0.022*** (0.005)	0.010*** (0.004)
Foreign citizenship	0.022*** (0.004)	0.027*** (0.005)	−0.110*** (0.007)	0.060*** (0.005)
Immigrant parents	0.073*** (0.003)	0.037*** (0.005)	−0.154*** (0.006)	0.043*** (0.005)
Father: executive	−0.011*** (0.002)	−0.019*** (0.003)	0.058*** (0.003)	−0.029*** (0.003)
Age				
20-24	0.094*** (0.004)	0.218*** (0.006)	−0.310*** (0.007)	−0.002 (0.006)
25-29	0.019*** (0.003)	0.118*** (0.005)	−0.118*** (0.006)	−0.019*** (0.005)
30-34	0.000 (0.003)	0.017*** (0.005)	−0.009* (0.006)	−0.008* (0.004)
40-44	−0.017*** (0.003)	−0.094*** (0.004)	0.089*** (0.005)	0.022*** (0.004)
45-49	−0.016*** (0.003)	−0.111*** (0.004)	0.092*** (0.005)	0.035*** (0.004)
50-54	−0.002 (0.003)	−0.009* (0.004)	−0.061*** (0.005)	0.073*** (0.004)
55-59	−0.016*** (0.003)	−0.021*** (0.005)	−0.254*** (0.006)	0.291*** (0.004)
Place of residence				
Deprived area (ZUS)	0.047*** (0.003)	0.018*** (0.004)	−0.108*** (0.005)	0.043*** (0.004)
Île de France	−0.011*** (0.002)	−0.013*** (0.003)	0.058*** (0.004)	−0.034*** (0.003)
Family situation (women)				
Children	0.017*** (0.003)	0.036*** (0.004)	−0.052*** (0.005)	−0.001 (0.004)
Child < 3 yo	−0.011*** (0.004)	−0.011* (0.006)	−0.102*** (0.007)	0.124*** (0.006)
Child 3-5 yo	0.010*** (0.004)	0.028*** (0.006)	−0.062*** (0.007)	0.024*** (0.006)
Married	−0.022*** (0.002)	−0.046*** (0.003)	0.014*** (0.004)	0.054*** (0.003)
Family situation (men)				
Children	−0.004 (0.003)	−0.027*** (0.004)	0.063*** (0.005)	−0.032*** (0.004)
Child < 3 yo	−0.017*** (0.004)	−0.032*** (0.006)	0.036*** (0.007)	0.012** (0.006)
Child 3-5 yo	−0.009** (0.004)	−0.025*** (0.006)	0.022*** (0.008)	0.012* (0.006)
Married	−0.035*** (0.002)	0.001 (0.004)	0.063*** (0.004)	−0.029*** (0.003)
R-Squared	0.05	0.09	0.18	0.14

Note: OLS estimates of CCUW predicted probabilities that an individual is of type θ_k (conditional on her gender, age group and education and path), on individual characteristics. *Immigrant parents* is a dummy for having at least one parent immigrant from North Africa, Sub-saharan Africa or the Middle East. *Father: executive* is a dummy equal to one if one's father's occupation is 'executive' or 'intermediary professions'. Standard errors are not corrected for the first-stage estimation.

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TABLE XII. – Models Simulation: Shares of Individuals Who do not Access
a Long-Term Job over a Fixed Period and who do not Remain Nonparticipant

	Period duration in quarters	CCUW model	Alt. : 2 uncons. MC + 4 stayers
Men			
Age: 20-29	8	0.230	0.228
	20	0.148	0.151
	32	0.126	0.126
	40	0.121	0.119
30-39	8	0.092	0.094
	20	0.058	0.064
	32	0.052	0.051
	40	0.051	0.046
40-49	8	0.063	0.064
	20	0.042	0.035
	32	0.036	0.024
	40	0.035	0.021
50-59	8	0.064	0.063
	20	0.051	0.044
	32	0.045	0.032
	40	0.043	0.029
Women			
Age: 20-29	8	0.238	0.249
	20	0.158	0.166
	32	0.135	0.137
	40	0.129	0.126
30-39	8	0.145	0.137
	20	0.098	0.080
	32	0.082	0.055
	40	0.079	0.045
40-49	8	0.101	0.101
	20	0.058	0.058
	32	0.047	0.040
	40	0.044	0.034
50-59	8	0.076	0.074
	20	0.058	0.053
	32	0.048	0.039
	40	0.044	0.033

Note: the first column reports the period duration in quarters. The second column presents the simulated shares of individuals who do not access a long-term job and who do not remain nonparticipant during the whole period in the CCUW model. The third column presents the same for an alternative model in which there are four stayer processes and two unconfined mover processes.

TABLE XIII. – Dynamic Process Stationary Equilibria: 2005-2007

Women	SJ	UJ	U	NP	Men	SJ	UJ	U	NP
20-29					Men 20-29				
Unconfined	0.581*** (0.036)	0.233*** (0.022)	0.088*** (0.015)	0.098*** (0.018)	Unconfined	0.582*** (0.040)	0.271*** (0.026)	0.110*** (0.014)	0.037*** (0.007)
Confined	0.000 (0.000)	0.104** (0.045)	0.514*** (0.063)	0.382*** (0.067)	Confined	0.000 (0.000)	0.141*** (0.030)	0.614*** (0.032)	0.245*** (0.026)
Total eq.	0.579*** (0.013)	0.129*** (0.007)	0.110*** (0.006)	0.182*** (0.007)	Total eq.	0.684*** (0.013)	0.136*** (0.009)	0.120*** (0.006)	0.061*** (0.004)
30-39					30-39				
Unconfined	0.646*** (0.042)	0.108*** (0.018)	0.090*** (0.012)	0.156*** (0.020)	Unconfined	0.611*** (0.048)	0.197*** (0.028)	0.135*** (0.021)	0.057*** (0.010)
Confined	0.000 (0.000)	0.536*** (0.172)	0.281*** (0.098)	0.183** (0.084)	Confined	0.000 (0.000)	0.358 (0.221)	0.514*** (0.188)	0.128*** (0.045)
Total eq.	0.674*** (0.009)	0.084*** (0.010)	0.057*** (0.007)	0.186*** (0.008)	Total eq.	0.846*** (0.006)	0.062*** (0.010)	0.055*** (0.008)	0.037*** (0.003)
40-49					40-49				
Unconfined	0.490*** (0.036)	0.156*** (0.022)	0.161*** (0.019)	0.193*** (0.018)	Unconfined	0.592*** (0.046)	0.173*** (0.031)	0.113*** (0.026)	0.122*** (0.013)
Confined	0.000 (0.000)	0.639*** (0.235)	0.292 (0.193)	0.068 (0.045)	Confined	0.000 (0.000)	0.303*** (0.081)	0.631*** (0.083)	0.066*** (0.025)
Total eq.	0.730*** (0.008)	0.061*** (0.011)	0.047*** (0.008)	0.162*** (0.006)	Total eq.	0.861*** (0.006)	0.041*** (0.003)	0.046*** (0.003)	0.053*** (0.004)
50-59					50-59				
Unconfined	0.462*** (0.047)	0.052*** (0.018)	0.087*** (0.013)	0.399*** (0.039)	Unconfined	0.418*** (0.054)	0.054*** (0.009)	0.080*** (0.011)	0.448*** (0.045)
Confined	0.000 (0.000)	0.529*** (0.106)	0.400*** (0.077)	0.071* (0.043)	Confined	0.000 (0.000)	0.274*** (0.088)	0.588*** (0.094)	0.138 (0.085)
Total eq.	0.528*** (0.010)	0.038*** (0.004)	0.041*** (0.003)	0.394*** (0.010)	Total eq.	0.595*** (0.016)	0.028*** (0.004)	0.047*** (0.004)	0.331*** (0.014)

Source: French Labor Force Survey (Enquête emploi) 2005-2007.

Sample: Individuals aged 20 to 59 whose education is finished and who responded to all six waves of the survey.

Note: SJ stands for *stable jobs*, UJ, for *unstable jobs*, U, for *unemployment*, and NP, for *nonparticipation*. pvalue<.01:***, pvalue<.05:**, pvalue<.10:*. Bootstrapped standard errors in parentheses (100 replicates).

the stationary occupation probability estimates reflect averages over the period. This rules out business cycles. In order to check the sensitivity of the results to conjunctural changes, we have estimated the model on a subsample made up of data from 2005 to 2007, so before the crisis, and have compared the estimates to those obtained using the entire dataset. TABLE XIII reports the stationary equilibria over 2005-2007. The figures are similar to those previously estimated on 2005-2009. The only one that is slightly different is the stationary probability of confined in unstable jobs for men aged between 30 and 39: in the 2005-2007 estimation, it amounts to 0.358(0.221) whereas it was 0.179(0.050) in the main version. Our main findings remain unchanged.

VI. Concluding Remarks

The purpose of the analysis presented is to quantify and characterize “confined” workers who alternate between short-term jobs and nonemployment without eventually obtaining long-term jobs. Complementary to the literature assessing the impact of short-term contracts and temping on workers or social welfare, we show that in the French context, the possibility of contracting workers for fixed-term periods has generated a group of confined workers. Confined workers represent a minority of approximately 5 %, but they are 12% of the young, and among the young, they are more than 25% of the less educated. This fact might illustrate an insider-outsider labor market in which a stable position takes time to achieve and in which the young are only able to signal their productivity through their educational achievements. Confined movers suffer

from the highest unemployment rates. Among the young, despite being at an age typically associated with labor market integration and ascending transitions, confined movers exhibit high probabilities of moving from employment to nonparticipation, which reflects a quite nonlinear labor market integration process.

These elements complement the previous literature on the average impact of the introduction of short-term contracts into the labor market. Policy makers, with the help of further research, should assess whether and to what extent the increase in labor-market flexibility has generated gains and losses for the different economic agents. In a country in which job stability is still the norm, it is possible that the confined movers identified and characterized in this study are those who have been harmed the most.

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Appendix

TABLE A.1. – Type-Probabilities Conditional on Initial State

Women	SJ	UJ	U	NP	Men	SJ	UJ	U	NP
Age: 20-29					Age: 20-29				
Unconf. Mov.	0.440*** (0.041)	0.899*** (0.031)	0.538*** (0.043)	0.288*** (0.022)	Unconf. Mov.	0.298*** (0.027)	0.911*** (0.035)	0.474*** (0.044)	0.371*** (0.049)
Conf. Mov.	0.000 (0.000)	0.101*** (0.031)	0.462*** (0.043)	0.257*** (0.024)	Conf. Mov.	0.000 (0.000)	0.089** (0.035)	0.526*** (0.044)	0.329*** (0.049)
Stable-Job St.	0.560*** (0.041)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	Stable-Job St.	0.702*** (0.027)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Nonpart. St.	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.456*** (0.022)	Nonpart. St.	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.300*** (0.027)
30-39					30-39				
Unconf. Mov.	0.300*** (0.033)	0.841*** (0.050)	0.524*** (0.037)	0.368*** (0.037)	Unconf. Mov.	0.188*** (0.021)	0.888*** (0.043)	0.459*** (0.047)	0.294*** (0.047)
Conf. Mov.	0.000 (0.000)	0.159*** (0.050)	0.476*** (0.037)	0.107*** (0.024)	Conf. Mov.	0.000 (0.000)	0.112*** (0.043)	0.541*** (0.047)	0.286*** (0.049)
Stable-Job St.	0.700*** (0.033)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	Stable-Job St.	0.812*** (0.021)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Nonpart. St.	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.525*** (0.022)	Nonpart. St.	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.421*** (0.028)
40-49					40-49				
Unconf. Mov.	0.148*** (0.015)	0.559*** (0.049)	0.733*** (0.041)	0.268*** (0.017)	Unconf. Mov.	0.131*** (0.015)	0.723*** (0.092)	0.530*** (0.072)	0.338*** (0.024)
Conf. Mov.	0.000 (0.000)	0.441*** (0.049)	0.267*** (0.041)	0.017 (0.012)	Conf. Mov.	0.000 (0.000)	0.277*** (0.092)	0.470*** (0.072)	0.028** (0.012)
Stable-Job St.	0.852*** (0.015)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	Stable-Job St.	0.869*** (0.015)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Nonpart. St.	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.715*** (0.013)	Nonpart. St.	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.634*** (0.022)
50-59					50-59				
Unconf. Mov.	0.287*** (0.029)	0.469*** (0.068)	0.565*** (0.062)	0.126*** (0.011)	Unconf. Mov.	0.370*** (0.035)	0.510*** (0.050)	0.508*** (0.053)	0.122*** (0.025)
Conf. Mov.	0.000 (0.000)	0.531*** (0.068)	0.435*** (0.062)	0.010* (0.005)	Conf. Mov.	0.000 (0.000)	0.490*** (0.050)	0.492*** (0.053)	0.026** (0.012)
Stable-Job St.	0.713*** (0.029)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	Stable-Job St.	0.630*** (0.035)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Nonpart. St.	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.864*** (0.009)	Nonpart. St.	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.852*** (0.017)

Source: French Labor Force Survey (Enquête emploi) 2005-2009.

Sample: 20- to 59-year-old individuals whose education is finished and who responded to all six waves of the survey.

Note: SJ stands for *stable jobs*, UJ, for *unstable jobs*, U, for *unemployment*, and NP, for *nonparticipation*. $pvalue < .01$ ***, $pvalue < .05$ **, $pvalue < .10$ *. Bootstrapped standard errors in parentheses (100 replicates).

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