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Atypical Employment and Prospects of the Youth on the Labor Market in a Crisis Context

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Abstract

We compare the entrance trajectories of two cohorts of young people into the labor market seven years after leaving the French educational system. We focus our analysis on the employment consequences of atypical employment spells, i.e. part time and temporary work contracts using a Markovian model of labor market transitions with fixed effects. We estimate the stepping-stone effect of atypical employment towards the employment norm of full-time open-ended contract on four gender-education segments of the population. We then disentangle the trend from the Great Recession effect using a dif-in-dif approach. This brings new insights about the redistributive impact of an economic crisis across gender. Unintended positive effects of the crisis on the trajectory of men transiting through temporary employment spells (external

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flexibility leverage) is brought to light. Women's chances to reach the employment norm through transitory spells of part-time work (internal flexibility leverage) appear to be affected negatively by the crisis.

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1 Introduction

Long-term consequences of massive labor market adjustments that took place following the 2008 global financial crisis still require to be explored¹. In the context of the French labor market, which is characterized by a strong dualism and a high employment protection, the adjustment was concentrated on the segment of atypical jobs characterized by lower working time or duration, with a relatively mild impact on unemployment (Bardaji, 2011). Young people, who are specifically concerned by these atypical jobs in their early career, were specifically affected by the economic downturn. Could the crisis induce scarring effect on their trajectories towards the open-ended full-time employment norm? In this article we measure the impact of the crisis on the entrance dynamics on the labor market of school-leavers with a special focus on the transitions across atypical and regular employment contracts.

Youth unemployment rate is at a high level in most European countries, nearly 25% on average among the 15 to 24 years old. Alongside the massive rise in youth unemployment, many continental European countries fostered the emergence of atypical employment contracts in the past decades, in particular part-time and fixed-term contracts. Young people are more frequently observed in the secondary segment of dual labor markets, a fact that is largely unwanted and related to their low experience on the labor market (Rouaud and Joseph, 2014; Couprie and Dzikowski, 2015). According to Eurostat (2015), the share of temporary work contracts among workers below 25 years old reaches 43% and the share of part-time workers reaches 32%. It increased respectively by 25% and 15% during the past ten years. Among young people, involuntary part-time work appears really large since 2 part-time workers over 3 declare that they would prefer having signed a full-time work contract (Couprie and Joutard, 2015). This is twice as large as what the whole population of "adult", mostly women, part-time workers tend to declare.

¹See Card and Mas (2016) for an introduction of up-to-date research results on the labor market impact of the Great Recession.

Young people are specifically affected by economic fluctuations. Their unemployment rate and their transitions into and out of employment reacted more strongly to crisis (for European countries, see, for example, Bachmann et al., 2015; Banerji et al. 2015, and for France, Bardaji, 2011). In a continental European country with a rigid labor market, such as France, the adjustment of the labor force comes preferentially through diminishing hiring rates and renewal rates of fixed-term contracts, without impacting much destruction rates of permanent contracts. Marchand and Minni (2010) observed that French firms seemed to use the leverage of external flexibility to adjust the labor force: the stock of temporary-agency jobs and fixed-term contracts strongly dropped during the crisis to increase after that. The internal flexibility leverage was also used during the crisis, with diminishing average hours worked per person (OECD, 2010) and an increase of the recourse of part-time contracts since the crisis.

Business cycle fluctuations also present gender redistributive effects. Theodossiou and Zangelidis (2009) bring to light a procyclical behavior or job to non-employment transitions for low educated men and a countercyclical evolution for females among the low educated group in 6 European countries. These effects could suggest a discouraged worker effect for males and an added-worker effect for females. On US data, females' unemployment tend to increase less during the great Recession than male's one, confirming this view (Hoynes et al., 2012). During the Great Recession, the drastic increase in unemployment among men generated a catch up effect on the employment gap between men and women (Jaba et al., 2015). The strong presence of females in the service economy brings them a comparative advantage in the evolution of the structure of the labor market (Petrogonlo and Ngai, 2014). In analysing the impact of heterogeneity on the transitions, we will have a special focus on gender differences regarding transitions and prospects due to the crisis.

Long-term consequences of these employment variations might specifically transit through their impact on new entrants into the labor market. There is a relative consensus in the literature that unemployment generates long-lasting scarring effects in countries characterized by a high degree of rigidity of their

labor market, for example Japan or countries from continental Europe; and short-lasting effects in countries who present a high degree of job mobility like the US (Kawaguchi and Murao, 2014). An economic crisis could improve or deteriorate employment prospects of young people depending on their initial trajectory before the event. In Japan, where the school is the main intermediary between employers and students, being unemployed due to a crisis just after leaving school is really harmful on the individual trajectory towards employment, an effect that is not observed in US (Genda et al., 2010). In France, the school-to-work transition process is a learning period characterized by a succession of entry-jobs and unemployment spells before reaching a stable career job years after. Entry-jobs are generally low paid and low quality jobs, atypical in terms of time or duration (temporary work or part-time). They could help developing human capital, professional network and acquire better knowledge about the employer-employee match productivity. Past labor market status could also play a signalling or stigmatizing role for the future employer.

A crisis changes the share of atypical contracts in the economy as well as the transition dynamics. On EU-SILC data, the crisis seems to impact negatively the transitions from temporary to permanent employment (Bachmann et al., 2015). These authors show the heterogeneous impact of the crisis by skill level, gender and age, strengthening the specific negative impact of the crisis on young people transition rates into employment. However, they do not disentangle the impact of the crisis from a time effect and they do not control for the influence of unobserved heterogeneity on transition rates. Finally, they only focus on the extensive margin of the labor market adjustment, forgetting the intensive one. We are able to tackle this set of drawbacks.

In this article we model the youth entrance process into the labor market by distinguishing employment situations by contract duration and working time. We aim at identifying a causal effect of the impact of previous labor market episodes on the trajectory and the chances to reach a full-time open-ended contract. We use a model that allows a great control of the impact of initial conditions on the trajectories (at the moment of entrance in the labour market).

Some of these fixed characteristics could be observed in the data (e.g.: initial education or demographics), but most of them are not observed in survey data such as network, individual abilities, etc. We use an estimator developed by Honoré and Kyriazidou (2000) that relies on heterogeneous transition dynamics with fixed effects. An unobserved heterogeneity component summarizes individual characteristics at the entrance time into the labor market. An observed individual heterogeneity component, time-varying, incorporates changes in labor market conditions or life events that could explain heterogeneous variations in the transition dynamics. The "state dependence effect" effect is identified and represents the impact of one labor market situation on the following one. In a second step, we study the causal impact of the crisis on the transition dynamics of young people on the labor market. The identification is achieved through a difference-in-difference approach based on the comparison of the behavior of two cohorts, the one which left the educational system in 1998 and did not experience the crisis during their first seven years of active life, and the one which left the educational system in 2004 and experienced the crisis. This comparison is robust to trend or institutional evolution of the labor market and the characteristics of young people.

This article is related to three strands of the literature that aim at modelling individual trajectories on the labor market using Markovian microeconomic models. First, it is related to articles that measure the so-called "stepping-stone" effect of temporary work on the propensity to reach an open-ended work contract. Accepting a fixed-term work contract appears generally better than staying unemployed regarding the future employment probability. This is the so-called "stepping-stone effect" observed in Spain (Güell and Petrogonlo, 2007), France (Givord and Wilner, 2015) and UK (Booth et al., 2002). Second, our work is connected to research that study the impact of part-time on individual trajectories. These articles usually focus exclusively on females of any age in relation with the decision to participate into the labor market. Blank (1994) showed that in the US, part-time work could foster low-skilled women to be employed full-time in the future. Conolly and Gregory (2005) points out the role

of individual unobserved heterogeneity in the stepping-stone effect of part-time work on future trajectories. It could be a dead-end for some women who have a lower attachment to the labor market. To our knowledge there is no specific analysis on young people despite part-time is particularly involuntary on this population. Last, a set of papers focuses on the effect of graduating during the Great Recession (Oreopoulos and al., 2012, Kahn, 2010). Consistent with the previous articles, Altonji and al. (2016) find that the youth graduating (from college) in times of higher unemployment experience significant and persistently earning losses compared to their luckier counterparts who graduated just before or just after the recession. It is interesting to note that a part of the earning loss is actually due to hours' reductions: they find large negative impacts of the recession on the probability of working full-time in their first years out of college. Furthermore, while the high-skilled major are usually sheltered from the negative impact of a recession, one impact of the "Great Recession" was to reduce the relative advantage of high-skilled major graduating during bad times.

We start by reminding the links between atypical work contracts and labor market responses to economic fluctuations, and then we present the data, the empirical method and the results. The last section provides a summary of the main results and concludes.

2 Part-time, Temporary Contracts and Flexible Labor Market

In this section we recall some key ideas to understand how the labor market adjusts to the economic fluctuations through variations in the shares of part-time and temporary contracts.

Temporary work² is a driver for flexibility on the labor market at the extensive margin. France's labor market has a strong duality: temporary contracts

²Temporary work here refers to fixed-term contracts and temporary agency work contracts.

are more costly but, contrary to open-ended contracts, there is no dismissal fee at the end of the fixed time-period. Cahuc et al. (*forthcoming*) show how employment protection for open-ended contract can strengthen the dualism of the labor market and increase job-turnover and the substitutability between temporary and open-ended contracts. The link between the share of temporary employment in the economy and the level of unemployment appears weak. Blanchard and Landier (2002) share this view and point out the deleterious effect on those who generally do not benefit from a permanent contract and bear the cost of the flexibility of the labor market through a succession of unemployment spells and unstable contracts. Sala et al. (2012) and Costain et al. (2010) also analyze a dual market with strong employment protection. They observe that the volatility of unemployment tends to increase in countries where flexibility at the margin is used in reaction to the business cycle. In their models, job destruction rates fluctuations due to the business cycle are amplified by the recourse to temporary contracts. This statement is also shared by Bentolila et al. (2012), who also predict an increase in the recourse of temporary work during recessions even though this fact does not appear in the data since the French labor market experienced a drop of temporary employment after the 2008 crisis. A cross-country observation shows that the highest increase in youth unemployment occurred in countries which had the highest share of temporary employment and the strongest duality on their labor market (Banerji et al., 2015). Though, there is no consensus about the empirical link between the share of temporary work and unemployment.

Part-time work could play a role at the intensive margin to adjust the labor force during economic downturns. In many OECD countries, part-time can be used as a substitute to dismissal plans and limit the rise in unemployment (Cahuc and Carcillo, 2011). In the French law, they can also be negotiated simultaneously with a modulation of the working time, reducing the cost of overtime hours. Hence, part-time contracts are often observed to be associated with unpredictability of the working-time on the worker's side. Promoting part-time work has been viewed by governments and unions as a work-sharing

device to reduce unemployment³. This link has a weak theoretical and empirical content (see for example Calmfors and Hoel, 1988; Hunt, 1999; Crépon and Kramarz, 2002). Nevertheless, as a device to increase the flexibility of the labor market, we still expect a link between part-time work and employment fluctuations. On UK and US data, Borowczyk-Martins and Lalé (2014) observe the countercyclical nature of part-time work. However, part-time work share increased drastically during the Great Recession. These stylized facts are not clearly visible on the French labor market. Couprie and Joutard (2015) found that involuntary part-time work among the youth responded to the crisis. On EU data, Buddelmeyer et al. (2004) observe the countercyclical nature of involuntary part-time work. Bargain et al. (2012) show that work-sharing arrangements in Germany prevented the unemployment rise after the 2007 crisis.

Besides these labor demand effects, part-time work and temporary employment are at the epicentre of active labor market policies. The possibility to cumulate labor income with unemployment insurance (Fremigacci and Terracol, 2014) reduces the inactivity trap phenomenon and avoids the wastage of skills associated to it. They could facilitate labor-market entry and improve labor market integration or reintegration.

To our knowledge, there is no empirical work that studies the impact of the Great Recession on the workers' trajectories simultaneously considering the extensive and intensive margin. A sample of school leavers is adequate for such a study since they represent a flow of entrants on the labor market and their experience of atypical employment appears to be mostly involuntary, reflecting labor demand fluctuations.

3 Data

The "Generation" survey of Cereq allows observing the school-to-work process of young people who leave for the first time the French educational system. It is a

³Demand for part-time work was subsidized by the French government during the 80's and till the end of the 90's.

representative survey, stratified by region, educational level and speciality. Each individual is surveyed 3 years, 5 years and 7 years after leaving school. Each time, a retrospective activity calendar is reported. It is then possible to know, with a monthly accuracy, the sequence of all employment and non-employment spells of the person being questioned. We use the so-called longitudinal surveys "Generation 1998" and "Generation 2004" which concerns, respectively, 16040 and 12365 young people who left the initial vocational or educational system in these years. School leavers from 1998 were then followed till autumn 2005 whereas those who left school in 2004 were followed till winter 2011.

[INSERT TABLE 1]

In order to focus our analysis on the functioning of the labor market, we exclude from the analysis young people who appeared to be at least once in their history self-employed. This represents approximately 9% of the 2004 cohort and 5% of the 1998 cohort. Descriptive statistics are presented in Table 1. These statistics are unweighted raw data. Transitions on the labor market are observed using the retrospective calendar data. In the data, an employment spell is identified by a change of employer. Summer jobs are ignored. The characteristics of the work contract (working-time and period) are collected at the beginning of the spell. However, since the work contract can evolve with the same employer, the information of the work contract is also collected at the end of the spell. The date of the last change is then also recorded. In the 1998 survey, the date of changing working-time is simulated since it is not available despite the existence of a change is known. This only affects the measure of internal evolution of working time. External evolutions are greater so we expect the bias due to this data manipulation to be negligible⁴. This procedure does not guarantee to observe all the work contract changes for a single individual but we hope to observe the vast majority of them.

⁴According to Couprie and Joutard (2015), 72% of the spells that begins part-time finishes part-time (within the same company) whereas a part-time job spell leads to another part-time job spell (with an employer change) in 34% of the cases only.

When the individual has several jobs at the same time, the principal one is described. Multiple-employment represents, according to INSEE (2014), 8.4% of salaried employment in 2007. Part-time workers are naturally more likely to be observed in such a situation. As a consequence, earnings of part-time workers are underestimated, as well as labor demand for part-time work since we only track primary part-time jobs. Nevertheless, it should not be a problem for our analysis which does not focus on these aspects but on transitions across status.

Work statuses were grouped in order to maintain a sufficient number of transitions across any states for the 3-years period we used in the dif-in-dif analysis. Four categories were finally selected: unemployed (voluntary and involuntary), employed part-time, employed full-time with a temporary work contract (temporary agency work, fixed term, or state-subsidized jobs) and employed full-time with an open-ended work contract. A higher level of disaggregation could seem preferable but it involves too few observations. Table 2 illustrates the frequencies associated with a higher disaggregation of contract types for the cohort 2004. It is clear that a disaggregation of part-time work contracts into permanent and temporary jobs, as well as a disaggregation of temporary work into temporary agency, fixed-term and state subsidized, involve low frequencies. We observe a correlation between the use of the intensive and the extensive margin: 41% of females' part-time jobs are temporary ; 52% of males' part-time jobs are temporary; whereas temporary contracts only represent 20% of full-time jobs in the data. Part-time jobs and temporary contracts are frequently cumulated but we cannot make this distinction by lack of observations. This is also because the difference-in-difference analysis requires observing transitions after 5 years of experience on the labor market and some transitions become too rare if we further disaggregate these contract types.

[INSERT TABLE 2]

The likeliness of transitions depends on the level of disaggregation of the states and by the time scale considered. Enlarging the window width to one year leads to a higher frequency of people observed without transition whereas

reducing the window width generates computational burden. With a window of 6 months, we have a computable model and we also observe a fairly large amount of transitions: between 55 and 65% of the individuals experience more than one transition (see Table 1 and Appendix A1). The robustness of the estimation will be confronted with a wider window of one year⁵. Transitions are considered at a biannual rate and correspond to the observed situation in April and October. These months are not holiday months and minimize the number of missing values associated with the observation window since the time after having left school and the survey is not too short⁶.

4 Method

Most of the papers that try to determine a causal link between past and current spells on the labor market lack an appropriate method to control for the impact of unobserved heterogeneity that could lead to biased results. Estimating state dependence allows evaluating whether experiencing a specific employment spell might generate, *ceteris paribus*, changes in the dynamics and future employment probabilities through various mechanisms such as changes in labor demand, opportunities, changes in human capital, abilities, etc. Observed transitions across spells do not reflect state dependence. If individuals differ regarding their chances to access to different kinds of contracts, and if these differences cannot be directly read in the data through observed components such as educational background or socio-demographic characteristics, then a spurious correlation would wrongly generate a link between past and future labor market status which would not be a true state dependence effect. Individuals who have the lowest "employability" might have characteristics in common with individuals who occupy an atypical employment. In this case, we could erroneously attribute

⁵Magnac (2000) shows that the choice of the time interval could significantly affect the results.

⁶The data contains missing values for the first months of observation since there remains a small heterogeneity in exiting date in the sample.

to the atypical employment spell a causal effect on unemployment.

4.1 A Dynamic Model of Labor Market Transition

The entrance trajectory of a school-leaver into the labor market is a complex phenomenon where initial conditions, fixed and variable factors, as well as employment history, matter. Summarizing them into a model is a complex task that requires some simplification. Our choice is to recognize the major impact of fixed unobserved heterogeneity in the trajectories (what characterizes an individual in the long-run) as well as the importance of work history, especially the spell that occurs one year before, on the current situation. In order to control for the presence of fixed unobserved heterogeneity, we adopt the estimator developed by Honoré and Kyriazidou (2000). It is close to Magnac’s (2000) estimator but has the advantage of taking into account the impact of time-varying factors. This is important in our case since changes of the work contract initiated by the employee because of life history events (by definition variable but observable in the data). Moreover, as we aim at determining the impact of the crisis on the transition from school-to-work process, the unobserved fixed factors will bring a great control of evolution of the cohort characteristic through time.

We consider a multiple states panel model with state dependence of order 1 and individual state-dependent fixed effects. The propensity for an individual i to be in state j is given by:

$$y_{ijt}^* = \sum_{k=1}^J \delta_{kj} I_{\{y_{it-1}=k\}} + x_{it}\beta_j + \alpha_{ij} + \varepsilon_{ijt}. \quad (1)$$

States are disentangled by working time and contract, we have J states in total. The individual i is observed in state j at each period if:

$$y_{ijt}^* = \arg \max_k y_{ikt}^* \text{ for } k = \{1, \dots, J\}. \quad (2)$$

As is standard in the well-known Random Utility Model (RUM) framework (McFadden, 1973), we assume that the underlying errors are independent across alternatives and over time conditional on both covariates and individual fixed effects and are identically distributed according to the Type 1 extreme value

distribution. That leads to the following conditional probability to occupy state j among J alternatives after leaving the educational system:

$$P(y_{it} = j | y_{it-1}, x_{it}, \alpha_i) = \frac{\exp(\sum_{k=1}^J \delta_{kj} I_{\{y_{it-1}=k\}} + x_{it}\beta_j + \alpha_{ij})}{\sum_{l=0}^J \exp(\sum_{k=1}^J \delta_{kl} I_{\{y_{it-1}=k\}} + x_{it}\beta_l + \alpha_{il})}, \quad (3)$$

where $\alpha_i \equiv \{\alpha_{ij}\}_{j=1}^J$, $t = 1, \dots, T$.

This probability is not necessarily the result of the only individual preferences through the utility maximisation framework and could also reflect the range of job opportunities and the eventual constraints coming from the demand size of the labor market (see Givord and Wilner, 2015). The individual unobserved heterogeneity is represented by the fixed effects grouped in the α_i and depends on the occupied state, i.e. the youths can have specific preferences for each state in the labor market (part-time, temporary work, stable employment, etc.). These fixed effects could also represent the impact of individual characteristics on the chance to be in state j , in relation with the functioning of the labor market. Typically, many individual characteristics could be considered as fixed factors impacting the probability to be in state j at each period of time: employability, area of specialisation, educational level or socio-demographic backgrounds.

The probability of being in state j also depends on time-varying covariates x_{it} : the evolution of the local business cycles can modify both the opportunities and the choices made between the different types of employment. From a same way, being in charge of new children can impact preferences or opportunities and the optimal decision taken by the youth.

Finally, the model allows for the presence of "true state dependence". The control of individual fixed effects allows taking into account the individual heterogeneity - in the sense that the previous state, y_{it-1} , enters the model as an explanatory variable. The set of coefficients attached to this lagged endogenous variable are grouped in a matrix $\delta \equiv \{\delta_{kj}\}_{k,j=1}^J$ and depends upon both the past choice and the current choice. These coefficients are actually our parameter of interest. We distinguish in the matrix two types of parameters, the δ_{kj} 's with $k \neq j$ which represents a mobility index between states k and j and the δ_{jj} 's

which is a measure of persistence in state j . According to their values, these parameters could reflect human capital accumulation, scarring effects, stigma effects - related for instance to the state-subsidized contracts, or search costs in case of job search, etc.

The problem associated with this dynamical multinomial model with fixed effect is well known: given a small number of periods T , the estimates of all the parameters are inconsistent due to the incidental parameter problem in a nonlinear framework. Indeed, that problem prevents the consistent estimation by maximum likelihood of the individual fixed effect and contaminates the estimation of the other parameters. The recourse to the conditional maximum likelihood is commonly done to circumvent this problem⁷. The general principle is to condition the likelihood function with respect to appropriate sufficient statistics in order to derive a set of probabilities that do not depend on the individual fixed effects. Magnac (2000) has shown that conditioning on the number of occurrences of every state between the periods 2 and $T - 1$ makes the fixed effect disappear from the likelihood expression. The limitation of this method is also known: the individuals who stay in the same state during the T periods are ignored and the only "movers" contribute to the identification and the estimation of the parameter of interest. This loss of information can be more or less severe depending on the situation. In our case, working on the youths is an obvious advantage: this population is more mobile than the active population and the loss of our initial sample is limited.

Here we follow the approach of Honore and Kyriazidou (2000) which shares the same principle as Magnac's one. The supplementary interest is to take into account time-varying covariates and be able to identify and control their contemporaneous effect on the current state provided that these variables satisfy certain conditions. For our population and the calendar period concerned, It seems in particular relevant to control both the evolution of the business cycle and important biographical events during the first seven years after leaving

⁷See Andersen (1970) in the case of binary choice without state dependence, Magnac (2000) in the dynamic multinomial case without time-varying covariates.

the educational system. These two kinds of covariates could naturally impact the professional trajectory of the youth. Omitting them in the specification may bias the estimates of the true state dependence, one part of this impact being spuriously attributed to the transition parameters. More precisely, on one hand, the occurrence of the economic crisis, four years after the end of the education period, could obviously impact the probability of occupying each state on the labor market (that could also have directly modified the state dependence parameters for structural reasons - the individual preferences are going to change and/or the firms are going to adjust their job posting behavior). On the other hand, personal events, having a new child, living with someone, etc., should also have an influence on the professional dynamics.

The disappearance of the fixed effect and the identification of the structural parameters in this model - the $\{\beta_j\}_{j=1}^J$ and the $\{\delta_{kj}\}_{k,j=1}^J$ parameters - are based on sequences of observed states where the individual moves from one state to another at least once during the periods 2 to $T - 1$.

Other usual identification conditions are required : given that only $(J - 1)^2$ components of δ are identified, we have to choose a reference state - consider for example the state J - by imposing the following normalization condition

$$\delta_{kJ} = \delta_{Jk} = 0 \text{ for } k = 1, \dots, J - 1. \quad (4)$$

In our case, we chose to consider non-employment as the reference state. This is the most standard way to compute the odds, moreover we could then look at the odds of attaining an open-ended employment contract when coming from several forms of atypical employment. A normalization condition is also imposed for the coefficients attached to the time-varying covariates: $\beta_J = 0$.

4.2 Estimation Procedure

Informally speaking, the general functioning of the estimator is the following. We consider all possible transitions between period 2 and $T - 1$ within the same sequence of states. More precisely, we isolate all the transitions at any moment of time. Let's denote these moments t and s . They can be neighboring, in which

case $s = t + 1$, or not, in which case $s > t + 1$. All the transitions that occur outside of this consideration are controlled, or conditional⁸. Using this artificial data (all possible transitions taken one by one at any time), the estimator can then be written as a simple conditional likelihood estimator representing the probability to observe all the possible associated binary choice. To this aim, within each kind of transition, it is the modelisation of the direction of the sequence (from j to j' or the opposite) that allows identifying the impact of the state-dependence parameters of the model without being contaminated by the fixed effect component (a precised description is in Aeberhardt and Davezies, 2012).

The identification of the impact of time-varying covariates encounters the following dilemma. On one hand, they should vary enough with time in order to have a significant impact on professional trajectories (at the extreme, without variation, they become a fixed effect and are ruled-out by the estimation procedure); on the other hand, their value should not change during the two periods that follow the transition, this condition is necessary for identifying the state dependence parameters in the presence of fixed-effect (see the proof in Honoré and Kyriazidou, 2000). Since this condition is restrictive, a likelihood is proposed where each observation is weighted according to a kernel function that describes how far we are from this condition. This leads to:

$$\sum_{i=1}^N \sum_{1 < t < s < T} I_{\{y_{it} \neq y_{is}\}} K \left(\frac{x_{is+1} - x_{it+1}}{\sigma_n} \right) \ln \left(\frac{\exp(D_{its})}{1 + \exp(D_{its})} \right), \quad (5)$$

where D is given by:

$$\begin{aligned} D_{its} = & (\beta_{y_{it}} - \beta_{y_{is}})(x_{it} - x_{is}) \\ & + \delta_{y_{it-1}, y_{it}} + \delta_{y_{is-1}, y_{is}} + \delta_{y_{is}, y_{is+1}} + I_{\{s > t+1\}} \delta_{y_{it}, y_{it+1}} \\ & - \delta_{y_{it-1}, y_{is}} + \delta_{y_{it}, y_{is+1}} + I_{\{s=t+1\}} \delta_{y_{it+1}, y_{it}} \\ & - I_{\{s > t+1\}} (\delta_{y_{is-1}, y_{it}} + \delta_{y_{is-1}, y_{it+1}}), \end{aligned} \quad (6)$$

⁸For example, for an individual who works full-time in period 2 and 3 and then part time in period 4, two observations will be considered: one which reflects the full-time to part-time transition between $t = 2$ and $t = 4$ and one which reflects the full-time to part-time transition between $t = 3$ and $t = 4$.

and $K(\cdot)$ is a standard Kernel smoothing function, comprised between 0 and 1, and greater if x_{is+1} is close to x_{it+1} . Two sets of conditions are necessary to establish that the maximization of this log of likelihood leads to a consistent and asymptotically normal estimator of the set of parameters (δ, β) .

For the first one, we retrieve the standard conditions in nonparametric estimations i.e. the regularity of the kernel and the choice of the bandwidth. The second set of conditions concerns the behavior of the time-varying covariates: for a pair of transitions occurring at t and s with $t < s$, the difference $x_{it+1} - x_{is+1}$ should be continuously distributed with a density that is bounded from above on its support and that is strictly positive and continuous in the neighborhood of zero. At the same time, conditional on $x_{it+1} - x_{is+1}$ being close to zero, data should show sufficient variation of $x_{it} - x_{is}$ in order to identify β .

Under certain regularity conditions, Aeberhardt and Davezies (2012) establish the asymptotic distribution of the estimator:

$$\sqrt{n\sigma_n^k} (\hat{\theta}_n - \theta) \longrightarrow N(B, J^{-1}VJ^{-1}), \quad (7)$$

where B is the asymptotic bias depending on k and σ_n .

The ‘‘sandwich’’ structure of asymptotic covariance matrix leads to choose the consistently estimator for the matrix J and V as follows:

$$\hat{J} = -\frac{1}{n\sigma_n^k} \sum_{i=1}^n \sum_{\substack{1 < t < s < T \\ m < l}} K\left(\frac{x_{is+1} - x_{it+1}}{\sigma_n}\right) h_{itsml}^{(2)}(\hat{\theta}_n), \quad (8)$$

$$\begin{aligned} \hat{V} &= -\frac{1}{n\sigma_n^k} \sum_{i=1}^n \left[\sum_{\substack{1 < t < s < T \\ m < l}} K\left(\frac{x_{is+1} - x_{it+1}}{\sigma_n}\right) h_{itsml}^{(1)}(\hat{\theta}_n) \right] \\ &\quad \times \left[\sum_{\substack{1 < t < s < T \\ m < l}} K\left(\frac{x_{is+1} - x_{it+1}}{\sigma_n}\right) h_{itsml}^{(1)}(\hat{\theta}_n)' \right], \end{aligned} \quad (9)$$

where $h_{itsml}^{(1)}$ and $h_{itsml}^{(2)}$ are the first (second) derivative of the individual unweighted contribution to the likelihood for an individual occupying the states m and l at time, respectively, t and s :

$$h_{itsml}(\theta) = I_{\{\{y_{it}=m, y_{is}=l\} \text{ or } \{y_{it}=l, y_{is}=m\}\}} \ln \left(\frac{\exp(I_{\{y_{it}=m\}} D_{its})}{1 + \exp(D_{its})} \right).$$

4.3 Determining the Impact of the Great Recession

We now describe the method used to identify the impact of the changing conditions due to the 2007 crisis on the dynamical model of youth integration into the labor market. Apart from the punctual and medium run adjustments of labor demand, the crisis hit individual trajectories of the young school-leavers from the 2004 cohort. Environment, prospects and behaviors might have been affected on both sides of the labor market. All these might have consequence on the state dependence component of the model.

[INSERT FIGURE 1]

In order to identify the causal impact of the crisis on the school-to-work transition dynamics, we adopt a difference-in-difference analysis. We compare the entrance dynamical process of two cohorts over 7 years: the one which left the school system in 1998 and the one which left the school system in 2004. Figure 1 illustrates the available data and the interrogation dates. The crisis hit the trajectory of the young entrants of the 2004 cohort between their 4th and 5th year out-of-school, whereas the whole path of the 1998 cohort remained unaffected. To understand the main determinants of the identification, we cut the 7 years periods into two equal parts (first 3 years, namely "early career", and years 5 to 7, namely "later career"). Year 4 was suppressed as a bumper year. It appears that:

- the difference between Cohort 2004 early career and Cohort 1998 early career (**Cohort effect**) reflects the effect of time (calendar effect) on the nature of the environment and population of young people: education, culture, background etc. and long run economic environment are different across cohorts). For example, the recent cohorts are more educated on average and they enter in a context where atypical employment is favored but not part-time which was favored in earlier years (Cohort 1998 was affected by reduced working-time incitations).

- the difference between Cohort 1998 later career and Cohort 1998 early career (**Experience effect**) reflects the impact of experience on the integration

process. The dynamics of entrance on the labor market (Markovian of order one in our case) could itself evolve with experience, especially at the beginning of active life. This is related to increased opportunities due to increased experience, evolution of motivation and career ambitions.

For the Cohort 2004, the difference between later and early career is also impacted by the crisis. To isolate the effect of the crisis, we consider the following difference-in-difference :

$$\begin{aligned}
 \textit{Crisis Effect} &= (\textit{G2004 later career} - \textit{G2004 early career}) \\
 &\quad \textit{Effect of experience for G2004 and crisis} \\
 &- (\textit{G1998 later career} - \textit{G1998 early career}) \\
 &\quad \textit{Effect of experience for G1998}
 \end{aligned} \tag{10}$$

If we make a common trend assumption, then we can isolate the impact of the crisis. In our case, this means assuming that the effect of experience described above would have been similar across cohorts, if the crisis had not happened. We apply this approach on the Markovian model. The assumption is not so strong⁹ because even if the flow of entrants into the labor market changed (education level, abilities, etc.) then these changes are controlled thanks to fixed effects. The evolution of heterogeneity with time is also controlled, especially evolution of family status and economic situation. We control for unobserved heterogeneity, cohort effects as well as economic climate on the dynamical transition process using local labor market unemployment rates¹⁰. As a consequence, the impact of the crisis that we capture will be focused on the transition dynamics of youth, controlling for the propensity to be observed in one labor market state. We focus on changes that affect atypical employment dynamics. Hence, changes

⁹It is possible to test for this assumption on the early career part of school-leavers by checking whether the difference of the evolution of the state dependence matrix due to experience (between 3 to 4 years after leaving school and 1 to 2 years after leaving school) in the 2004 cohort is similar to the one observed in the 1998 cohort.

¹⁰Quarterly local unemployment rates are computed at the district level ("département"), this represents approximately a hundred of zones for France. These rates are matched with the geographical residence information of the individual, an information that varies with time (date of the interview).

that are reflected by state dependence parameters variations.

Concretely the difference-in-difference analysis applied on the dynamical model requires preliminarily to estimate separately the model on each of the 4 categories described above. Then, we compute the difference-in-difference. Finally, standard errors are computed using 500 bootstrap replications. A proper significativity test can then be applied to test the presence of a significant causal impact of the great recession.

5 Results

5.1 Descriptive Results

We compare cohorts with similar active life experience and choose to segment the data by sex and educational level¹¹ which are the main factors driving heterogeneity in the process of integration into the labor market.

[INSERT TABLE 3]

We start our analysis by descriptive results. Table 3 presents the labor market status of school-leavers from the two cohorts of 1998 and 2004. The statistics is averaged over the 5 first years of entrance into the labor market. Unemployment has clearly increased except for men with a higher educational level. Men with a secondary educational level experienced the highest increase, close to 20%. These variations could result from the worsening of economic conditions. This is coherent with Barret et al. (2014) who observe that the youth integration process deteriorated during the crisis. Unemployment duration increased by 1 month on average whereas employment duration decreased by 2 months (over the 36 first months after leaving school).

¹¹The labor market could be considered as segmented between these categories. Segregation by gender is high (see for e.g. Matteazi, Pailhé and Solaz, 2014). The process of youth integration into the labor market is highly heterogeneous and strongly determined by their characteristics before the entrance on the labor market in particular the educational level (Couprie and Dzikowski, 2015).

The occurrence of open-ended full-time positions tends, on average, to decrease for men and increase for women. Our observations are compatible with the view that men, especially the lowest educated, were specifically affected by the crisis since their labor market occupations are more likely to occur in sectors that were affected as well, such as industry or manufacturing sector (Cochard et al., 2010). The fact that female part-time work decreases could be related to the increase in female involvement into the labor market. The increase in male's part-time work is not very strong but could be due to evolutions of constraints coming from the demand side of the labor market, or to fiscal reforms specific to France which removed the incentives to offer part-time jobs between the two periods. At the extensive margin, temporary work contracts decreased for all categories, except for men with a higher educational level. All in all, the evolutions of the different work status seem globally to differ by gender and educational level. These observations reinforce our choice to estimate the model separately on these four sub-samples: we expect the lowest educated individuals to be more constrained on the labor market, whereas women could be more likely to prefer atypical work situations, especially regarding part-time, however this might not be true on a population of young people and for any level of education.

5.2 The Determinants of Youth Labor Market Status

Table 4 presents the results of the estimation of the time-varying covariates parameters of the dynamic multinomial model, *i.e.* the β'_j s of equation (1). Each coefficient represents the impact of the contemporaneous covariate on the propensity to be observed in state j at date t . For women, family status variables relate quite strongly with the observed state: the arrival of a child impacts negatively females' propensity to be observed in any kind of labor market status as referred to the unemployment status. Being in a couple increases the propensity to be in an atypical work episode, whereas living with parents is not favorable to full-time permanent job situations. For men, family status variables have little

impact except the arrival of a child which is positively related to being in a permanent full-time job, whereas living at parent's place decreases the propensity to be observed in any kind of state. These variables could be potentially suspected of being endogenous and we are not sure of the direction of the causality between family status and labor market status. Local economic climate, reflected by the local unemployment rate, impacts more clearly men labor market status than women's, in the expected direction. High local unemployment rates seem to affect negatively the propensity to be observed in a temporary full-time job for nearly all categories and cohorts considered. Economic climate also has a significant impact on the propensity to be in a permanent full-time job for men school leavers of the 1998 cohort. This effect does not appear in 2004. The impact of economic climate on the propensity to be in part-time work compared to staying unemployed is weak even on the female's subsample. In our data, temporary work contracts react to the business cycle which is not the case of part-time work. This result is not incompatible with the existence of an internal adjustment of labor demand through changes in hours of work as well.

[INSERT TABLE 4]

We now turn to the estimation results of the state dependence parameters of the panel data model (Table 5). The odds-ratio represents the causal impact of the preceding state on the succeeding state, having controlled for fixed-effects determinants and time-varying covariates. These results can be interpreted in contrast with the raw correlations reflected by the transition matrices (Tables A2 and A3 in Appendix). The diagonal terms represent the persistence and the chances to stay in the same state from one period to another one. The last column reflects the stepping stone effect or the chances to transit from any labor market status to the norm : an open-ended full time status, in reference to the not employed situation.

We first consider females leaving the schooling system in 1998 with a secondary level of education. A temporary full time worker has a probability of 11% to be observed in an open-ended full-time position 6 months later, whereas

this probability reach only 5% if she occupies previously a part-time position. If she remains unemployed, she only has 3% chance to be observed full-time employed the period after (Table A2). State dependence parameters (Table 5) show a slightly different picture since we observe that the stepping-stone effect of part-time or temporary work status is clearly present (significant positive coefficients of the last column). Being in an atypical work episode multiplies by nearly 5 the chances to be in a typical full-time open-ended position 6 months later, compared to unemployed individuals.

If we consider individuals leaving the school system with a higher education level, males or females, the picture is rather similar. A stepping-stone effect is present. For all categories, it is always better to accept an atypical employment contract in order to increase the chances to reach an open-ended full-time situation. It multiplies the chances to sign an open-ended full-time contract by 4 to 6 compared to unemployed individuals. Few papers doubt about this effect in the literature (Güell and Petrongolo, 2007) since experiencing atypical work contracts could be a mean to improve professional network and avoid depreciation of one's employability and human capital skills. We estimate the order of magnitude of the stepping-stone effect.

Looking carefully at the coefficient, we also observe a ratchet effect which is typical of the trajectories of youth entrance on the labor market. The coefficients that are below the diagonal are generally lower than those observe above the diagonal, which means that the chances to move upwards (from atypical situations to the norm) are greater than the chances to move downwards (from the norm to atypical situations). Hence the entrance trajectories of young people follows the direction of the norm which appears to be in this analysis the full-time open-ended contract. As soon as this contract is signed, the chances to remain in such a situation become really high, as testified by the transition and state-dependence matrices. Despite state dependence drastically decreased over the years, the stability of this situation is remarkable so that this contract can still be considered as the culmination point of the integration process into the labor market for all four categories considered.

5.3 Evolutions of Youth Prospects and the Effect of the Great Recession

We now look at the evolutions of the state dependence matrix between the two cohorts (Table 5). Comparing cohort 1998 with cohort 2004, the persistence into any employment situation has clearly diminished (the diagonal terms of the state dependence strongly decreased between the 2 periods). A striking fact is that this effect is much less visible on the transition matrix (see Table A2 and A3). Two explanations come to mind to explain these differences. First, the interpretation of the state dependence matrix requires the use of a reference situation : unemployed individuals. This means that the situation of employed young people tend to worsen compared to unemployed ones. Hence, we could presumably think that unemployed young people experience better prospects with time on the labor market and have higher chances to reach the employment norm. Hence the increased turn-over rates of the labor market reduce the prospects of employed young but increases those of unemployed young people. A second possibility comes from the control of the individual heterogeneity factors. It could be that they play a compensation role (e.g.: increasing education and competences) to the evolution of the labor market. The labor market evolves structurally (state dependence effect) in an unfavorable way (more unstable), but this evolution could be compensated by individual determinants such as ("employability" or preferences shifts). We observed on Table 1 that the educational level as well as the leaving age from the educational system increased between the two cohorts. They could potentially explain these differences.

We now turn to the analysis of the upgrading transitions and the evolution of the stepping-stone effects. For all 4 categories, the state dependence that relates temporary full-time contracts with open-ended ones decreased between the two cohorts. There are more transitions in the most recent cohort and the chances to remain in a temporary employment situation also decreased (see the diagonal term), compared to the unemployment situation.

The state dependence effect of part-time work on the trajectories has evolved

very differently depending on the population (see Table 5 and 7). For females with a secondary educational level, state dependence in direction of the employment norm improved between the two cohorts. However, for females with a higher educational level, the dependence between part-time and open-ended full-time work is positive but diminishes with time. For males this state dependence effect did not evolve significantly. The interpretation at this point is difficult since we do not know if we can attribute this impact to the crisis or trend structural evolution.

A robustness analysis implemented using annual data shows slightly different results (see Table A4 and A5). According to this analysis, the diminishing stepping-stone from temporary to open-ended full-time contracts that we observed on bi-annual data remains clearly established except for the most educated men who could experience more favorable trajectories in the case of annual data. The improved stepping-stone effect of part-time for low educated females is confirmed with the annual window, but not the result on more educated females. Hence, the analysis implemented on biannual and annual data reflect different realities, it seems logical that we do not capture the same kind of contracts and dynamics depending on the time-window considered, an observation already present in Magnac (2000). We keep in mind that the results obtained on people with a secondary education level tend to behave in a more robust way to a change of the window width.

[INSERT TABLE 6]

The difference-in-difference analysis requires the use of the biannual data and cannot be implemented on annual data. It allows identifying the proper impact of the great recession on the state dependence matrix under the assumption that the effect of experience would have remained the same for the two cohorts in the absence of crisis. Table 6 presents the difference of the difference of the coefficients of the state dependence matrix computed according to equation (10). The great recession appeared to have decreased the upgrading transitions of females, with higher education or not, especially from part-time

to full-time jobs. The stepping-stone effect for them remains positive, but has decreased due to the the crisis. For males, the stepping-stone effect of temporary full-time work increased, especially among the educated men, who also experienced an increased permanence (diagonal) into temporary full-time job positions compared to unemployed individuals.

[INSERT TABLE 7]

Table 7 summarizes the result of the disentangling process between trend evolutions of youth entrance dynamics and crisis effect. We notice that the crisis slowed down the trend decline in the transitions from temporary to open-ended positions, especially for men. It also counteracts the trend increase of the stepping-stone effect of part-time to full-time work for women.

If we turn our analysis to the transitions from part-time situations, we only get a significant effect for female's state dependance, not for males. This could be due to the small size of the transitions sample for men. The stepping-stone effect from part-time to full-time open-ended contract is clearly positive and follows an upgrading trend. This is probably due to the increased involvement of females into the labor market especially from the structural functioning of the labor market, and especially the employer side (because here, the impact of the educational level is controlled in the fixed effect). In France, the crisis resulted in a short-term increase in part-time jobs (internal flexibility margin was used to reduce the labor force, Tresor-Economics, 2011). This might have diluted the quality of existing part-time workers and reduce their chances, on average, to reach an open-ended contract which, by the way, became rarer. We thus show here an unknown negative effect of the crisis on women employment prospects.

If we turn our attention to the temporary work, we observe that with time, the stepping-stone effect of temporary work is decreasing, this trend could be due to the fact that recruitments in open-ended contract become less frequent with time. In a longitudinal perspective, we observe that the polarization of the labor market between employed and unemployed individuals tend to diminish

over time probably because of the increased turn-over on the jobs. This effect is not visible on simple cross-sectional data which would only show an increase in the size of the secondary segment of the labor market. Something is sure: the evolution of the secondary segment does not always concern the same people and a longitudinal view is fundamental to apprehend the true inequality on the labor market. For men, the crisis had a positive, opposite effect, on this tendency. Results need to be taken in reference with the unemployment situation which has gradually increased with time and with the crisis. Hence it appears that compared to unemployed men, the situation of temporary employed workers improved due to the crisis (did not deteriorated as much as what the trend would induce). Various interpretations are possible for this phenomenon. First, the crisis decreased the number of temporary jobs in the economy (Tresor-Economics, 2011), leading to an increased average quality of the workers which then become more likely to reach the employment norm. Second possibility, the signaling effect of being in a temporary work changed because of the crisis. We cannot disentangle here whether we are in the presence of a selection or a signalling effect.

6 Summary and Discussion

This article enriches previous research that analyzes the effect of the Great Recession on the labor market by adopting a dynamical perspective and focusing on school leavers. We have studied the process of youth entrance into the labor market, comparing, during seven years, two cohorts of school-leavers from the French educational system in 1998 and in 2004. The last cohort was affected by the Great recession whereas the first one was not. We segmented the population by gender and educational level and conducted a structural analysis of the state dependency across labor contracts depending on which kind of flexibility they allow (none, extensive and intensive margin). Work contracts were disentangled by working-time and duration in order to study the dynamic process that allows reaching the employment norm of a full-time open-ended contract. Main results

are the following:

The typical full-time open-ended contract is rarer but remains the culmination point of the integration process of new entrants into the labor market. Unsurprisingly, a positive stepping-stone effect of part-time work and temporary contracts appears without ambiguity for all cohorts and all categories of individuals. Whatever the time, the educational level and the sex, it is always better to occupy a job, even part-time or temporary, than staying unemployed, in order to reach the employment norm of an open-ended full-time contract.

It appears that the prospects of employed young people (in temporary or open-ended full-time contracts) tend to gradually deteriorate with time compared to unemployed. Unemployed individuals experience a trend increase of their employment prospects in link with the increased turn-over rates on the labor market. This brings an unintended view of the reality of labor inequalities on a dual labor market: the second segment is not a monolith made of stable individuals but tend to be mixed more and more with the first segment, an insight that is impossible to get to grips with cross-sectionnal data which generally show an increase of the size of the second segment.

Finally, it appears that since 1998, the dynamics of the labor market for young people evolved in a complex way, with lots of heterogeneity. The overall time evolution and the Great Recession induced redistributive effects that often go in the opposite direction than the trend. The prospects of temporary workers on the labor market, which have a clear downward trend with time (lower persistence, increased turnover and lower chances to reach an open-ended contract) were improved by the Great Recession, probably because the prospects of unemployed people deteriorated even more. Insiders (young people who already occupy a job) seem to have improved prospects when the economic situation is deteriorating due to the Great Recession. For women, part-time work did not play this favorable role during the Great Recession since their chances to reach an open-ended full-time job from a part-time one deteriorated. This two effects are due to the use of the internal and external flexibility to adjust the labor

force. The market reacted by a decrease in temporary jobs and an increase in part-time jobs leading to changes in the distribution of productivity within each employment category. Since women are mostly concerned by part-time work, this leads to strong differences in how males and females prospects are affected by the crisis. Polarization forces of the labor market play at different levels for males and females, the Great Recession affect these forces differently. This result is striking but remains coherent with other results in the literature: Gender differences in the stepping-stone effects were also observed by Booth et al. (2002). Theodossiou and Zangelidis (2009) already observed opposite gender reactions to the business cycle.

Even though the method we implemented is robust to various points, notably the presence of fixed effect that induce spurious correlations across states, results need to be taken with caution since they could be sensible to the choice of the time window and the order of the state dependence considered for the analysis. Moreover, even though the common trend assumption necessary to achieve the identification of the effect of the Great Recession is convincing, it could still be questionable if the dynamic of youth entrance into the labor market evolves differently across time and experience.

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**ATYPICAL EMPLOYMENT AND PROSPECTS OF THE YOUTHS ON THE
LABOUR MARKET IN A CRISIS CONTEXT**

Hélène Couprie and Xavier Joutard

TABLES AND FIGURES

4th january, 2017

Table 1 : Descriptive statistics of the sample

Cohort	Women		Men	
	1998	2004	1998	2004
Fixed factors				
Age at the exit of the educational system	21.5885 (2.8811)	22.0199 (2.8511)	21.1475 (2.8205)	21.4562 (2.8276)
A-level – “Baccalaureat”	0.7394 (0.4390)	0.8153 (0.3881)	0.6256 (0.4840)	0.7018 (0.4575)
Diploma from higher education	0.4240 (0.4942)	0.5412 (0.4983)	0.3450 (0.4754)	0.4425 (0.4967)
Without any diploma	0.1100 (0.2850)	0.0563 (0.2306)	0.1730 (0.3783)	0.1133 (0.3161)
Variable factors averaged over time <i>(October and April each year)</i>				
Living alone	0.1897 (0.2850)	0.2102 (0.3008)	0.2140 (0.2854)	0.2484 (0.3161)
Living in a couple	0.5137 (0.3819)	0.5358 (0.3830)	0.3193 (0.3467)	0.3387 (0.3548)
Has an additional child	0.3170 (0.4618)	0.2792 (0.4624)	0.1626 (0.3936)	0.1373 (0.3386)
Unemployment rate	7.9842 (1.5651)	8.6368 (1.5129)	7.9964 (1.5684)	8.6575 (1.5465)
Bi-annual transitions (4 states)				
No transition	0.1045 (30.55)	0.1473 (0.3544)	0.1401 (0.3471)	0.1756 (0.3805)
One transition only	0.2378 (0.4257)	0.2298 (0.4207)	0.2757 (0.4419)	0.2772 (0.4479)
More than one transition	0.6580 (0.4744)	0.6229 (0.4847)	0.5842 (0.4930)	0.5468 (0.4979)
<i>Number of Observations</i>	<i>6229</i>	<i>4970</i>	<i>6917</i>	<i>4960</i>

Unweighted statistics, standard errors in parenthesis. A transition is a change in the type of work contract working. Changing employer but keeping the same type of contract is thus not considered as a transition.

Table 2: Distribution of contracts by working-time and duration

2a) Women, 5 years after leaving school, Generation 2004

Work Time / Duration	Permanent	Fixed Term	Temporary Agency	State-subsidized
Part Time	10.0	5.0	0.4	1.5
Full Time	65.8	13.6	1.7	2.0

N=4225 observations representing 230000 working women, in %.

2a) Men, 5 years after leaving school, Generation 2004

Work Time / Duration	Permanent	Fixed Term	Temporary Agency	State-subsidized
Part Time	2.4	2.0	0.4	0.2
Full Time	77.6	9.3	5.2	3.0

N=4314 observations representing 260000 working men, in %.

Table 3: Labor market status during the 5 first years after leaving school

	Women Secondary		Women Higher	
	Cohort98	Cohort04	Cohort98	Cohort04
0 - Not employed	30.0 %	32.5 %	12.4 %	13.1 %
1 - Part-time	18.6 %	16.5 %	12.3 %	10.8 %
2 - Unstable full-time	23.0 %	21.4 % </td <td>19.2 %</td> <td>17.9 %</td>	19.2 %	17.9 %
3 - Permanent full-time	28.3 %	29.6 %	56.1 %	58.2 %

	Men Secondary		Men Higher	
	Cohort98	Cohort04	Cohort98	Cohort04
0 - Not employed	20.0 %	23.9 %	13.1 %	10.7 %
1 - Part-time	4.7 %	5.5 %	4.0 %	4.5 %
2 - Unstable full-time	27.2 %	26.4 %	14.3 %	17.7 %
3 - Permanent full-time	48.0 %	44.2 %	68.7 %	67.0 %

Weighed statistics. For both cohorts, labor status is averaged over the 5 years after leaving school.

Figure 1: Illustration of the comparative analysis

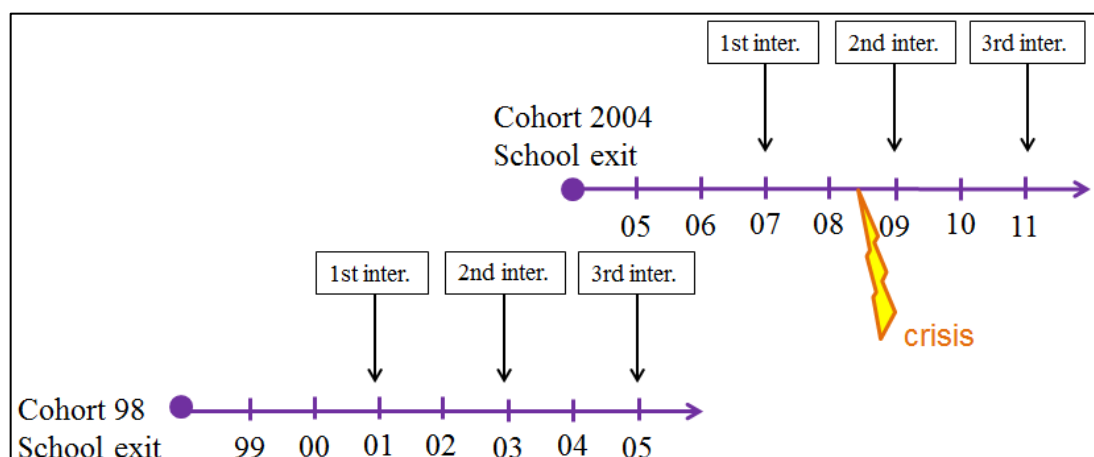


Table 4: Effect of time-varying covariates on transitions

Table 4a) For school-leavers with a secondary education

WOMEN SECONDARY EDUCATION								
Destination State / Covariate	COHORT 1998				COHORT 2004			
	In couple	At parents	Child	Local unempl	In couple	At parents	Child	Local unempl
Part-time	-0.1846 (0.1335)	-0.0806 (0.1278)	-0.2716*** (0.0854)	0.0122 (0.0381)	0.2991* (0.1703)	0.2409 (0.1543)	-0.4947*** (0.1271)	0.0321 (0.0464)
Unstable Full-time	-0.0986 (0.1087)	-0.2903*** (0.1071)	-0.6370*** (0.0895)	-0.0396 (0.0314)	0.2073* (0.1188)	-0.0685 (0.1113)	-0.7269*** (0.1132)	-0.0504 (0.0369)
Permanent Full-time	-0.5768*** (0.1765)	-0.6264*** (0.1782)	-0.5297*** (0.1413)	-0.0391 (0.0589)	-0.1211 (0.1980)	-0.6461*** (0.2096)	-0.5851*** (0.1483)	0.0161 (0.7867)

MEN SECONDARY EDUCATION								
Destination State / Covariate	COHORT 1998				COHORT 2004			
	In couple	At parents	Child	Local unempl	In couple	At parents	Child	Local unempl
Part-time	0.3287 (0.2789)	0.3135 (0.2079)	-0.6000 (0.3920)	-0.0258 (0.0646)	-0.3176 (0.2496)	-0.2454 (0.2239)	0.2813 (0.2598)	-0.1156* (0.0688)
Unstable Full-time	0.1607 (0.1207)	-0.1819** (0.0898)	0.0089 (0.1447)	-0.1368*** (0.0273)	-0.0134 (0.1366)	-0.3718*** (0.1107)	0.0660 (0.2184)	-0.1687*** (0.0331)
Permanent Full-time	0.1536 (0.1514)	-0.3685*** (0.1374)	0.2740 (0.1884)	-0.2110*** (0.0454)	-0.0709 (0.1895)	-0.6567*** (0.1567)	0.0939 (0.2475)	-0.0623 (0.0480)

Parameter estimates from Honore and Kyriazidou's estimator. Standard errors in parenthesis. Significance level: * means 10%; ** means 5%; *** means 1%.

Table 4b) For school-leavers with a higher education

WOMEN HIGHER EDUCATION								
	COHORT 1998				COHORT 2004			
Destination State / Covariate	In couple	At parents	Child	Local unempl	In couple	At parents	Child	Local unempl
Part-time	-0.0124 (0.2150)	-0.0432 (0.2316)	-0.2363 (0.1582)	-0.0015 (0.0767)	0.1409 (0.1854)	0.1655 (0.2552)	-0.3828** (0.1698)	-0.0111 (0.0568)
Unstable Full-time	0.0124 (0.1686)	-0.5258*** (0.1759)	-0.9654*** (0.1303)	-0.1264*** (0.0474)	-0.1828 (0.1498)	-0.3467* (0.1780)	-0.8164*** (0.1140)	-0.1163** (0.0454)
Permanent Full-time	-0.1906 (0.2697)	-0.6429** (0.2572)	-0.6106*** (0.1786)	-0.0283 (0.0791)	-0.2814 (0.1953)	-0.6145*** (0.2366)	-0.4528*** (0.1521)	0.0651 (0.0587)

MEN HIGHER EDUCATION								
	COHORT 1998				COHORT 2004			
Destination State / Covariate	In couple	At parents	Child	Local unempl	In couple	At parents	Child	Local unempl
Part-time	-0.0608 (0.4702)	-0.8233** (0.3543)	-0.3541 (0.3824)	-0.0400 (0.1255)	-0.6689** (0.2874)	-0.6425** (0.3114)	0.7368** (0.3111)	0.0625 (0.0941)
Unstable Full-time	-0.2058 (0.2010)	-0.7867*** (0.1881)	0.0531 (0.2496)	-0.2173*** (0.0546)	0.1429 (0.1571)	-0.6958*** (0.1495)	0.0872 (0.2154)	-0.1514*** (0.0569)
Permanent Full-time	-0.0044 (0.2474)	-0.9880*** (0.2057)	-0.0118 (0.2147)	-0.3437*** (0.0645)	0.1135 (0.1964)	-1.0721*** (0.2101)	0.9724*** (0.2526)	-0.0406 (0.0749)

Table 5: Estimation of State dependence, women

Table 5a) For school leavers with a secondary education

WOMEN SECONDARY EDUCATION								
COHORT 1998					COHORT 2004			
From / To	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time
Not Employed	REF	REF	REF	REF	REF	REF	REF	REF
Part-time	REF	25.2 (***)	1.9 (***)	4.8 (***)	REF	26.8 (***)	3.1 (***)	7.4 (***)
Unstable Full-time	REF	1.9 (***)	10.6 (***)	5.9 (***)	REF	1.7 (***)	8.8 (***)	4.4 (***)
Permanent Full-time	REF	1.9 (***)	1.7 (***)	173.0 (***)	REF	2.3 (***)	1.9 (***)	118.9 (***)
MEN SECONDARY EDUCATION								
COHORT 1998					COHORT 2004			
From / To	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time
Not Employed	REF	REF	REF	REF	REF	REF	REF	REF
Part-time	REF	41.9 (***)	2.9 (***)	4.5 (***)	REF	24.4 (***)	2.1 (***)	4.9 (***)
Unstable Full-time	REF	2.0 (***)	9.5 (***)	5.5 (***)	REF	1.3 (ns)	5.9 (***)	3.9 (***)
Permanent Full-time	REF	2.2 (***)	2.1 (***)	111.9 (***)	REF	1.5 (ns)	1.0 (ns)	77.9 (***)

Odds-ratios from Honore and Kyriazidou's estimator. Significance level in parenthesis: * means 10%; ** means 5%; *** means 1%, ns means not significant at 10%. Bi-annual calendar data.

Table 5b) For school leavers with a higher education

WOMEN HIGHER EDUCATION								
COHORT 1998					COHORT 2004			
From / To	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time
Not Employed	REF	REF	REF	REF	REF	REF	REF	REF
Part-time	REF	41.1 (***)	2.1 (***)	5.8 (***)	REF	18.2 (***)	2.0 (***)	4.1 (***)
Unstable Full-time	REF	1.9 (***)	9.9 (***)	5.3 (***)	REF	0.95 (ns)	6.8 (***)	3.4 (***)
Permanent Full-time	REF	4.1 (***)	1.5 (*)	227.1 (***)	REF	2.0 (***)	1.1 (ns)	107.0 (***)

MEN HIGHER EDUCATION								
COHORT 1998					COHORT 2004			
From / To	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time
Not Employed	REF	REF	REF	REF	REF	REF	REF	REF
Part-time	REF	42.9 (***)	1.8 (*)	3.8 (***)	REF	32.6 (***)	2.9 (***)	4.2 (***)
Unstable Full-time	REF	1.7 (*)	12.6 (***)	6.4 (***)	REF	0.8 (ns)	5.1 (***)	3.1 (***)
Permanent Full-time	REF	2.1 (**)	1.6 (***)	101.0 (***)	REF	1.1 (ns)	0.7 (*)	61.7 (***)

Odds-ratios from Honore and Kyriazidou's estimator. Significance level in parenthesis: * means 10%; ** means 5%; *** means 1%, ns means not significant at 10%. Bi-annual calendar data.

Table 6: Impact of the crisis on state dependence

SECONDARY EDUCATION								
WOMEN					MEN			
From / To	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time
Not Employed	REF	REF	REF	REF	REF	REF	REF	REF
Part-time	REF	0.39 (0.44)	-0.84* (0.44)	-1.31** (0.60)	REF	0.14 (0.82)	0.05 (0.55)	-0.56 (0.76)
Unstable Full-time	REF	0.28 (0.40)	-0.61** (0.31)	-0.13 (0.46)	REF	0.32 (0.60)	-0.10 (0.26)	0.91** (0.36)
Permanent Full-time	REF	-0.12 (0.75)	-0.15 (0.63)	0.47 (0.85)	REF	1.61 (1.17)	-0.46 (0.50)	0.30 (0.64)

HIGHER EDUCATION								
WOMEN					MEN			
From / To	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time
Not Employed	REF	REF	REF	REF	REF	REF	REF	REF
Part-time	REF	0.45 (1.71)	-0.38 (0.63)	-1.47* (0.84)	REF	-0.41 (11.79)	-0.23 (2.23)	1.33 (2.20)
Unstable Full-time	REF	-0.69 (0.61)	-0.33 (0.46)	-0.57 (0.51)	REF	-0.70 (2.80)	1.45*** (0.54)	1.41** (0.57)
Permanent Full-time	REF	0.09 (0.85)	-0.36 (0.73)	-1.25 (0.84)	REF	0.76 (3.95)	0.50 (0.84)	-0.52 (0.79)

Difference-in-difference estimation on the effect of the crisis on the parameters of the state dependence matrix. Standard errors, in parenthesis, were computed by bootstrap (500 replications). ***,** and * mean respectively 1%,5% and 10% significance level.

Table 7: Evolutions of the stepping-stone effect

Difference of the state-dependence coefficient ($\delta_{2004} - \delta_{1998}$)	Trend Effect (<i>Global-Crisis</i>)	Crisis Effect (<i>diff-in-diff</i>)	Global Evolutions
From part-time to permanent full-time			
Women secondary	+1.73	-1.31**	+0.42***
Men secondary	NS	NS	NS
Women higher	+1.13	-1.47*	-0.34***
Men higher	NS	NS	NS
From unstable to permanent full-time			
Women secondary	-0.30	NS	-0.30***
Men secondary	-1.25	0.91**	-0.34***
Women higher	-0.45	NS	-0.45***
Men higher	-2.15	1.41**	-0.74***

APPENDIX

Table A1: Details about the estimation procedure

Subsample	Number of indiv.	Indiv. not used in the algorithm	Number of Pairs transitions at any time	0-1 or 1-0	0-2 or 2-0	0-3 or 3-0	1-2 or 2-1	1-3 or 3-1	2-3 or 3-2
SECONDARY EDUCATION LEVEL									
Cohort 1998 Females	3588	11.23%	124675	22475	27080	16251	14206	17039	27624
Cohort 1998 Males	4531	15.71%	137644	6033	31228	27081	5309	7536	60457
Cohort 2004 Females	2280	12.76%	79237	12752	16971	12147	8494	8562	20311
Cohort 2004 Males	2765	18.30%	83167	4533	19521	14354	3893	4444	36422
HIGHER EDUCATION LEVEL									
Cohort 1998 Females	2641	18.67%	74973	4906	9699	11983	6078	13438	28869
Cohort 1998 Males	2386	22.97%	59183	1592	8005	19913	1794	4180	23699
Cohort 2004 Females	2690	24.54%	72895	5471	9666	11715	5530	11869	28644
Cohort 2004 Males	2195	31.62%	49866	2211	6711	10744	2154	3703	24343

Table A2: Transition rates for school-leavers with a secondary education

WOMEN SECONDARY								
From / To	COHORT 1998				COHORT 2004			
	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time
Not Employed	76.50	7.99	12.29	3.17	77.07	7.66	11.36	3.90
Part-time	10.13	79.00	5.84	5.03	9.94	75.41	7.52	7.13
Unstable Full-time	12.23	3.78	73.17	10.77	15.18	4.71	69.97	10.14
Permanent Full-time	3.90	2.44	2.27	91.39	3.68	2.02	2.06	92.24
MEN SECONDARY								
From / To	COHORT 1998				COHORT 2004			
	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time
Not Employed	69.49	3.86	19.37	7.14	72.08	4.53	18.04	5.36
Part-time	10.19	70.55	10.19	8.97	12.76	66.98	11.65	8.61
Unstable Full-time	10.53	1.28	73.81	14.31	12.73	1.39	72.42	13.45
Permanent Full-time	2.15	0.43	2.64	94.80	3.11	0.60	2.28	94.06

Weighted statistics, computation based on bi-annual calendar data. Each cell gives the probability (in %) of being observed in state (columns) conditional on the event that the individual was observed 6 months earlier in state (rows).

Table A3: Transition rates for school-leavers with a higher education

WOMEN HIGHER EDUCATION								
COHORT 1998					COHORT 2004			
From / To	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time
Not Employed	64.68	7.05	16.88	11.34	63.96	8.34	18.21	9.49
Part-time	5.20	81.79	5.91	7.10	6.30	76.00	6.31	11.39
Unstable Full-time	7.59	2.94	73.57	15.87	9.81	2.93	71.12	16.14
Permanent Full-time	1.34	1.91	1.23	95.53	1.29	1.33	1.16	96.21

MEN HIGHER EDUCATION								
COHORT 1998					COHORT 2004			
From / To	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time
Not Employed	60.54	3.33	17.26	18.87	59.77	5.25	20.49	14.49
Part-time	6.39	78.26	5.95	10.35	6.80	72.33	9.29	11.58
Unstable Full-time	8.21	1.40	71.39	19.12	8.82	1.65	71.70	18.08
Permanent Full-time	1.42	0.37	0.97	97.30	1.36	0.36	0.99	97.29

Weighted statistics, computation based on bi-annual calendar data. Each cell gives the probability (in %) of being observed in state (columns) conditional on the event that the individual was observed 6 months earlier in state (rows).

Table A4: State dependence school leavers with secondary education (Annual Data)

WOMEN SECONDARY EDUCATION								
COHORT 1998					COHORT 2004			
From / To	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time
Not Employed	REF	REF	REF	REF	REF	REF	REF	REF
Part-time	REF	9.0 (***)	1.8 (***)	4.3 (***)	REF	9.0 (***)	2.1 (***)	6.7 (***)
Unstable Full-time	REF	1.3 (***)	6.4 (***)	5.5 (***)	REF	1.9 (***)	5.0 (***)	4.7 (***)
Permanent Full-time	REF	1.6 (***)	1.66 (***)	54.4 (***)	REF	2.1 (***)	1.9 (***)	58.1 (***)
MEN SECONDARY EDUCATION								
COHORT 1998					COHORT 2004			
From / To	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time
Not Employed	REF	REF	REF	REF	REF	REF	REF	REF
Part-time	REF	12.0 (***)	1.6 (***)	2.5 (***)	REF	7.6 (***)	2.2 (***)	4.1 (***)
Unstable Full-time	REF	1.5 (**)	4.3 (***)	3.6 (***)	REF	1.1 (ns)	4.2 (***)	3.5 (***)
Permanent Full-time	REF	1.9 (**)	1.7 (***)	36.1 (***)	REF	1.2 (ns)	0.8 (ns)	18.2 (***)

Odds-ratios from Honore and Kyriazidou's estimator. Significance level in parenthesis: * means 10%; ** means 5%; *** means 1%, ns means not significant at 10%. Annual calendar data.

Table A5: State dependence school leavers with higher education (Annual Data)

WOMEN HIGHER EDUCATION								
COHORT 1998					COHORT 2004			
From / To	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time
Not Employed	REF	REF	REF	REF	REF	REF	REF	REF
Part-time	REF	10.2 (***)	1.8 (***)	2.2 (***)	REF	8.0 (***)	1.6 (**)	4.4 (***)
Unstable Full-time	REF	1.8 (***)	6.1 (***)	3.6 (***)	REF	0.9 (ns)	3.6 (***)	2.9 (***)
Permanent Full-time	REF	3.3 (***)	1.6 (**)	46.1 (***)	REF	1.7 (**)	0.8 (ns)	40.8 (***)

MEN HIGHER EDUCATION								
COHORT 1998					COHORT 2004			
From / To	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time	Not Empl.	Part-time	Unstab F-Time	Perm. F-Time
Not Employed	REF	REF	REF	REF	REF	REF	REF	REF
Part-time	REF	8.3 (***)	1.6 (*)	1.5 (ns)	REF	6.3 (***)	2.3 (***)	2.6 (***)
Unstable Full-time	REF	0.8 (ns)	4.5 (***)	2.6 (***)	REF	1.3 (ns)	4.6 (***)	3.9 (***)
Permanent Full-time	REF	0.961 (ns)	0.988 (ns)	20.0 (***)	REF	1.1 (ns)	0.8 (ns)	26.8 (***)

Odds-ratios from Honore and Kyriazidou's estimator. Significance level in parenthesis: * means 10%; ** means 5%; *** means 1%, ns means not significant at 10%. Annual calendar data.