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Lost and found? The cost of job loss in France

Vahé Nafilyan

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LOST AND FOUND? THE COST OF JOB LOSS IN FRANCE[1]

Vahé Nafilyan[2]

Abstract

Combining the longitudinal dimension and the retrospective calendar of the French Labour Force Survey (2003-2011), we analyse the labour market transitions and outcomes of workers who were dismissed for economic reasons. This study analyses the re-employment patterns of displaced workers and their earnings losses, as is common in the literature, as well as the consequences of displacement for other aspects of job quality. Results suggest that the cost of involuntary job loss is important and goes beyond the fall in earnings. Workers who are made redundant face relatively long spells of non-employment before getting back to work and their new jobs tend to be of lower quality than their pre-displacement jobs along a number dimensions. Re-employed displaced workers suffer a monthly wage penalty of 15-20% and are, on average, nine times as likely to lose their job again as are workers who have not been made redundant. In addition, displaced workers are more likely to work part-time once re-employed, and to have fewer paid holidays and lower job authority than had they not been dismissed, though these differences tend to fall over time.

Résumé

Dans cette étude, nous analysons les transitions et les performances sur le marché du travail des salariés qui ont été licenciés pour motif économique. Pour ce faire, nous utilisons la dimension longitudinale de l'Enquête Emploi en continu (2003-2011) combinée avec le calendrier rétrospectif. Nous examinons les perspectives de réemploi des employés licenciés pour motif économique ainsi que les conséquences de la perte d'emploi sur le salaire et d'autres indicateurs de la qualité de l'emploi. L'analyse montre que les conséquences de la perte involontaire d'emploi sont importantes et ne se limitent pas à une perte de revenus. Les employés licenciés pour motif économique non seulement les subissent une longue période de non-emploi, mais lorsqu'ils sont réemployés, la qualité de leur emploi généralement moindre. Une fois réemployés, ils subissent une perte de salaire d'environ 15-20% et ont neuf fois plus de chance de perdre à nouveau leur emploi que s'ils n'avaient pas été licencies. De plus, ils ont une plus forte probabilité de travailler à temps partiel, ont moins de vacances et de responsabilités, bien que la différence s'amenuise au cours du temps.

1. Special thanks go to Gwenn Parent, Barbara Petrongolo, Glenda Quintini for their comments and support. I am heavily indebted to Paul Swaim for his invaluable help. I also would like to thank Mark Keese and the participants to the conference for the Launch of the OECD Analytical Report on Displaced Workers on 16-17 May 2013 for their comments and suggestions

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INTRODUCTION

1. Economic and policy background

1. During the recent economic crisis, a substantial number of workers all over the world lost their jobs. However, job destruction is not uncommon even in time of strong economic growth, since it may result from the ongoing process of creative destruction associated with structural changes, such as the introduction of new technologies and increased foreign competition. Although job destruction is unavoidable in a dynamic labour market, the cost of displacement may be high for the workers and communities involved. Earlier research for a number of countries has shown that involuntary job loss for economic reasons often has detrimental consequences on individual labour market prospects and career paths, while also affecting other dimensions of well-being, such as health, mortality, and family life (see OECD, 2013, and the sources cited therein).

2. Although plant closures and mass lay-offs figure prominently in policy debates in France, little has been known about the incidence and consequences of worker displacement due to the difficulty of establishing sound empirical evidence with the available data. OECD (2013) recently has shown that permanent workers face a lower risk of displacement in France than in many OECD countries, consistent with the strict legislation regulating redundancies reducing their incidence. Despite the low incidence of displacement, the feeling of job insecurity appears to be particularly widespread among permanent workers in France (Postel-Vinay and Saint-Martin, 2004). One possible explanation for this paradox could be that the consequences of job loss on workers' labour market outcomes are particularly severe and long-lasting in France. This paper sheds light on this issue by providing new estimates of the economic losses experienced by displaced workers in France.

3. The paper also identifies the groups of workers most often experiencing redundancy and explores the mechanisms explaining the cost of job loss. This information can help improve the design of labour market policies aiming to support displaced workers and improve their reemployment opportunities.

1.1. The displacement literature

4. Over the last two decades the consequences of job displacement – defined as involuntary separation resulting from operating decisions of the employer that are unrelated to the performance of the employee – have received growing attention from researchers, first in the United States and then in other OECD countries.[3] While early studies made use of survey data (mainly the Displaced Workers Survey, which is a supplement to the Current Population Survey), an increasing number of studies examining the consequences of displacement on earnings are based on administrative data, not only in the United States (Jacobson *et al.*, 1993; Couch and Placzek, 2010) but also in other countries - for example Margolis (2000) for France, Eliason and Storrie (2006) for Sweden, Schmieder *et al.* (2009) for Germany, Hijzen *et al.* (2010) for the United Kingdom. OECD (2013) provides comparative estimates of the earnings losses suffered by displaced workers in seven OECD countries, not including France, for which this issues could be studied using administrative data.

5. The main advantage of administrative datasets is to provide a long panel with little attrition and a large number of observations, as well as accurate estimates of income and wages. Individuals

3. See OECD (2013) for a detailed literature review of the impact of displacement on workers' earnings in the OECD countries

may be tracked for a long period of time, which allows researchers to analyse the long- term consequences of displacement (von Wachter *et al*, 2007). In addition, the large number of observations may be used to test heterogeneity in the effects (between men and women for instance). While administrative records have primarily been used to analyse the earnings and wage impact of displacement, recent studies emphasise the impact of displacement on non-labour market outcomes, such as mortality (Sullivan and von Wachter, 2009) or fertility (Huttunen and Kellokumpu, 2012).

6. However, datasets based on administrative records suffer from several limitations. First, compared with survey data, they usually provide little information on the workers' socio-demographic characteristics and few indicators of job quality. Therefore analysing the cost of job loss is generally limited to the earnings aspect. Second, identifying job displacement may prove quite challenging. In most cases, the reason for changing jobs or moving out of the labour force is unknown in administrative data. Accordingly, this strand of the literature generally identifies all job separations occurring at a firm at the same time that it either closes or sharply reduces employment as representing displacements, even though it is not possible to directly verify the real motive for each of the job separations.[4] Another limitation is that, owing to the nature of the datasets, the sample is typically restricted to workers employed at relatively large companies (typically more than 100 employees[5]). This may be quite problematic, as the incidence of displacement is typically higher in small than in large firms (OECD, 2013).

7. Researchers have also analysed the incidence and consequences of displacement using household surveys. One advantage of household surveys is that they provide a wide array of information about worker characteristics and post-displacement labour market situation, whereas such information is usually very limited in administrative datasets. In household surveys the reason for job separation is reported by the individual and may be used to better differentiate job separations that have been initiated by the employer from quits. One important limitation of survey data is that the identification of displacement depends on the accuracy of respondent's answers to questions about the reason why they left previous employment. Recall bias also may be a problem in long retroactive surveys, since some job transitions might not be reported, especially among temporary workers. In addition, displaced individuals who get back to work rapidly, without experiencing any earnings loss, tend to declare that the reason they left their previous job was to move to a better job rather than that they were displaced. In order to compare the two types of data used in the research literature, von Wachter *et al.* (2009) use matched survey and administrative data for California in the 1990s. Interestingly, they find that survey data tend to underestimate the incidence of job losses, as displacements followed by short, or no unemployment spells and small earnings losses tend to be underreported. By contrast, administrative data tend to overestimate job displacement, notably by including many voluntary job separations. In addition, survey data yield larger estimates of earnings losses than administrative records, chiefly because displacement followed by small earnings losses (or even by increased earnings) are typically underreported in surveys.

8. One of the main issues in defining job displacement is that distinguishing between resignation and redundancies is not always clear, since when a company is going through economic

4. Firm closures are typically identified when the firm "disappears" from the dataset (i.e. its identifying number no longer appears in the database). Since this may be due to its closure, or to the firm's being taken over by another company, researchers have to make sure that the firm has not simply changed its ID. To do so, they look at whether those employed at year t-1 in a company suspected of closure are all employed in in a different (but common) firm at time t.

5. Another reason researchers sometimes restrict their analysis to fairly big companies is that some administrative datasets are not comprehensive and include only a sample (though generally large) of employees that is more representative for large than for small firms.

hardship, or planning to switch technologies, some workers may anticipate that they may be made redundant in the near future and consequently start looking for another job. In addition, Farber (2003) argues that firms that want to reduce employment without dismissing workers may do so by encouraging workers to resign, by reducing (or failing to raise) wages, or by reducing working time. Downsizing may be achieved without making any permanent worker redundant. This may be especially common in countries where permanent workers are well protected against dismissal, like in France. Reducing hiring, encouraging voluntary departures, not renewing temporary contracts or dismissing temporary agency workers are ways for companies to reduce the workforce without entailing costs associated with dismissals for economic reasons. For instance, the company PSA decided to destroy 850 jobs in April 2013 in response to declining cars sales. No permanent workers were made redundant, as only temporary agency workers were dismissed.

9. The choice between using administrative records or household surveys may thus depend in part on how the researcher wishes to define displacement. A comprehensive definition of displacement in which all separations due to the economic difficulties faced by the company are considered as displacement, regardless of who initiated the separation, generally implies using administrative data. On the other hand, studies analysing the consequences of job separations initiated by the employer because of economic reasons or technological change may find that survey data is better suited to capture narrowly defined displacement events.

1.2. Displacement in France

10. Empirical studies of the consequences of job loss in France are scarce, but they already provide good insight into some aspects of the consequences of involuntary job loss. Nonetheless, these studies do not provide a complete assessment of the costs of displacement and many questions remain unanswered. This section briefly reviews earlier studies.

11. Lefranc (2003) uses the French Labour Force Survey (from 1990 to 2000) to estimate the earnings loss associated with displacement defined as dismissals for economic reasons. The main limitation of these data is that displacement status can only be identified for individuals who are unemployed at the survey date. Therefore, the sample of displaced workers consists of workers who were displaced within the past year and who are unemployed or out the workforce at the time of the interview. This implies that displaced workers who rapidly return to work are not identified as displaced. The estimate of wage losses is therefore likely to be biased, with the direction of the bias depending on which kinds of displaced workers tend to be re-employed rapidly. Moreover, it is not possible to look at quarterly labour market transitions with these data, which makes difficult to analyse in detail the re-employment prospects of displaced workers. Lefranc finds that displacement is associated with a loss of around 12% in weekly wages. The wage loss is found to be larger for those with no tertiary education.

12. Margolis (2000) makes use of a longitudinal dataset that combines administrative records from several sources (DADS, SUSE) in order to assess the consequences of worker displacement during the period 1985-1989. Contrary to most studies, he finds that displacement has virtually no impact on wages. This finding may reflect the fact that displacement status was identified differently than in other studies. Rather than being restricted to job losses resulting from dismissal for economic reason, displacement is broadly defined as all separations associated with firm closures. As underlined above, implementing this type of a definition in an administrative dataset tends to overestimate the number of displaced workers, since some employees leaving the company for reasons unrelated to the economic situation may nonetheless be identified as displaced. Indeed, Margolis reports displacement rates that are four times as high as the official figures published by the Ministry of Labour, even though his sample is restricted to medium and large firms which typically have lower displacement

rates than smaller firms. More recently, Royer (2011), using the same dataset as Margolis (2000), but for the 1995-1999 period, shows that job loss owing to firm closure has a long-lasting impact on workers' wages, the magnitude of which is however smaller than in the United States. Seven years after displacement, displaced workers earn, on average, 5% less than non-displaced workers.

13. While Margolis (2000) and Royer (2011) identify displacement through firm closure, the analysis in this study, follows Lefranc (2003) in restricting the definition of displacement to workers reporting that they were dismissed for economic reasons.[6] Since the populations of interest are not the same, the results reported below are not directly comparable to the former two studies. While the results are more comparable to those of Lefranc (2003), this study better exploits the longitudinal dimension and retrospective calendar of the French Labour Force Survey to provide more detailed evidence about the incidence and wage impact of displacement, while also focussing on a more recent period (2003-2011). In addition, while Lefranc (2003) focuses exclusively on displaced workers who are unemployed when first interviewed this study analyses trajectory of all displaced workers. Another difference with prior studies is that they focus primarily on the non-employment spell duration (Margolis, 2000) and on the wage loss caused by displacement (Lefranc, 2003; Margolis, 2000; Royer, 2011), whereas the welfare cost of displacement is not limited to earnings losses. As shown by Brand (2006), displacement has detrimental consequences for a wide range of aspects of job quality. This paper extends the existing literature for France by analysing the consequences of job loss for a number employment outcomes, including, wages, job insecurity, working time arrangement and job benefits.

1.3. Main findings

14. Results suggest that displaced workers in France face relatively long spells of non-employment before getting back to work and their new jobs tend to be of lower quality than pre-displacement jobs. Re-employed displaced workers suffer a wage penalty of 15-20%, and are on average 9 times as likely to lose their job as those who have not been made redundant. In addition, displaced workers are more likely to work part-time, have less paid holidays, and are less likely to hold a managerial position than if they had not been dismissed, though these differences fall over time.

2. Measuring Job Displacement in France

15. In this section we describe the legislation regulating the dismissal for economic reasons and explain how, in light of this regulatory structure, we use the French Labour Force survey to analyse the consequences of job displacement for workers' labour market prospects.

2.1 The legal definition of dismissal for economic reasons

16. Legislation distinguishes two ways to dismiss an employee who is employed on an open-ended contract (*Contrat à durée indéterminée*), depending on the reasons motivating dismissal. Dismissal for economic reasons (*Licenciement pour motif économique*) is used to terminate an open-ended contract for reasons unrelated to the employee's job performance, typically on grounds of economic difficulties or technological change. Conversely, dismissal on personal grounds (*Licenciement pour motif personnel*) is used to break the employment contract when the cause of dismissal relates to the individual behaviour or insufficient professional qualifications of the employee. A way to terminate an employment contract on the joint initiative of the employer and the employee, the *rupture conventionnelle du contrat de travail*, was introduced in the last quarter of 2008.

6. Licenciement pour motif économique

2.1.1 Defining the causes justifying redundancy

17. The Labour Code (Article L1233-3) states that economic hardship or technological change can constitute grounds for dismissal for economic reasons. However, neither economic hardship nor technological change are properly defined by the Labour Code, leaving room for the jurisprudence to clarify these notions. For instance, default, bankruptcy, losses are generally considered to provide real and serious justifications for dismissal, whereas a slight decline in sales is not. Corporate re-structuring does not systematically constitute grounds for dismissal. Safeguarding the competitiveness of the company may provide the employer with grounds to make employees redundant,[7] but objective proof of an existing threat to the company's future must be produced. The 2006 judgment of the Cour de Cassation rules that a company may make employees redundant to prevent potential economic difficulties.[8] However, the employer must clearly identify the potential threats to the company in the medium run, which justify dismissing workers.

18. The implementation of new technologies constitutes grounds for making employees redundant, even if the company is not facing economic problems.[9] However, technological changes must be relatively significant to justify making redundancies. For instance, introducing a new software an employee is not proficient with would hardly be considered sufficient to warrant making this employee redundant, since training could be offered to this employee. The jurisprudence is however somewhat imprecise regarding the definition of sufficiently significant technological change.

2.1.2 Procedural requirements for dismissal for economic reasons

19. The redundancy procedure is subject to strict rules, defined primarily by the Labour Code and possibly supplemented by collective agreements. Dismissal for economic reason may be individual or collective (if ten or more employees are made redundant within 30 days), the procedure being slightly different depending on the number of workers that are made redundant. However, in both cases, the legal framework is designed to prevent employers from specifically targeting the employees they want to dismiss.

20. Before making an employee redundant, the employer must attempt to find another position for the employee within the establishment or within the company (Article L1233-4). For the redundancy to be motivated by a real and serious cause, the employer has to prove that no other position is suitable for the employee. If no attempt has been made to find another position for the employee (or if the employer fails to produce proof of this attempt), then the dismissal would be considered as invalid. Even after an employee has been made redundant, that worker must be given priority by the firm when it is hiring in the year following dismissal.

21. Regardless of the number of jobs that are destroyed, an order of layoffs (*ordre de licenciement*) must be defined, preventing employers from selecting directly the employees who are made redundant. The criteria defining the order of redundancy are set by collective agreements, or, in the absence of collective agreements, by the employer, after consulting with the works council or staff representatives. Even if there is no collective agreement regulating the order of layoffs, the Labour Code (Article L1233-5) specifies that when setting criteria for the order of layoffs the employer has to take into account four factors: family situation, job tenure, individual characteristics that may hinder

7. Cass. Soc., 5 avril 1995, Bull. civ. V, n° 123 : "lorsqu'elle n'est pas liée à des difficultés économiques ou à des mutations technologiques, une réorganisation peut constituer un motif économique si elle est nécessaire à la sauvegarde de la compétitivité de l'entreprise".

8. Cass. soc., 11 janvier 2006, n° 05-40.977.

9. Cass. soc., 9 octobre 2002, n° 9044.956.

re-employment prospects (such as age or disability), and professional qualifications by employment category. Professional qualifications must be objectively defined, and in event of a dispute, the employer may be asked by the judge to prove the objectivity of the criteria.[10] The objective of those criteria is to protect workers for whom displacement is likely to cause above average hardship (e.g. single parents, older workers, etc.). The criteria cannot include religion or race. Although more weight may be put on one (or some) of them, all criteria have to be taken into account.

22. The Labour Code does not specify how job categories should be defined. A judgement of the Cour de Cassation states that all the employees performing similar activities which entail common professional qualifications are considered to belong to the same job category.[11] In the event of a dispute, the judge has to assess whether job categories are too narrowly defined, since defining job categories narrowly may be a way to target a particular employee.

23. Dismissed workers are entitled to a severance payment which depends on the job tenure. Employees with more than one year of tenure are entitled to a severance payment equal to at least two tenths of monthly wage per year of tenure. Those with more than ten year of tenure receive a supplement of two fifteenths of monthly wage per year of tenure above ten.

2.1.3 Disputing the dismissal

24. The dismissed employee can contest the validity and regularity of the dismissal before the Conseil des Prud'hommes within the 12 months following the dismissal. The procedure can be long (up to two years in Paris for instance). It can also be costly for the employer if the dismissal is found to be unjustified, as, in this case, the dismissal is made invalid and the employer compelled to re-integrate the employee and pay him the wages he missed owing to the dismissal.

2.2 Identifying displacement in the French Labour Force Survey

25. We use 2003-2011 data from the French Labour Force Survey (*Enquête Emploi en continu*) to study the incidence and the short and medium term consequences of job loss. This survey provides information on a wide range of labour market outcomes. It is used, inter alia, to compute unemployment rates using the ILO definition. Since July 2001, the survey takes place quarterly and data are collected throughout the quarters. The sample is made up of homes. All people living in the households are surveyed, but only those aged 15 or over are actually interviewed. A sixth of the sample is renewed each quarter, which means that each household is surveyed up to six times. Since individuals are surveyed for up to six times during six consecutive quarters, the survey may be used to analyse labour market transitions and individual career paths, albeit over a relatively short period of time. The length of the panel can be extended by also making use of the retrospective calendar. By combining retroactive questions and the longitudinal dimension of the *Enquête Emploi* data, individuals can be tracked for up to 10 quarters.

26. The main advantage of this dataset is to provide a wide array of information about socio-demographic backgrounds of the individuals, as well as a number of indicators of job quality. The main shortcomings of these data are the relatively short duration of the panel and potential biases due to attrition and measurement error (e.g. in reported wages). In addition, as wages are reported only at the first and the last interviews, the pre-displacement wage of employees displaced before the first interview is unknown. Therefore, some estimation methods, such as the differences-in-differences method (DiD) cannot be implemented using the full sample and must be restricted to displacement

10. Cass. Soc., 3 avril 2002: RJS 2002, n°797.

11. Cass. Soc. 13 février 1997: Bull. civ. 1997 ,V n°63.

events that occurred between the first and the last interview. Even working with this restricted sample, the application of DiD is limited by the fact that a maximum of only two earnings values are observed for each worker and these two observations are always measured after a delay of 5 quarters, limiting the possibility to analyse how the earnings impact of displacement changes as the time since displacement varies. Accordingly, we place considerable emphasis on the estimation results from cross-sectional specifications that do not include individual fixed effects, but which do allow a fuller analysis of the time profile of the impacts of displacement. While the cross-sectional specifications are potentially subject to selection biases, due to uncontrolled heterogeneity, we provide considerable evidence that the resulting bias appears to be small in this data set. When feasible, we also compare estimation results using the two estimation methods. See Appendix A for further detail on the data source and descriptive statistics. In particular, Table A2 presents baseline characteristics and outcomes of displaced and non-displaced workers.

27. The displacement definition used here is based on the reasons that individuals report for separating from their previous job. Unlike the older version of the *Enquête employ* used in Lefranc (2003), all individuals, regardless of their labour market status, are asked about the reason for separation from their previous job. Respondents are explicitly asked about the legal tool used to breach their previous job's employment contract. Individuals reporting having been dismissed for economic reason are identified as displaced, since they have experienced an involuntary separation resulting from operating decisions of the employer. Using data from 2003-2011, we identify 2,364 individuals as displaced, of whom 1,209 were made redundant during the interview period. The remaining individuals are identified thanks to the retrospective calendar (see Appendix A for more detail). Dismissal for economic reason is a legal category that corresponds to a relatively narrow concept of displacement. Since dismissing workers for economic reason is costly for employers (because of severance payments and potential disorders related to implementing redundancy plans), the workforce is likely to be adjusted using other means, such as implementing voluntarily separation plan, or decreasing the number of temporary workers, whenever possible. Those other forms of workforce adjustments are difficult to capture in this data source, since the true motive for the job separation is unobserved. Therefore, this study focuses on workers who were specifically dismissed for economic reason. Owing to the strict legislation regulating dismissal for economic reasons, economic hardship or technological changes are likely to be the underlying cause of the job separation for those individuals. However, one must keep in mind that some job separations caused by economic difficulties are not identified.

2.3 Potential data issues

28. In the following, we examine the two main issues that are generally related to survey data: attrition and measurement error.

2.3.1 Analysing attrition

29. Because information on wages is available only at the first and last interviews, the sample is restricted to the individuals who are surveyed for six consecutive quarters. Around half of those permanently employed one year before the first interview are not surveyed for six consecutive quarters. Attrition in the labour force survey is primarily driven by people who move, as the sampling unit of the labour force survey is not individuals but homes (i.e. specific addresses).

30. Attrition decreases the sample size, thereby reducing the precision of the estimates. In addition, attrition may also be selective, i.e. the characteristics of the individuals remaining in the panel may differ systematically from the characteristics of those who drop out. Differential attrition may bias the estimates and thereby threaten the validity of the results. If the attrition decision among those who have been made redundant is correlated with characteristics influencing their labour market

prospects, then the estimates of the effects of job displacement on career outcomes will be biased. For instance, it might be the case that the most educated displaced workers have better job prospects than other displaced workers and are also more likely to move to another area in order to get a new job. If so, then less-educated workers will be overrepresented in the post-attrition sample of displaced workers and the adverse effects of displacement on career outcomes would be overestimated.

31. The amount of bias depends on the magnitude of attrition and the selectivity of attrition. Jauneau and Nouël de Buzonnière (2011) find that attrition in the French Labour Force Survey is mainly driven by the age of the respondent, their housing status, and whether the house in located in urban or rural area. Attrition affects most young people (aged below 25). As many in this age group are either students or temporary workers, they are more likely than older people to move house and thereby to drop out of the survey sample. However, the attrition pattern may be different in our sample, as it is restricted to permanent workers who are typically older than age 25.

32. To test whether there is selective attrition among displaced and non-displaced workers, a binary variable equal to one if the individual is surveyed six times and thus remains in the sample is regressed on a set of socio-demographic, job and housing characteristics, as well as an indicator equal to one if the individual has been made redundant last year and interactions of this indicator with the other covariates. The estimation sample consists of persons employed on a permanent contract one year before they were surveyed for the first time. More formally, the following regression equation is estimated:

$$Stayer_i = \alpha + \beta D_i + X_i\gamma + (D_i \times X_i)\delta + \varepsilon_i$$

where D_i is a binary variable indicating whether the individual was dismissed for economic reasons during the prior year and X_i is a vector including socio-demographic, job and housing characteristics, region dummies and year fixed effects.

33. Results are reported in Table B1 (see Appendix B). Overall, results presented in Table B1 suggest that attrition is unlikely to be a major source of bias, since there is virtually no differential attrition among displaced and non-displaced workers for the characteristics that past research suggests are most associated with employment outcomes, i.e. gender, age, education and occupation,. In other words, displaced workers' attrition propensity is not affected differently by gender, age, education, and baseline occupation as non-displaced workers'. Therefore, attrition is unlikely to be a major threat to the robustness of the results presented in this study.

2.3.2. Comparing displacement rates in survey and administrative data

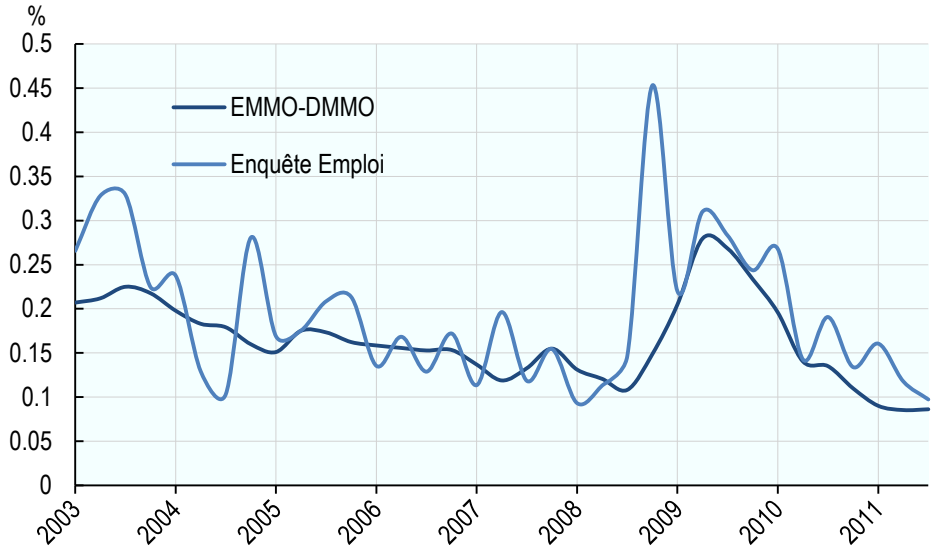
34. In the following, we compare the quarterly separation rate computed using the Labour Force Survey restricted to those who are interviewed for six consecutive quarters to the official figures published by the DARES, the statistical service from the Ministry of Labour. The DARES computation is based on exhaustive administrative files recording all job separations and creations for companies with ten or more employees.[12]

35. As displayed in Figure 1, the estimates of job loss rates computed using the sample restricted to those interviewed for six consecutive quarters in the French Labour Force Survey have a similar magnitude and follow the same trend as the official figures provided by the Ministry of Labour, suggesting that neither self-reporting nor attrition strongly bias our results. The *Enquête Emploi* estimates are more noisy at the beginning of the period than after 2005 because the number of

12. DMMO records all job separations and creations for the companies with 50 or more employees; EMMO for companies with 10 or more but less than 50 employees

observations were lower in 2003 and 2004 than in the subsequent years.[13] The main difference in the rates yielded by administrative and survey data is the spike in the latter in the fourth quarter of 2008. This is when a new way to breach the employment contract on the joint initiative of the employer and the employee, the *rupture conventionnelle du contrat de travail* was introduced. However, the *rupture conventionnelle* du contrat de travail was introduced in the labour force survey as a reason for leaving your job only in 2009. It is possible that, in the absence of an appropriate category, some employees whose contract was breached by a rupture *conventionnelle* reported having been dismissed for economic reasons.

Figure 1**. Rate of dismissal for economic reasons in survey and administrative data**



Note: The base sample include all permanent employees working in private and public companies with 10 or more employees in a given quarter. Those who were dismissed for economic reasons the next quarter are identified as displaced. Weighted estimates.

Source: Enquête Emploi and EMMO-DMMO

2.3.3 Measurement errors

36. Comparing the information on wages of the labour force survey with tax data, Hagneré and Lefranc (2006) find that cross-sectional information on monthly wages are reliable and accurate.[14] Declared wages are very close to the true value reported in the tax file. Consequently, the bias due to measurement error is likely to be negligible when using cross-sectional models. However, the variation in wages for job stayers (i.e. the difference in wages reported in the first and last interviews) is more imprecisely estimated than the level of wages. Therefore, one must be careful when interpreting the results of regressions measuring the change in wages between the first and last interviews, as in the difference-in-difference models discussed in Section 5, below.[15]

13. The sample size of the Labour Force Survey has been steadily increasing since 2003

14. A fraction of the labour force survey -containing those interviewed in the last quarter of each year- is matched with tax data. The resulting dataset is called textit Enquête sur les revenus fiscaux et sociaux

15. Hagneré and Lefranc (2006) restrict their sample to those who have not changed jobs over the interview period.

37. One crucial question is whether individuals report correctly how they left their previous job. International studies show that displaced individuals who get back to work rapidly without experiencing any earnings loss tend to declare that the reason they left their previous job was to move to a better job. However, in France casual evidence suggests that, for permanent workers, who benefit from high employment protection, job loss is generally a highly significant experience that is not easily forgotten. Moreover, in the French Labour Force survey respondents are not asked about the reason they left their previous job but about the legal tool used to breach the employment contract, thereby limiting the bias due to post-displacement situation.

3. The Incidence of Job Loss

38. As shown by Figure 1 in the previous section, the incidence of dismissal for economic reasons is highly cyclical. A surge in job separations due to dismissals for economic reasons is observed during the recent downturn. Interestingly, there is also some tendency for quarterly rates of dismissal for economic reason to fall over time (apart from the spike during the crisis). This does not necessarily mean that there is a downward trend in displacements of permanent workers. Even though part of the decrease could be due to employers shifting an increasing share of labour demand shocks onto temporary workers, the decrease in dismissals for economic reasons can be driven by employers exerting increasing pressure on workers to accept another form of contract termination, in order to avoid the legal complexities of dismissing workers for economic reasons.

39. Some workers have a greater risk of being dismissed for economic reasons than others. The probability of being dismissed for economic reasons may be expressed as the probability of working in a firm facing economic difficulties or technological change times the probability of being selected to be dismissed when employed in a firm that is restructuring:

$$P(D = 1) = P(Ec = 1) \times P(D = 1|Ec = 1)$$

where $D = 1$ if the individual was made redundant, $Ec = 1$ if a worker is employed in a company implementing a restructuring plan. This relationship holds true only if $P(D) = P(D \cap Ec)$, which can reasonably be assumed since employees working in economically sound companies have a very low probability[16] to be dismissed for economic reason.

40. We estimate a simpler specification relating the probability a permanent worker is displacement to a number of observable characteristics of that worker and the initial job. While it would be instructive to decompose the displacement risk into the two components defined above, this is not possible using the information provided by the *Enquête Emploi*. Whereas $P(D|Ec = 1)$ could be modelled based on the criteria used to define the order of dismissal (see section 2.1), the economic health of the firm the worker is working for and hence $P(Ec)$ cannot be directly observed.[17]

41. As reported in Table 1, OLS and probit models yield very similar estimates, both in term of direction and magnitude.[18] The factors that matter most in determining a worker's probability of being

16. Although no evidence can be produced about the economic health of the firm, the legislation regulating dismissal for economic reasons suggests that companies that are not facing economic difficulties nor technological change cannot easily dismiss workers for economic reasons.+-

17. This may help to explain why the R-squared is low in Table 1, although that also reflects the difficulty of predicting low probability events.

18. The marginal effect of the probit model is computed for workers with less than five years of job tenure, working as machine/plant operators in the manufacturing sector, who are male, aged 35-44 and single with vocational secondary education.

made redundant are age, education, industry and job tenure. Women are more likely to be dismissed for economic reasons than men, even once other personal and job characteristics are controlled for. Similar results are found in Denmark, Finland, Korea and the United States in OECD (2013).

Table 1. **The effect of demographic and job characteristics on the risk of job displacement**

	(1) OLS		(2) Probit (marginal effect)	
	Coefficient	Robust standard error	Coefficient	Robust standard error
Women	0.000582**	(0.000270)	0.00123**	-0.00052
Less than 25 vs 35 to 44 years old	-0.00234***	(0.000473)	-0.00353***	-0.00104
25 to 34 vs 35 to 44 years old	-0.000101	(0.000350)	0.0000506	-0.000715
45 to 55 vs 35 to 44 years old	0.000605*	(0.000335)	0.00131	-0.000809
More than 55 vs 35 to 44 years old	0.00183***	(0.000472)	0.00486***	-0.00146
Foreigner	0.000793	(0.000562)	0.00135	-0.00105
Married vs. single	-0.000462*	(0.000277)	-0.000961	-0.000589
Widowed vs. single	0.000139	(0.00107)	0.000251	-0.00214
Divorced vs. single	0.00113**	(0.000501)	0.00212*	-0.00109
Upper tertiary vs vocational secondary	-0.00124***	(0.000479)	-0.00231**	-0.000964
Short tertiary vs vocational secondary	-0.00131***	(0.000392)	-0.00256***	-0.000791
Upper secondary vs vocational secondary	-0.000394	(0.000382)	-0.000883	-0.000723
Lower secondary vs vocational secondary	-0.000103	(0.000443)	-0.000223	-0.000902
Primary education vs vocational secondary	0.000255	(0.000350)	0.000513	-0.000714
Have at least one child	-0.000170	(0.000271)	-0.000454	-0.000573
Managers vs machine/plant operators	-0.00205**	(0.000921)	-0.00511**	-0.00258
Professionals vs machine/plant operators	-0.000205	(0.000431)	-0.000661	-0.000916
Technicians /assoc. prof. vs machine/plant operators	0.000628	(0.000411)	0.0014	-0.000905
Clerks vs machine/plant operators	0.000167	(0.000422)	0.00034	-0.000929
Services and sales workers vs machine/plant operators	-0.000648	(0.000515)	-0.00112	-0.000978
Agricultural workers vs machine/plant operators	-0.000150	(0.00112)	-0.000214	-0.00285
Craft and related sales vs machine/plant operators	-0.00284***	(0.00110)	-0.00543**	-0.00241
Elementary occ vs machine/plant operators	-0.000771*	(0.000424)	-0.00137*	-0.000754
Agriculture vs. manufacturing	-0.00231***	(0.000828)	-0.00391***	-0.0015
Construction vs. manufacturing	0.000470	(0.000501)	0.000278	-0.00079
Wholesale/retail vs. manufacturing	-0.000638	(0.000392)	-0.00135*	-0.000691
Transport, comm. vs. manufacturing	-0.00235***	(0.000382)	-0.00413***	-0.00099
Finance/business vs. manufacturing	-0.00171***	(0.000359)	-0.00299***	-0.000766
Other services vs. manufacturing	-0.00332***	(0.000369)	-0.00529***	-0.00111
5 to 9 years of job tenure vs less than 5	-0.00156***	(0.000382)	-0.00243***	-0.000693
10 to 19 years of job tenure vs less than 5	-0.00260***	(0.000319)	-0.00391***	-0.000835
20 or more years of job tenure vs less than 5	-0.00372***	(0.000348)	-0.00515***	-0.00103
Year fixed effects	Yes		Yes	
Region fixed effects	Yes		Yes	
Observations	408,819		408819	
R-Squared	0.001		0.0295	

Note: The base sample includes all permanent employees working in private and public companies at a given quarter. Those who were dismissed for economic reason the next quarter are identified as displaced. Column 2 reports the marginal effect for the individual of reference. Robust standard errors in parentheses. Weighted estimates.

*** p<0.01, ** p<0.05, * p<0.1

Source: Enquête Emploi 2003-11.

42. Interestingly, displacement risk increases monotonically with age and declines monotonically with job tenure. Younger workers are, everything else equal (e.g. once job tenure is controlled for), less likely to be made redundant than prime age employees. Results suggest, at a given level of job tenure, that older workers are much more at risk than all younger age groups. However, older workers generally have greater job tenure than younger workers and therefore are, on average, less likely to be dismissed for economic reason than younger workers, who typically have shorter tenure. That said, older workers with short job tenure are particularly at risk of being made redundant when a redundancy plan is implemented. This might indicate that older workers are more likely to be affected by technological changes than younger employees. In addition, older workers may be more willing to accept to be made redundant than younger employees, since they are entitled to receive relatively generous unemployment benefits[19] for two years while not being required to actively search for work, a potentially attractive transition to retirement. It may therefore be easier for employers to dismiss older employees than prime age and younger workers, who may be more inclined to sue their employer or go on strike.

43. Table 1 shows that education protects from being made redundant. One possible explanation why, all things being equal, workers with tertiary education are less likely to be made redundant than less educated workers is that tertiary educated workers may be better at adapting to technological change than less skilled workers. When a job is destroyed, the labour code specifies that the employer must attempt to find another position for the employee within the establishment or within the company. It may be easier to reallocate tertiary educated workers than less educated workers, as they have more generic skills than less educated workers.

44. As was already noted, long-tenure workers have lower chances to be made redundant than employees with shorter job tenure. This is partly due to the rules regulating dismissal for economic reason. The order of dismissal has indeed to take job tenure into account (see Section 2.1). Moreover, severance payment depends chiefly on job tenure. Consequently, the cost of dismissals for employers is larger for long-tenured workers than for recently hired employees.

4. Re-employment patterns after displacement

45. The length of the non-employment spell that generally follows displacement is a critical element of the cost of job loss. The longer it takes to displaced workers to get back to work, the larger is the cost associated with displacement, since, despite unemployment benefits, non-employment implies a substantial income loss and may be detrimental to workers' future employability. Future labour market outcomes may indeed be undermined by career breach and long periods of non-employment.

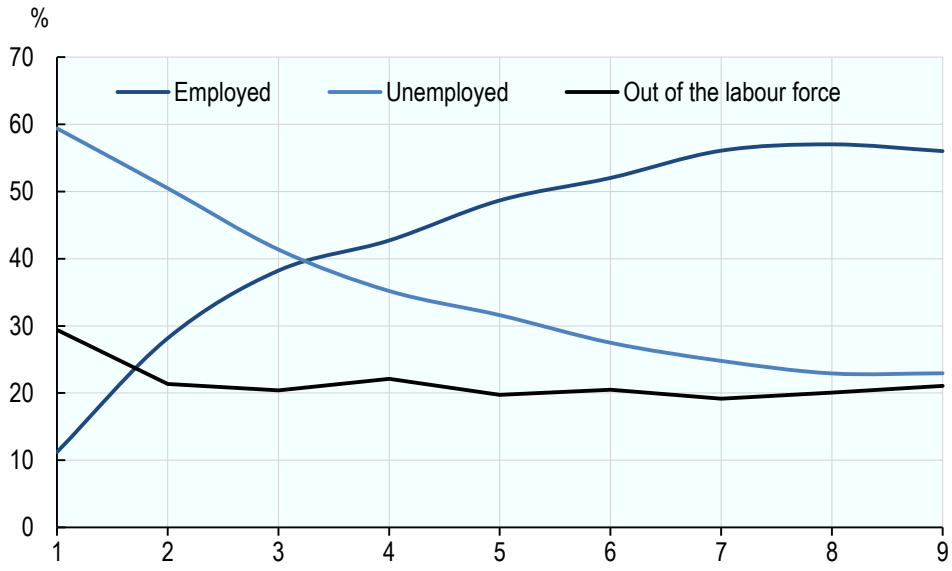
19. Unemployment benefits for workers who have been dismissed for economic reasons, if they benefit from a convention de reclassement personnalisé (personalised redeployment agreement), amount to 80% of their gross wages - up to 6,161 euros per month- for the first year

4.1. Labour market status after displacement

46. Related research has shown that employment rates of displaced workers are low in France compared with their counterparts in other OECD countries (OECD, 2013). In France 40% of displaced workers are re-employed within a year, compared with more than 70% in Australia, 60% in New Zealand, 55% in the United States and around 50% in Canada, Korea and Russia. Two years after job loss, the unemployment rate among displaced workers is over 20%, that is, more than twice as much as the national average. The share of individuals who have left the labour force remains fairly constant, around 20%. As will be seen, older worker have relatively poor re-employment opportunities and, consequently, many of them just wait to reach the legal age for retirement rather than actively looking for a new job.

47. Figure 2 provides additional information re-employment prospects following job loss by displaying the evolution of shares of displaced workers in different labour force status in the nine quarters following job loss. In the first quarter following displacement, 59% report being unemployed and 29% are inactive, while 11% have already moved into a new job. By the fourth quarter, the employment rate has risen to 43%, mostly due to falling unemployment. By the ninth quarter following job loss the share who have become re-employed appears to be stabilising a little above 50%, while the shares unemployed and inactive have both converged to about 20%.

Figure 2. **Labour market status following displacement**



Note: Labour market status defined using the ILO definition of unemployment (weighted estimates).

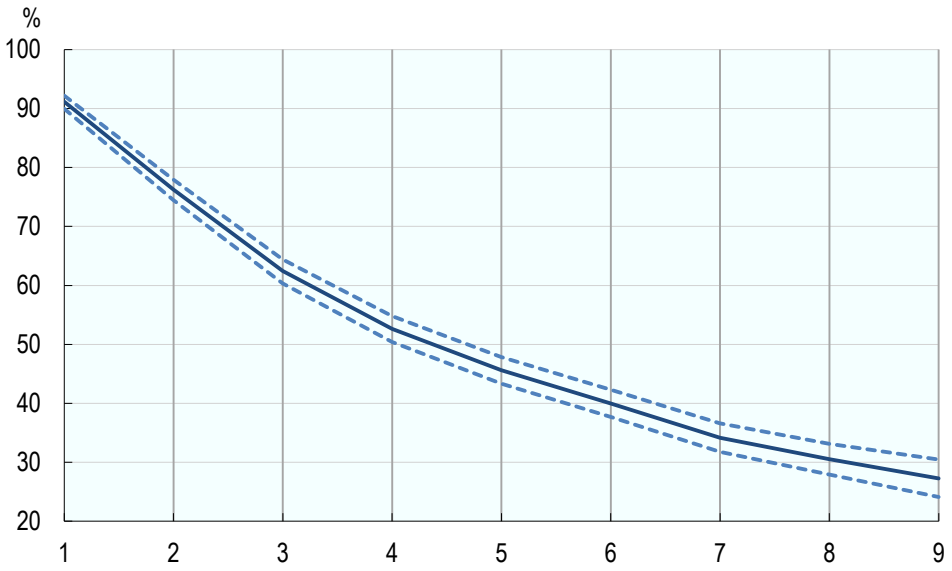
Source: Enquête Emploi (2003-11)

4.2. Non-employment spell duration

48. Duration models, which account for the fact that the sample is right-censored (i.e. the re-employment date is not observed for all individuals) are used to provide a more complete analysis of the length of time displaced workers remain out of work. Figure 3 shows on the vertical axis the proportion of displaced workers that are still out of work after a stated number of quarters following job loss. The Kaplan-Meier estimator measures the length of time people remain out of work after job loss. As displayed in Figure 3, the median duration of non-employment following displacement is around one year. In addition, more than a quarter of displaced workers are out of work for at least two

years. Long non-employment spells are particularly detrimental for future labour market prospects, as long-term unemployed risk to lose touch with the labour market.

Figure 3. **Kaplan-Meier survival estimate of joblessness duration**



Note: Kaplan-Meier survival estimate. Non-employed include unemployed jobseekers and people out of the labour force.

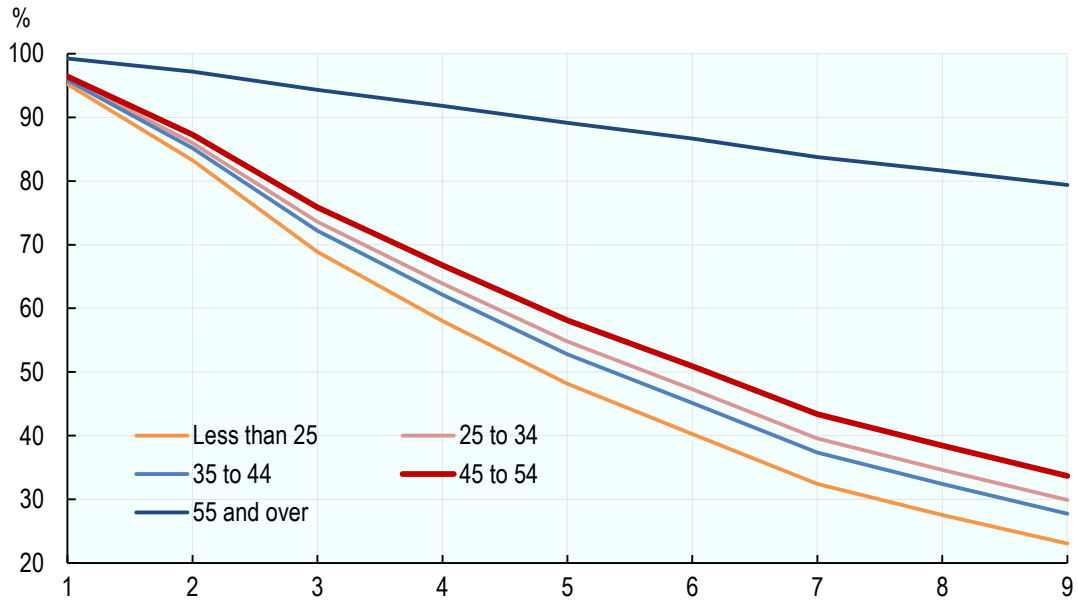
Source: Enquête Emploi (2003-11)

49. The length of the spell of non-unemployment following redundancy is likely to be influenced by certain socio-demographic characteristics and previous labour market experience. In order to estimate how the duration of non-employment differs between different socio-demographic groups, a semi-parametric proportional hazard model is used. The main advantage of the Cox model is that it does not rely on any assumption about the functional form of the baseline hazard rate. Independent variables include socio demographic and previous job characteristics and a binary variable referring to whether the individual receives unemployment benefits. (See Table C1 in Appendix C for detailed regression results.)

50. While men and women face similar re-employment prospects once other socio-demographic and previous labour market experience are controlled for, Figure 4 shows that age has a significant effect on the speed of re-employment. There is little difference in the re-employment speed of workers aged less than 55 years, though youth (aged less than 25 years) tend to get back to work slightly more rapidly than other age groups. By contrast, workers aged 55 years or more, have very low re-employment rates. One year after job loss, only 10 percent of this group is re-employed. After two years, the employment rate is only around 20 percent. The poor re-employment prospects of older displaced workers is particularly worrying in light of the need to increase the effective age of retirement. As was noted above, the unemployment benefits system is particularly generous for older unemployed: those aged 57 years old and over can receive unemployment benefits even when they are not actively looking for work.[20]

20. The Dispense de recherche d'emploi was introduced in 2008

Figure 4. **Age and joblessness duration**



Note: Fitted survival curves based on a Cox proportional hazards model. The estimates are reported in Annex table C4. Independent variables include socio-demographic and former job characteristics, as well as the size of the town of residence and year and region fixed effects. The individual of reference is a man, with upper secondary education, living with a partner in a big city, who used to work as an unskilled employee in the manufacturing sector and is, or was, eligible to unemployment benefits. See Appendix A3 for complete estimations results. Weighted estimates.

Source: Enquête Emploi (2003-11)

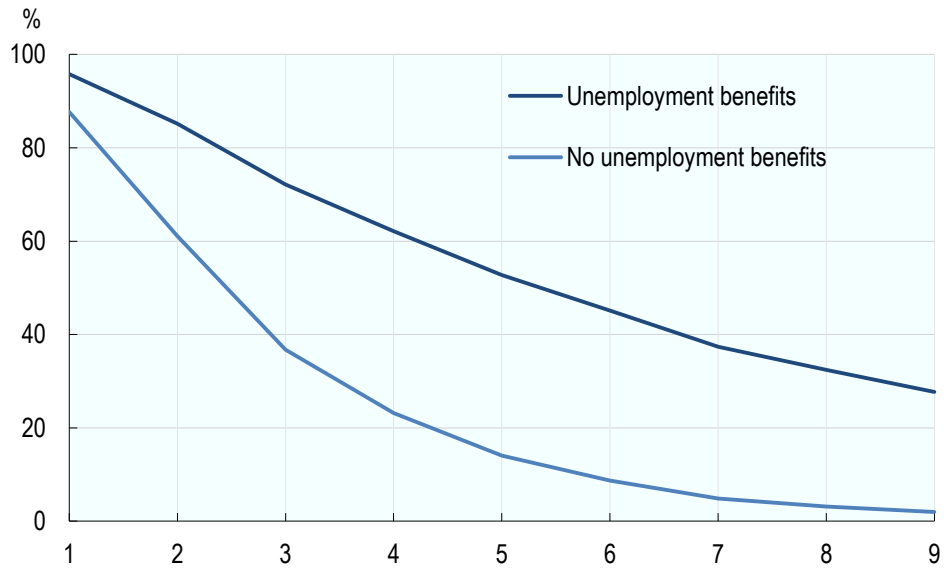
51. Women with children tend to have lower re-employment rates. In any given quarter, women with children are on average 25% less likely to get back to work than women without children, all things being equal. One reason for re-employment prospects to be poorer for women with children than without children is that the cost of getting back to work is larger for mothers than for other women without child. However, there is another factor that may drive this result. Women willing to leave the labour force to look after their children might be more likely to be dismissed for economic reason than women who preferring to keep working, inasmuch as when collective dismissal plans are implemented it is generally possible for some employees to volunteer to leave the company with generous severance payment. The degree of labour market attachment is unfortunately unobserved, making causal inference difficult, since the relationship between fertility and labour market participation are complex. The main issue in measuring the impact of the number of children on female labour supply is that fertility decisions and labour market participation are jointly determined, making the identification of a causal impact rather challenging.

52. Not all displaced workers are eligible for unemployment benefits. To receive unemployment benefits, displaced workers must have been working at least six months over the previous 22 months, if the job loss occurred before April 2009. Those who were made redundant after April 2009 must have worked for four months over the previous 24 months if aged less than 50, 36 months if aged above 50. In addition, some those eligible to unemployment benefits may not claim the benefits for a variety of reasons. For instance, those with better labour market prospects may chose not to claim unemployment benefits, as they expect to get back to work very quickly.

53. Figure 5 shows that spell of non-employment experienced by displaced workers who receive unemployment benefits tend to be longer compared to that of those who do not. The median duration

of non-employment spell that follows displacement is two quarters and half for those who do not receive any unemployment benefits while half of those receiving unemployment benefits remain non-employed for more than five quarters.[21]

Figure 5. **Unemployment benefits and joblessness duration**



Note: fitted survival curves based on a Cox proportional hazards model. The estimates are reported in Annex table C4. The main variable of interest is a binary variable indicating whether individuals receive unemployment benefits. Independent variables include socio-demographic and former job characteristics, as well as the size of the town of residence and year and region fixed effects. The individual of reference is a prime age man, with upper-secondary education, living with a partner in a big city, who used to work full-time as an unskilled employee in the manufacturing sector. Weighted estimates.

Source: Enquête Emploi (2003-11)

54. Standard economic theory suggests that unemployment benefits may have detrimental effects on re-employment rates. Since the reservation wage is higher when receiving benefits, job seekers would tend to reject low quality job offers. Unemployment benefits may also undermine incentive to look for a job, but benefits entitlement is (in principle) conditional on the recipients looking actively for work and the duration of benefits is limited to one or, in some cases, two years. While getting back to work rapidly is generally considered a positive outcome, rapid re-employment may be sub-optimal if it results in poor matches and workers' skills are underused on the new job. The income derived from unemployment benefits may allow job seekers to search longer for work and eventually move to jobs that better suit their skill-set. The improved quality of matching may outweigh the social cost generated by longer unemployed spells.

55. In the results reported in Figure 5, it is also difficult to disentangle causal and selection effects. While eligibility criteria have some elements of randomness (the six/four months threshold), the decision to claim benefits for those eligible is highly endogenous, in the sense that it is very likely to be determined by factors influencing labour market outcomes. For, instance, individuals expecting

21. These values refer to a reference person who is a prime-age male with an upper-secondary education living with a partner in a big city, who used to work full-time as an unskilled employee in the manufacturing sector.

to get back to work very quickly may decide not to claim unemployment benefits, even though they are entitled to them.

56. As a robustness check, the Cox proportional hazards model was re-estimated restricting the sample to those with less than one year of tenure in their previous jobs. Workers with less than six months of job tenure (four after 2009) have significantly lower chance to receive unemployment benefits, as they would be eligible only if they had been working prior to the job they lost and have not received unemployment benefits in the period between the two jobs. Workers with more than six months of job tenure are eligible to receiving unemployment benefits, and therefore are much more likely to get unemployment benefits than lower tenured workers. Limiting the sample to those with less than 12 months of job tenure is a way to reduce unobserved heterogeneity between those who claim unemployment benefits and those who do not. Results are presented in Figure C1 (See Appendix C). Although the difference in the non-employment duration between those who receive unemployment benefits and those who do not is lower than when the sample is not restricted to low-tenured workers, there is evidence that those who get unemployment benefits tend to remain unemployed longer than those who do not.[22]

5. Understanding the earnings losses of displaced workers

57. Previous research has shown that workers dismissed for economic reason may suffer large and long-lasting earnings losses, due both to the sometimes long spells of non-employment examined above and also to lower wages once re-employed and shorter hours. This section analyses overall earnings losses and shows that re-employed displaced workers in France earn 15-20% less per month than had they not been displaced. This result is found to be robust across a range of methodological approaches.

5.1 Measuring the impact of displacement

58. One of the main purposes of this analysis is to estimate the impact of redundancy on various aspects of job quality, including earnings, hourly wage rates, working-time arrangements, job insecurity and paid leave entitlement. This involves answering the counterfactual question: what would have been the worker's employment situation had she not been displaced? More precisely, as the full impact of displacement includes the decrease in job quality prior to job loss due to the firm's misfortune, the most appropriate counterfactual would be the outcome that would have been observed had the worker's firm not experienced economic difficulties and ultimately displaced that worker. Theoretically, the individual effect of displacement may be written as:

$$\beta_i = y_i(1) - y_i(0)$$

where $y_i(1)$ is the outcome if the individual has been made redundant while $y_i(0)$ is the outcome if the individual has not been made redundant. Of course, each worker is only observed in one of the two states, so that we have to construct a counterfactual value for the unobserved outcome

59. The simplest way to estimate the impact of displacement is to compare workers' outcomes before and after displacement. More formally, we have

22. Additional estimation methods, such as Regression Discontinuity Design or Instrumental Variable, could be implemented to further explore the causal impact of unemployment benefits on the duration of non-employment spell following displacement, but this is not the primary focus of the present analysis.

$$\beta = E(y_i|D = 1, T = 1) - E(y_i|D = 1, T = 0)$$

where $D = 1$ if the worker has been, or is going to be, displaced, and $T = 0$ in the baseline period and T = 1 in the period following displacement. This model is likely to underestimate the change in job quality outcomes caused by displacement, as job quality in their previous jobs would probably have risen, had they not been dismissed for economic reason. Similarly, other aspects of job quality are expected to improve over time, as unsatisfied workers may choose to move to another job. In addition, displacement occurs mostly when the company the employee is working for goes through economic hardship. The poor economic health of the firm is likely to impact workers' job quality outcomes in the quarters prior to displacement (Jacobson et al., 1993). Unless pre-displacement outcomes can be observed long before displacement, the first-difference estimator would be biased toward understating the impact of displacement, inasmuch as the decrease in job quality prior to displacement due to the firm's misfortune is considered as one of the effects of displacement.

60. Another way to measure the change in employment outcomes resulting from displacement is to compare displaced workers' outcomes to those of non-displaced workers. The main issue with the cross-sectional comparison is that the likelihood of being dismissed for economic reasons is not the same for all workers. Simple mean comparisons are likely to be biased since displaced and non-displaced workers may have different characteristics that affect the outcomes of interest. However, assuming that the characteristics that drive both displacement likelihood and job quality outcomes are observed, the impact of displacement could be written as:

$$\beta = E(y_i|X, D = 1, T = 1) - E(y_i|X, D = 0, T = 1)$$

61. However, this formulation still runs up against the problem that the second term on the right-hand side of this equation is not observed for displaced workers. The challenge is thus to construct a comparable sample of non-displaced workers that can be used to estimate the second term, and hence the difference which would then represents the <u>average</u> effect of displacement, rather than the individual effect for any specific displaced worker.

62. Controlling for observed characteristics is a way to construct counterfactual outcomes using the group of non-displaced workers. However, even when observed heterogeneity is controlled for, displaced and non-displaced workers may still have different unobserved characteristics that affect displacement propensity as well as job quality outcomes. A difference-in-differences approach can be used to rule out time-invariant heterogeneity. The impact of displacement is now estimated by the difference in outcomes between displaced and non-displaced workers in the baseline period subtracted from the difference in the post-displacement period:

$$\beta = [E(y_i|X, D = 1, T = 1) - E(y_i|X, D = 0, T = 1)] - [E(y_i)|X, D = 1, T = 0) - E(y_i)|X, D = 0, T = 0)]$$

63. In other words, the change in outcome among displaced workers is compared to the change in outcome among non-displaced workers. An unbiased estimate of the impact of displacement is identified only if there would have been no difference in the earnings movements of displaced and non-displaced workers in the absence of displacement, that is, if displaced workers' earnings would have evolved in the same way as non-displaced workers had they not been made redundant. This assumption is likely to hold only if pre-displacement outcomes are observed during a sufficiently long period before displacement and are controlled for in the estimation. Since the pre-displacement history observable in the data used here is very limited, it probably is not possible to fully control for selection effects into displacement. As a result, the difference-in-differences (DiD) estimates reported below are likely to understate the impact of displacement, although to a lesser extent than would estimates based on the first-difference model. As is explained below, the usable sample for estimating the DiD estimator is also smaller than the sample available to estimate the cross-sectional model described

above and it is not possible to examine the time profile of the earnings impact with this estimator in this data set. Accordingly, we adopt the cross-sectional model as our basic specification, while using the DiD estimates as a robustness check.

5.2 Empirical results

64. For the reasons discussed above, the bulk of studies examining the effects of displacement on earnings use difference-in-differences approach, following Jacobson *et al.* (1993). Unfortunately, the structure of the dataset used here, which was constructed from the French Labour Force Survey, takes the form of a short and rather sparse panel that is not well suited to estimating the DiD model. The most fundamental problem is that there is no information on wages in the retroactive questions, so that the pre-displacement wages of individuals dismissed before the first interview (i.e. identified as displaced using the retrospective calendar) remain unknown. Consequently, the difference-in-differences method cannot be applied to the entire sample.[23] In order to examine the short and medium run effects of displacement, the following cross-sectional regression equation is estimated using OLS:

$$y_{it} = \alpha + \sum_{k=-4}^{9} \beta_k D_{it}^k + \sum_{k=-4}^{9} \gamma_k C_{it}^k \quad + X_{it}\theta + \varepsilon_{it}$$

where y_{it} stands alternately for: (i) monthly wages,[24] defined as earnings when employed (i.e. excluding zero earners from the sample); (ii) earnings, defined as wage earnings whether employed or not (i.e. including zero earners in the sample); and (iii) income, defined as wage earnings, whether employed or not, plus unemployment benefits. D_{it}^k is a set of binary variables measuring the time distance t to the occurrence of displacement. $D_{it}^k = 1$ if, in period *t*, worker *i* had been made redundant k quarters earlier, where *k* ranges from -4 to 9.[25] The β_k capture the effects of displacement on earnings and wages, *k* quarters following its occurrence. C_{it}^k is a set of binary variables for each quarter in the cohort, so that the γ_k capture the wage patterns of non-displaced workers.[26] X_{it} includes socio-demographic characteristics (age, gender, education, nationality, marital status, the size of the area of residency), baseline job characteristics (pre-displacement occupational status and industry sector, as well as working time arrangement), and region and year fixed effects. Individuals are interviewed for six consecutive quarters, but wages are only observed twice, in the first interview and five quarters afterwards in the last interview.

65. This cross-sectional model compares the wages of displaced and non-displaced workers in the pre- and post-displacement period, once observable heterogeneity is controlled for. All unobserved heterogeneity is captured by the error term, ε_{it}. OLS coefficients β_k are unbiased only if the error term is not correlated to displacement propensity, that is $E(\varepsilon_{it}|D_{it}^k X_i) = 0$. All variables that are not included in the controls are captured by the error term. If the probability of being made redundant is associated with characteristics that are correlated with earnings, then the estimate of the impact of displacement would be biased, unless those characteristics are controlled for. For instance, if less able employees are more likely to be made redundant than others, then OLS estimates would overestimate the wage loss caused by displacement. The model assumes that displaced and non-displaced workers have the same

23. However, DiD, estimated on the sample restricted to the dismissals that took place during the interview period (e.g. six quarters), will be used as a robustness check.

24. Or the logarithm of monthly earnings.

25. Note, however, that the panel that can be constructed from the Enquête Emploi is sparse in the sense that yit is observed for at most two values of k for any given individual, always five quarters apart.

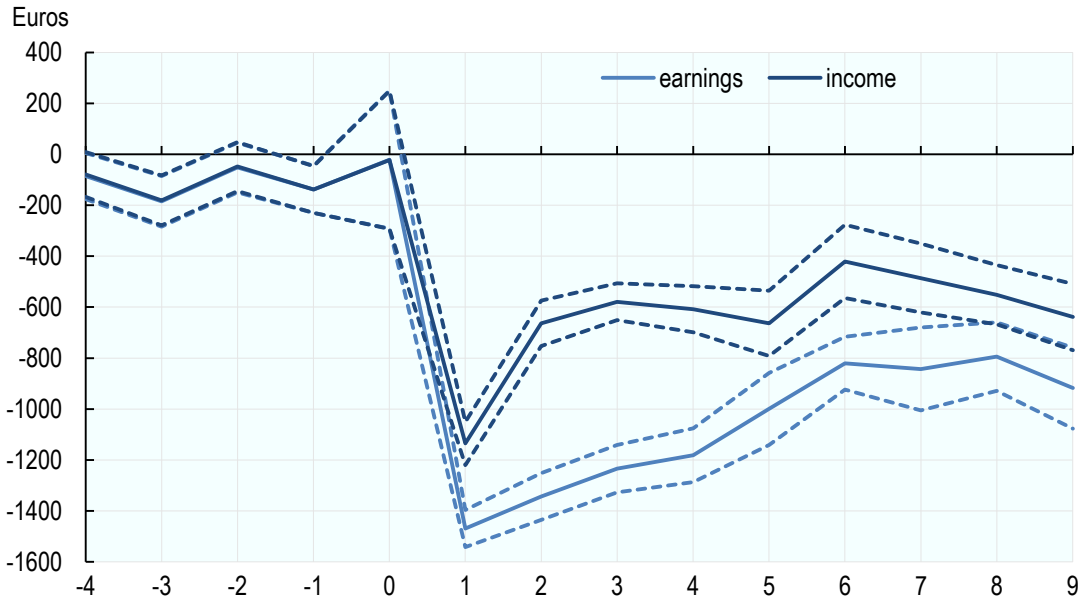
26. See Annex A for an explanation of how the estimation sample is constructed of multiple cohorts of displaced and non-displaced workers.

earning capability. The amount of bias depends on whether the unobserved characteristics driving selection into displacement are also influencing labour market outcomes.

66. There are reasons to believe that the amount of bias of OLS coefficient is relatively small in the dataset used here. First, the economic health of the firm may be deemed independent from workers' unobserved characteristics. Economic shocks affecting firms are unlikely to be caused by workers characteristics. Even if that is so, it remains possible that the most able workers would leave a firm that is facing strong economic difficulties. However, it is costly for French workers to resign when their firm is facing economic difficulties, as workers who resign forfeit their entitlements to unemployment benefits and severance payments. As for which workers are made redundant, the legal framework regulating dismissal for economic reason is designed to prevent employers from selecting directly the employees who are to be dismissed, as has been seen in section 2. Before presenting a range of robustness checks the remaining of this section presents the core estimation results.

67. Figure 6 shows that displaced workers suffer a significant loss of earnings that is only partially compensated by unemployment benefits. Before displacement, displaced and non-displaced workers earn similar wages, once socio-demographic and baseline job heterogeneity is controlled for, supporting the idea that, conditional on socio-demographic and baseline job characteristics, displacement may deem to be exogenous. The small shortfall in pre-displacement earnings, as compared to the control group, could be due to the impact of the firm's economic misfortune on workers' monthly wages. Indeed, one would expect workers employed in firms facing economic difficulties to work shorted hours and receive smaller bonuses than otherwise comparable workers employed in economically sound firms.

Figure 6. **Earnings changes before and after displacement**



Note: Cross-section estimates. Income includes wages and unemployment benefits. Zero earning are included. Baseline monthly wages (i.e. at t = 0): 1,757 Euros. The coefficients of a set of binary variables indicating the distance to displacement event are graphed. The control group includes those employed on a permanent contract in the baseline quarter and who have not been dismissed for economic reason. Independent variables include socio-demographic and baseline jobs characteristics, year and region fixed effects. Weighted estimates. 95% confidence intervals are graphed.

Source: Enquête Emploi (2003-11)

68. The fall in wages after displacement is very sharp and its evolution follows more or less the re-employment pattern of displaced workers discussed above. Though unemployment benefits mitigate the fall in income resulting from displacement, displaced workers' incomes are still significantly lower than those who were not made redundant. Two years after displacement, on average, displaced workers receive 500 euros less per month than non-displaced workers, even once unemployment benefits are included. Severance payments partly compensate the income loss caused by displacement, but they are generally small compared with the wage and earnings loss associated with displacement, except perhaps for very long-tenured workers[27].

69. Wage and earnings losses are partly driven by the long non-employment spells that typically follow displacement (see Section 4 above). Unsurprisingly, displacement has a strong impact on workers' probability of being employed in the quarters immediately following displacement. The impact of job loss on employment rate, by comparison with a control group of non-displaced workers, is estimated using the following regression:

$$y_{it} = \alpha_i + \sum_{k=-4}^{9} \beta_k D_{it}^k + \sum_{k=-4}^{9} \gamma_k C_{itk} + X_{it}\theta + \varepsilon_{it}$$

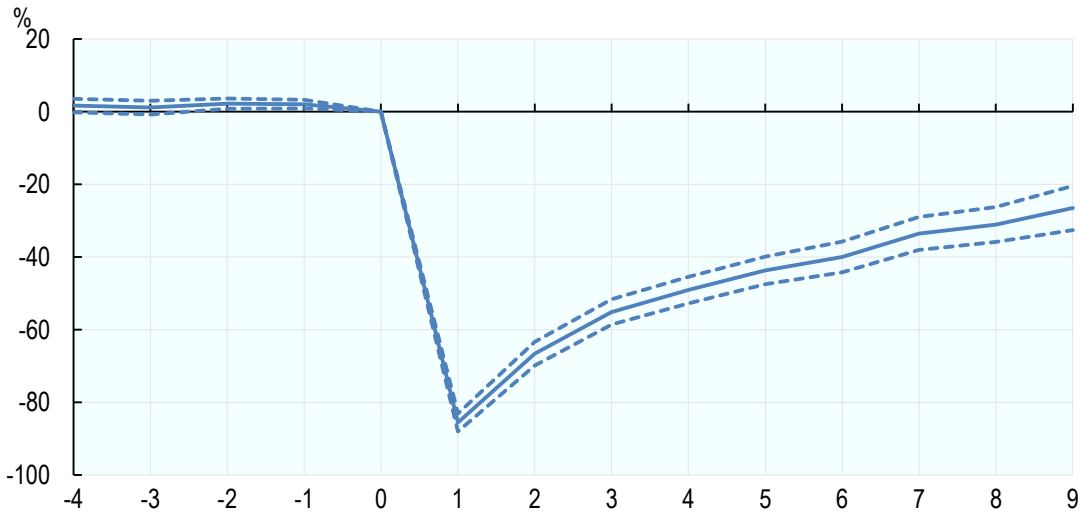
70. The only difference with the model used to estimate the earnings impact of displacement is that this regression includes individual fixed-effects α_I.[28]

71. Results are reported in Figure 7. In the quarters prior to displacement, there is no difference in employment rate between displaced and the control group of non-displaced workers. Unsurprisingly, displacement entails a massive drop in employment probability in the subsequent quarters. One quarter after displacement, displaced workers are 90 percent less likely to be employed than in the counterfactual situation of non-dismissal. Two years after having been made redundant, displaced workers' employment rate is still 35 percentage points lower than that for non-displaced workers. The persistence of a significant differential in employment rates between displaced workers and non-displaced workers is due to displaced workers having relatively poor re-employment prospects (see section 4)., While non-displaced workers tend to stay in the labour force, they experience a small decline in their employment rate, mainly due to older workers retiring .

27. Employees with more than one year of tenure are entitled to a severance payment equal to at least two tenths of monthly wage per year of tenure. Those with more than ten year of tenure receive a supplement of two fifteenths of monthly wage per year of tenure above ten.

28. See Appendix D for further detail on the fixed-effects specification.

Figure 7. **The displacement impact on employment probability**



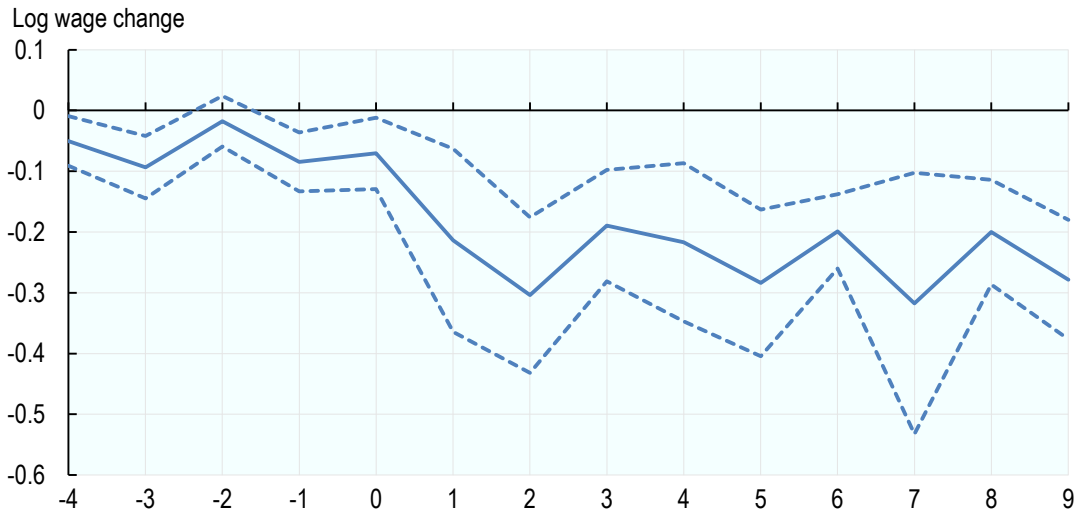
Note: The dependent variable is a binary variable indicating whether the individual is employed or not. Baseline value (i.e. at t=0): 99.4%. The coefficients of a set of binary variables indicating the distance to displacement event are graphed. The control group includes those employed on a permanent contract in the baseline quarter and who were not dismissed for economic reason n the following quarter. Independent variables include individual fixed effects, time varying socio-demographic and year and region fixed effects. Fixed estimation. Confidence interval at 95% are graphed

Source: Enquête Emploi (2003-11)

72. The fall in monthly earnings after displacement may also be partly attributed to lower average pay on the new jobs than on pre-displacement jobs. International evidence suggest that wage rates in post displacement jobs tend to be lower than in pre-displacement jobs (See OECD, 2013 for a detailed literature review). In addition, displaced workers missed out wage growth that typically would have had occurred had they not been dismissed. To measure the impact of displacement on monthly wage rates the same estimation strategy as for monthly earnings is used. However, the sample is now restricted to those in work in the period following displacement. In interpreting wage losses for this group, it should be borne in mind that displaced workers who get back to work relatively quickly after job loss differ from those who remain unemployed longer or withdraw from the labour market, as was discussed in Section 4 (above).

73. The estimation results reported in Figure 8 indicate that post-displacement wage losses are in the range of 20-30 log-points (corresponding to 22-35 percent declines in pay) and that these losses are persistent through the end of the nine quarter window available in the *Enquête Emploi*. Two years after having lost their job, re-employed displaced workers still suffer from at least a 20% monthly wage loss, which indicates that job displacement entails medium-run earnings losses and quite probably also has adverse long-run consequences on workers' career.

Figure 8. **Log monthly wage losses associated with displacement**



Note: The dependent variable is the log of monthly wage. The sample is restricted to employed persons. Baseline monthly wages (i.e. at t = 0): 1,757 Euros. The coefficients of a set of binary variables referring to the number of quarters before and after job loss are graphed. The control group includes those employed on a permanent contract in the baseline quarter and who have not been dismissed for economic reason. Independent variables include socio-demographic and baseline job characteristics, year and region fixed effects. OLS estimation. Weighted estimates. Confidence interval at 95% are graphed

Source: Enquête Emploi (2003-11)

74. Figure 8 also suggests that the earnings of displaced workers dip slightly even before they are made redundant. These small differences shown are not always statistically significant, but they could be due to firm's economic misfortune having an impact on workers' monthly wages prior to the layoff date. Indeed, one would expect workers employed in firms facing economic difficulties to work shorted hours and receive less bonuses compared to those employed in economically sound firms.

5.3 Average effects and robustness checks

75. In order to check the robustness of our core cross-sectional estimates, we estimate difference-in-differences (DiD) models on the sample restricted to workers who lose their job during the interview period and the corresponding control group. As was explained above, information on wages is available only at the first and last interview dates, which greatly limits our ability to apply the DiD technique to this data set.. Nonetheless, DiD provides a useful check of robustness, especially since these estimators have become the standard method to estimate wage and earnings losses caused by displacement (OECD, 2013). The advantage of this method compared with the cross-sectional estimator presented above, is that DiD controls for time-invariant unobserved heterogeneity. The wage loss caused by displacement may be estimated using the following regression equation:

$$y_{it} = \alpha_i + \beta_{DID} D_{it} + \sum_{k=-4}^{5} \gamma_k C_{itk} + X_{it}\theta + \varepsilon_{it}$$

76. Where the variables are the same as in the cross-sectional model above, except that: the single intercept term has been replaced the individual fixed effects (α_i) and the post-displacement window is limited to five quarters. The earnings impacts of being displaced at each point from 4 quarters prior to displacement to 9 quarters after displacement has been collapsed to a single average impact term ($\beta_{DiD}D_{it}$).

77. The DiD estimation results are reported in columns 4a and 4b of Table 2, where 4a reports results for monthly earnings (monthly wages including zero earnings) while column 4b reports results for log monthly wages excluding zero earnings observations. The DiD estimates can be compared with three sets of cross-sectional (CS) estimates[29]. Column 1 reports the same specification except that the individual fixed effects have been replaced by a single intercept term and the sample has been expanded to include the observations related to displacements before the survey interview. Column 2 reports results when the CS model is re-estimated with the smaller sample used for DiD estimation. These CS models are intermediate specifications that are used to assess the robustness of the CS results presented in Section 5.2 to omitting individual fixed effects. The CS estimates in column 3 are also estimated for the restricted sample, but the specification has been expanded to include treatment fixed effect (i.e. a binary variable that equal to one if the individual was, or is going to be made redundant).

Table 2. **Comparing results from different estimation methods]**

	OLS				DID			
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
	Monthly earnings	Log monthly wage	Monthly earnings	Log monthly wage	Monthly earnings	Log monthly wage	Monthly earnings	Log monthly wage
Displaced	-1,163***	-0.242***	-1,222***	-0.204***	-1,134***	-0.146***	-1,180***	-0.160***
	(21.82)	(0.0235)	(31.83)	(0.0325)	(52.00)	(0.035)	(67.59)	(0.0522)
Displacement window (quarters)	10	10	6	6	6	6	6	6
Individual Fixed effects	No	No	No	No	No	No	Yes	Yes
Treatment fixed effects	No	No	No	No	Yes	Yes	No	No
Time invariant characteristics	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Time-varying characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.352	0.574	0.357	0.581	0.357	0.581	0.007	0.023
Number of individuals	81,897	77,978	76,745	76224	76,745	76,224	76,851	76,337
Observations	1,279,719	1,220,911	726,222	706,059	726,222	706,059	728,236	707,638

Note: Dependent variable are: a) monthly earnings (including zero earnings) b) log monthly wage. Baseline monthly wages (i.e. at t = 0): 1,757 Euros. The independent variable of interest is a dummy variable equal to one if the worker has been displaced over the last six (ten) quarters. The control group includes those employed on a permanent contract in the baseline quarter and who have not been dismissed for economic reasons. Independent variables include socio-demographic and baseline job characteristics, year and region fixed effects. Treatment fixed-effect is a binary variable indicating whether the individual belongs to the treatment or control group. It is equal to one if the individual has been, or will be made redundant, zero otherwise. Robust standard errors in parentheses. Weighted estimates. *** p<0.01, ** p<0.05, * p<0.1

Source: Enquête Emploi 2003-2011.

78. Comparing the estimates reported in columns 1a and 2a of Table 2 shows that monthly earnings losses are modestly smaller for workers who were displaced during the last ten quarters than for the workers who were made redundant over the last six quarters, probably because re-employment rates are higher for the former group and hence the sample include fewer zero earners. By contrast, columns 1b and 2b suggest that the monthly wage loss for re-employed displaced workers is moderately higher for those displaced over the last ten quarters than for those displaced over the last six quarters. This difference may be due to selection into re-employment, as those with poorer labour market prospect may need more time to get back to work. However, the overall similarity of the CS

29. In Table 2 the Cross sectional estimates refer to a single impact parameter and the coefficients can be interpreted as average short-run impacts. The estimates are consistent with the results presented in Section 5.2: coefficient from column 1 is equal to the average of the quarterly effects presented in Figure 6.

estimates across the two samples suggests that difference-in-differences models (including group or individual fixed effects) probably would lead to similar results for those displaced over the last ten quarters, as it does for the workers who were made redundant during the six interview quarters.

79. According to the DiD specification (column 4), displaced workers suffer monthly earnings losses nearly 1,200 euros, while re-employed displaced workers suffer a monthly wage loss of 16 log points (15%). The results reported in Table 2 indicate that DiD models yield slightly lower estimates of the change in monthly wage experienced by re-employed displaced workers, but very similar estimates of monthly earnings losses, suggesting that the amount of bias caused by unobserved, time-invariant differences between displaced and non-displaced workers is small. However, the very short time period used to estimate the DiD models may lead them to understate the wage loss caused by displacement. The earnings impact of displacement is estimated based on the change in earnings between shortly before displacement, when the firm's economic misfortune may already negatively impact displaced workers' wages, and shortly after displacement.[30] As a result, it is possible that the cross-sectional estimates are actually more reliable than are the DiD estimates. While that cannot be verified, it is reassuring that the estimated impact of displacement on earnings is very similar whichever estimation strategy is adopted. This indicates that the CS results presented in Figures 6-8 are credible and unlikely to be biased by unobserved heterogeneity, as selection into displacement is accounted for by the socio-demographic and job characteristics

80. In addition, the wage growth of non-displaced workers who do not experience any job separation is likely to be underestimated in the LFS data. Hagneré and Lefranc (2006) show that in the French LFS wage growth of job stayers tend to be underestimated when compared with data on wages derived from income tax returns. Therefore, the difference between OLS and DiD estimates may not be entirely due to selection bias, but could also be due to DiD estimates being biased toward underestimating the effects of displacement.

5.4 Heterogeneous effects of displacement

81. Displacement may affect workers differently depending on their socio-demographic characteristics. To test whether the effects of displacement vary depending on worker characteristics (e.g. gender, age, education), separated regressions are run on different sub-populations. Doing so is tantamount to including a set of interaction terms into the estimation models described above. Owing to the relatively small sample size, we are not able to analyse in detail the profile of displacement effects (i.e. how displacement effects vary over time) so we only measure an average displacement effect between the first and last interviews by collapsing each point from 4 quarters prior to displacement to 9 quarters after displacement to a single average impact term, as in column 1 of table 2. We use CS estimates.

82. Results are reported in Table 3. The top half presents results on the impact of displacement on monthly earnings (i.e. including zero earnings) while the bottom half displays results on the effects of lower re-employment rate for women, as women incur proportionately displacement on the log of monthly wage (i.e. on the monthly wages of re-employed displaced workers). The results suggest that the percentage decline in earnings following displacement are larger for women than for men (70 percent for women compared to 62 percent for men), even though the absolute decline in monthly earnings is somewhat larger for men. Interestingly, this difference in not solely driven by a larger

30. Due to the nature of the data, pre-displacement wages are observed between one and four quarters before job loss. Baseline monthly wages are affected by the economic health of the firm mostly through shorter hours, as baseline hourly wage rates are contractually defined and cannot be lowered by the employer without the employee's permission.

monthly wage losses than men even once re-employed,, though the difference is only significant at the 10 per cent level. Bigger proportionate earnings losses once re-employed are primarily due to women being more likely than men to work part-time once re-employed. Indeed the difference disappears once working time is controlled for.

Table 3. **Variation in the wage impact of displacement**

	Gender		Age		Education	
	Men	Women	Below 45	45 or over	Tertiary	Sec. or less
Monthly earnings ((Including zero earnings)	-1,231***	-1,029***	-935.5***	-1,242***	-1,540***	-1,054***
	(30.99)	(29.86)	(22.82)	(55.4)	(72.71)	(20.48)
Baseline wage (in Euros)	1971	1468	1667	1896	2391	1534
Change in %	-0.624	-0.701	-0.561	-0.655	-0.644	-0.687
Number of individuals	46291	34816	49468	31639	20183	60924
Observations	727,039	540,821	745,956	521,904	320,977	946,883
R-squared	0.324	0.375	0.346	0.398	0.292	0.324
Log monthly wage (Excluding zero earning)	-0.194***	-0.316***	-0.222***	-0.286***	-0.186***	-0.259***
	(0.0213)	(0.0487)	(0.0259)	(0.0514)	(0.0453)	(0.0275)
Difference	0.122*		0.064		0.073	
t-test	1.747		1.112		1.38	
Number of individuals	43,799	32,568	44,755	31,612	19,299	57,068
Observations	408,372	299,555	416,271	291,656	181,865	526,062
R-squared	0.024	0.025	0.033	0.011	0.023	0.025

Note: CS specification. Baseline monthly wages (i.e. at t = 0): 1,757 Euros. The independent variable of interest is an indicator equal to one if the individual has been made redundant over the last ten quarters. The control group includes those employed on a permanent contract in the baseline quarter and who have not been dismissed for economic reasons. Separated regressions are run for each demographic group. Robust standard errors, clustered at the individual level, in parentheses. Weighted estimates.

*** p<0.01, ** p<0.05, * p<0.1

83. The mean earnings loss for older workers is estimated to be 66 percent, compared to 56 percent for younger and prime-age displaced workers, although this difference is not statistically significant.[31]. Even once re-employed, older workers tend to suffer greater monthly wage losses than younger workers. This phenomenon is well documented in the displacement literature, e.g. Morissette *et al.* (2007) for Canada, Borland *et al.* (2002) for the United Kingdom, Couch and Placzek (2010) for the United States. There are several reasons that can explain why older workers suffer greater wage losses than prime-age workers or younger people. First, older workers may have more to lose than younger workers, in the sense that they generally have longer job tenure and hence risk losing the benefits associated with it, including the higher wages related to the accumulation of specific skills. In addition, the general skills of older displaced workers may tend to be "rusty" or out of date and, hence, no longer marketable, compared to the general skills of younger people.

84. Although tertiary-educated workers experience on average greater earnings losses in euros than displaced workers with upper-secondary or less education, there is virtually no differences when the loss is expressed as a percentage of baseline monthly earnings. However, re-employed displaced workers with secondary education or less seem to experience higher wage losses once re-employed

31. The coefficients are rather imprecisely estimated, owing to the small number of re-employed displaced workers aged over 45.

than tertiary-educated workers. This may be due to tertiary-educated workers being more adaptable to other occupations, as they have more general skills than less educated displaced workers.

85. Similar results are found when using difference-in-differences models (See D5), suggesting that CS estimates are unlikely to be strongly biased, as shown in section 5.3.

5.5 The drivers of wage losses

86. In the following, we aim to explain why displaced workers experience a fall in monthly wages once re-employed. While part of the change in monthly wages is attributed to a decline in the average number of hours worked, post-displacement jobs also tend to offer lower hourly wages than pre-displacement jobs. The final part of the section is dedicated to explaining the fall in hourly wage rate.

5.5.1 Decomposing the monthly wage losses

87. As has been seen, displaced workers tend to have lower monthly wages once re-employed. That may be due to displaced workers having lower hourly wage rates or shorter hours. In this section, based on models presented in Section 5.3., we estimate an average effect that is decomposed into a wage and an hours component. In order to disentangle the effects of these two potential channels, we introduce the number of hours worked into the wage equation as a covariate, so as to capture the wage effects due to change in working time. Ideally, one would like to use the hourly wage rate as a dependent variable. However, the number of hours worked per month is missing for a significant proportion of the respondents - around 30 per cent. This information is more likely to be missing for self-employed or for interim workers than for regular employees. As displaced workers have greater chance to become self-employed or temporary workers than the control group of non-displaced workers, partial non-response may bias the results. Therefore, a set of dummies indicating whether the number of weekly hours is known, and if so, the number of hours worked is included in the wage regression:

$$y_{it} = \alpha + \beta_h D_{it} + \sum_{k=0}^{9} \varphi_k H_{it}^k + \sum_{k=-4}^{5} \gamma_k C_{itk} + X_{it}\theta + \varepsilon_{it}$$

with $H_{it}^0 = 1$ if the number of hours worked per week is missing, $H_{it}^1 = 1$ if the individual works less than 5 hours a week, $H_{it}^2 = 1$ if the employee works between 5 and 10 hours per week, and so on. $\beta_h$captures the impact of displacement on hourly wage rates. However, one must be careful when interpreting the results, since the information on the number of hours worked is missing for a number of individuals.

88. Results of different estimation methods are presented in Table 4. Our preferred specification (column 4) suggests that around half of the monthly wage losses can be attributed to a change in the number of hours worked. This conclusion follows from a comparison of the size of the coefficient of the displacement dummy (-0.0774) with the size of the corresponding coefficient in column 4b of Table 2 (i.e. when the model is estimated omitted the control for weekly hours worked on the new job), which turns out to be about twice as large (-0.156). One reason reduced hours play an important role in explaining earnings once re-employed is that displaced workers are more likely to work part-time than if they had not been made redundant (see next section). The remaining half of the fall in monthly wages is due to lower hourly wage rates. The next section examines the drivers of the fall in hourly wage rate.

Table 4. **Displacement and hourly wage rates**

	OLS		Differences-in-Differences	
	(1)	(2)	(3)	(4)
Displaced	-0.201***	-0.171***	-0.105***	-0.0774***
	(0.0323)	(0.0202)	(0.0249)	(0.0299)
Displacement window (quarters)	10	6	6	6
Individual Fixed effects	No	No	No	Yes
Treatment fixed effects	No	No	Yes	No
Time invariant characteristics	Yes	Yes	Yes	No
Time-varying characteristics	Yes	Yes	Yes	Yes
R-squared	0.611	0.577	0.581	0.572
Number of individuals	78,094	76,365	76,365	78,820

Note: The dependent variable is the logarithm of monthly wage. Baseline monthly wages (i.e. at t = 0): 1,757 Euros. The independent variable of interest is a dummy variable equal to one if the worker has been displaced over the last six (ten) quarters. The control group includes those employed on a permanent contract in the baseline quarter and who have not been dismissed for economic reason. Independent variables include weekly hours worked, socio-demographic and baseline job characteristics, year and region fixed effects. Robust standard errors in parentheses. Weighted estimates.

*** p<0.01, ** p<0.05, * p<0.1

5.5.2 Displacement and skills use

89. Wages losses suffered by re-employed displaced workers are commonly attributed to the loss of human capital that results from displacement. The loss of human capital may be due to the displaced workers' skills being underused in their new jobs. As many displaced workers change industry and/or occupation, they may lose the benefit of industry and occupation-specific skills, especially if the skill requirements of their new job are a poor match for their skills. Another explanation for the human capital loss is that wage losses following displacement are due to human capital depreciation during the non-employment spells that typically follow displacement. Section 4 shows that the median duration of non-employment spells following displacement is around one year in France. All these explanations point to the importance of changes in human capital in explaining the effect of displacement on wages.[32]

90. Some theoretical work hints that skills mismatch may explain part of the wage losses associated with displacement. The job search theory can indeed give useful insights of the sources of hourly wages losses. Using the theoretic framework of job search, Krolikowski (2005) build a search and matching model that predicts relatively poor match-quality on the first post-displacement job in conjunction with a significant job ladder. The model performs very well in simulating earnings losses caused by displacement and the subsequent recovery.

91. In order to examine how skills use changes following displacement this study uses data on pre- and post-displacement occupations linked to data on skills requirements by occupation that are derived from O*NET (See Appendix A.3). By doing so, we are able to measure the change in skills requirements that results from the observed change in occupation. Those who move to occupations

32. Some of these arguments may also apply to non-displaced workers who change jobs. For example, Nedelkoska and Neffke (2011) find that workers moving directly between jobs have a greater chance to move to jobs that minimise human capital loss, while those experiencing unemployment between two jobs tend to move to occupations where human capital loss is larger.

requiring lower skills or education than their previous occupation are probably victims of a skills mismatch that reduces their earnings potential.

92. Table 5 shows that half of re-employed displaced workers in our sample have changed occupations (defined using ISCO 1998 at the two-digit level). Similar findings for other OECD countries, including Australia, Canada, Korea and the United States are presented in OECD (2013). However, the share of displaced workers experiencing professional downgrading appears to be low, as only four percent of re-employed displaced workers are in an occupation requiring a lower level of education than their pre-displacement occupation and only 3.5 percent of displaced workers experience a decrease in required education in combination with a switch in the most important skills-set used on the job. (See Appendix for the definition of the skills-sets.) OECD (2013) also finds that the share of displaced workers experiencing professional downgrading in OECD countries is fairly low, typically ranging from 3 to 8 per cent of re-employed displaced workers. In comparison, around 15 per cent of non-displaced workers change occupation, and fewer of them experience professional downgrading. For example, 8% of displaced workers who change occupations experience occupational downgrading (i.e. a significant reduction in the educational requirements of their job), as compared to 3% of non-displaced workers who change occupation. Note that the smaller incidence of downgrading for non-displaced workers changing occupations is partly due to workers changing occupation while remaining in the same company (Lainé, 2010).

Table 5. **Share of workers changing occupation and skills-set**

	Displaced workers	Non-displaced workers
Change occupation	0.502	0.156
Lower required education	0.041	0.005
Higher required education	0.024	0.012
Bad switch	0.036	0.004
Number of individuals	1,038	67,748

Note: Change occupation is equal to one if the worker's occupation observed in the last interview is different from the baseline occupation (i.e. at t = 0), zero if he has not changed occupation, and missing if he left employment. Occupations are coded using the International Standard Classification of Occupations (ISCO, 1998) at the two-digit level. Lower educational requirement is equal to one if the individual changed occupation and the new occupation has lower educational requirement. Bad switch is equal to one if the individual has changed occupation which requires a different set of skills and has lower educational requirement. See Appendix for further detail.

Source: Enquête Emploi 2003-2011.

93. Results reported in column 1 of Table 6 suggest that while non-displaced workers who change occupation have higher hourly wages (around 2 percent) than non-displaced workers who stay in the same occupations (and usually the same job), re-employed displaced workers who change occupations experience substantially greater wage losses than those who become re-employed in the same occupation. Displaced workers who do not change occupation when getting back to work experience a 16 percent (0.171 log points) fall in hourly wage rate, while hourly wage rate of those who change occupation fall on average by 25 percent (0.283 log points), suggesting that the wage penalty caused by job loss is partly driven by the loss of occupation-specific skills (or, at least, the lack of an opportunity to use those skills on the post-displacement job). However, one must be careful when interpreting these coefficients, as changing occupation after displacement may not be exogenous, in the sense that displaced workers who change occupation may differ from occupation-stayer displaced workers in unobserved characteristics that are associated with greater adjustment difficulties, independently of occupational mismatch.

Table 6. **Hourly wage rate and change in skills use**

	(1)	(2)	(3)
Displaced	-0.171***	-0.218***	-0.220***
	(0.0328)	(0.0237)	(0.0237)
Change occupation	0.0241***		
	(0.00386)		
Change occupation x displaced	-0.136***		
	(0.0465)		
Lower educational requirement		-0.0488**	
		(0.0246)	
Lower educational requirement x displaced		-0.175***	
		(0.0873)	
Bad switch in skills requirement			-0.0529*
			(0.0281)
Bad switch x displaced			-0.156*
			(0.0914)
R-Squared	0.601	0.601	0.601
Number of individuals	77,043	77,043	77,043
Observations	1,191,628	1,191,628	1,191,628

Note: The dependent variable is the logarithm of monthly wage but the number of hours worked is included as a covariate. Baseline monthly wages (i.e. at t = 0): 1,757 Euros. Change occupation is equal to one if the worker's occupation observed in the last interview is different from the baseline occupation (i.e. at t = 0), zero if he has not changed occupation, and missing if he left employment. Occupations are coded using the International Standard Classification of Occupations (ISCO, 1998) at the two-digit level. Lower educational requirement is equal to one if the individual changed occupation and the new occupation has lower educational requirement. Bad switch is equal to one if the individual has changed occupation which requires a different skill-set and has lower educational requirement. See Appendix for further details. The control group includes those employed on a permanent contract in the baseline quarter and who have not been dismissed for economic reason. Independent variables include socio-demographic and baseline job characteristics, year and region fixed effects. Robust standard errors in parentheses. Weighted estimates.

*** p<0.01, ** p<0.05, * p<0.1

Source: Enquête Emploi 2003-11.

94. Table 6, columns 2 and 3 show that displaced workers who change occupation and experience a fall in required years of education – used here as a proxy for professional down-grading – suffer a very large wage penalty of around 35%, regardless of whether they move to an occupation requiring a different skills-set. The very small share of non-displaced workers experiencing these types of downward occupational mobility also face a wage penalty, but it is much smaller than that borne by displaced workers at around 5 percent.

95. As few displaced workers are affected by professional downgrading, at least as measured in Table 5, most of the average fall in hourly wage rates experienced by displaced workers cannot be explained by new jobs being less demanding in term of skills and educational requirement than pre-displacement jobs. However, many more displaced workers become re-employed in a different occupation that has educational requirements that are similar to or even higher than those in their old occupation, yet still experience larger hourly wage losses than displaced workers who become re-employed in the same occupation. This seeming paradox may reflect the loss of occupation-specific skills that are not captured by the measures of skills derived from O*NET. The O*NET captures only quite generic skills, while missing more specific occupational skills that are largely learned by working in the occupation. Although the new occupations in which these displaced workers find work

require the same sets of generic skills as their previous occupations, these workers lack the professional experience and, hence, skills that are specific to their new occupations. Occupation-specific experience may indeed be rewarded by employers and this may explain why job losers who change occupation experience greater losses than those who do not, despite moving to occupations that require similar skills-sets.

96. An important part of the wage penalty associated with displacement may be due to the loss of firm-specific human capital and rents associated with long job tenure. Some skills are firm-specific in the sense that they can only be used (and subsequently rewarded) when employed within the company. Moreover, wages tend to grow with job tenure, as many firms still use tenure-based reward systems whereby wages increase regularly with tenure. In sum, a number of different factors likely contribute to the hourly wage fall associated with displacement, including skill losses along a number of different dimensions, only some of which are captured in the measures of skill mismatched used in this section, but probably also rents associated with long-tenure.

6. Displacement and job quality

97. This section shows that post-displacement jobs tend to be poorer than pre-displacement jobs along a number of dimensions of job quality other than wages. While the impact of displacement on working time arrangements, holiday entitlements and job responsibility appear to be transitory, re-employed displaced workers face considerably higher job insecurity than had they not initially been made redundant.

6.1 Job (in)security

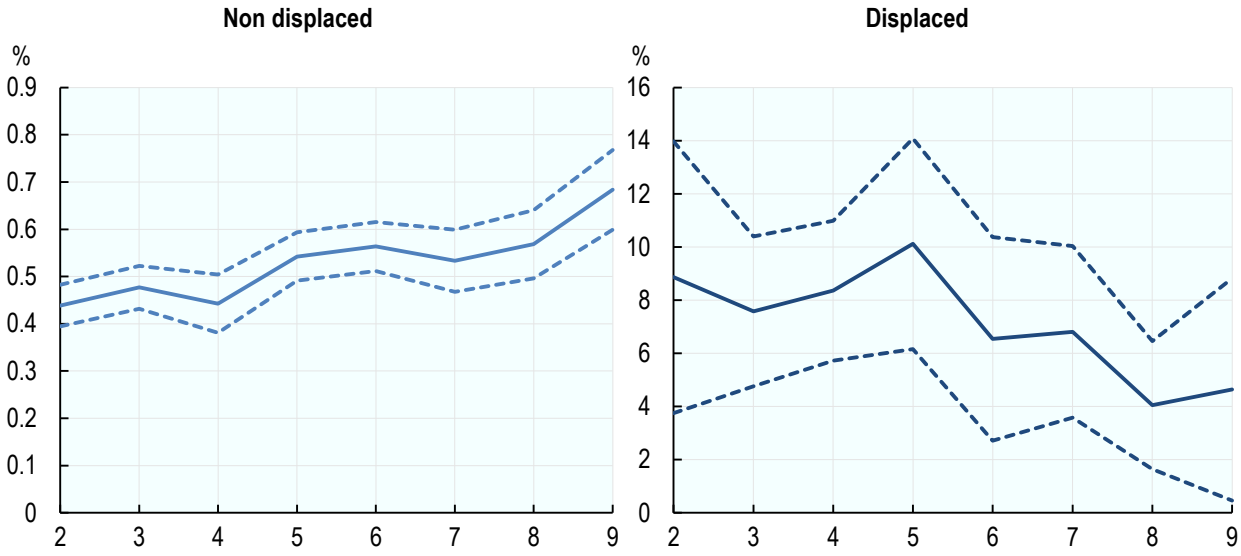
98. The displacement literature is relatively sparse regarding empirical evidence of the impact of displacement on job security, despite the fact that job security may be highly valued by workers. Indeed, the consequences of displacement for future job stability may affect individual welfare as much as the earnings losses caused by job loss. In this section we show that the risk of future displacement increases following initial displacement. In order to measure the increased likelihood of job loss after initial displacement, we compare the probability of job loss between non-displaced workers and re-employed displaced worker, over the nine quarters following initial displacement. The following regression equation is estimated using a linear probability model:

$$JL_{it} = \alpha + \sum_{k=2}^{9} \beta_k D_{it}^k + \sum_{k=2}^{9} \gamma_k C_{it}^k + X_{it}\theta + \varepsilon_{it}$$

where $JL_{it} =$ is a binary variable equal to one if the individual experienced an involuntary job separation in the last quarter, zero if the individual was continuously employed over the last quarter or has voluntarily left her job. As before, D_{it}^k is a set of binary variables measuring the time distance t to the initial displacement, C_{it}^k is a set of binary variables for each quarter in the cohort and X_{it} is a vector of individual characteristics

99. Figure 9 shows that re-employed displaced workers have lower job stability than workers who were not initially displaced. Within the year following displacement, displaced workers who find a new job are 15-20 times more likely to involuntarily lose their job than non-displaced workers. The job loss rate differential falls during the second year following the initial displacement, but remains high. Even two years after initial displacement, displaced workers are still 7 times more likely to experience a job separation than those who were not dismissed for economic reason in the first place, suggesting that displacement has quite long lasting consequences on future job stability.

Figure 9. **Predicted quarterly job loss rates after initial displacement**



Note: Involuntary job loss refers to separations that occurred following dismissal for economic reason, dismissal for cause, end of temporary contracts, and bankruptcy (for self-employed). Weighted estimates. 95% confidence intervals are graphed

Source: Enquête Emploi (2003-11)

100. Displacement results therefore not only in relatively long spell of unemployment and lower wages but also in increased job insecurity. There are reasons to believe that increased job insecurity is a major element of the cost of job loss, as job insecurity is often deemed to strongly affect workers' well-being.

101. Post-displacement jobs tend to be more insecure than pre-displacement jobs, primarily because the incidence of temporary work and self-employment increases after displacement, as displayed in Table 7. Among the displaced workers who find a new job within a year after having been made redundant, only 55% are employed on a permanent contract, while all of them used to have a permanently employment contract. A significant share of displaced workers is hired on temporary contracts (either fixed-term contracts or temporary agency placements), while 12.5% of them are self-employed. The picture is very similar two years following displacement. Temporary employees and the self-employed are considerably more vulnerable to job destruction than permanent employees, who benefit from strong job security. The fear of losing a permanent job is all the stronger in France, because there is a clear divide between permanent and temporary contracts in terms of employment protection. Nonetheless, it should be noted that self-employment can be a good opportunity for some workers and the role of displacement in spurring workers to set up their own business clearly emerges in these data.

Table 7. **Contract type of re-employed displaced workers**

Year following displacement	Permanent contract	Fixed-term contract (CDD)	Temporary work	Self-employed
1	0.55	0.24	0.08	0.14
2	0.59	0.22	0.06	0.13

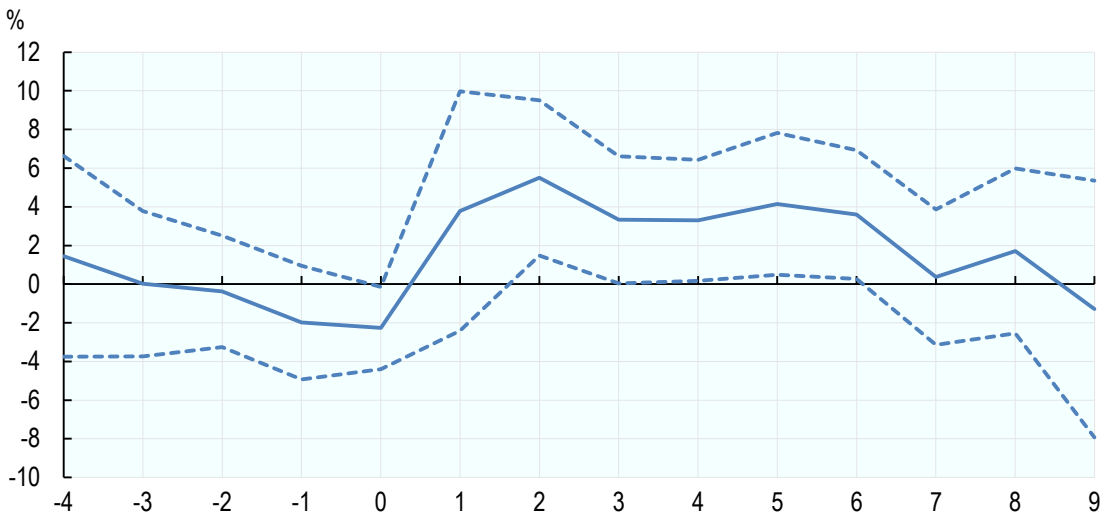
Note: Permanent contracts include open-ended contract in private and public companies and civil servants. Fixed-term contracts in both private and public companies and in the public service. Weighted estimates

Source: Enquête Emploi (2003-11)

6.2 Part-time work and unsocial working hours

102. The same estimation method as was described in section 4 is used to estimate the impact of displacement on various dimensions of job quality. Figure 10 shows that the incidence of part-time work tends to increase slightly in the quarters following displacement for displaced workers who return to work. However, the differential with non-displaced workers falls over time. Interestingly, Farber (1999) presents similar findings for the United States. However, in our case, once individual fixed effects are introduced in the regression equation, while the point estimates remain similar, the standard errors increase and the results are less significant (see Appendix A4).

Figure 10. **Part-time differential resulting from job loss**



Note: The coefficients of a set of binary variables indicating the distance to displacement event are graphed. Baseline value (i.e. at t = 0): 14.2%. The control group includes those employed one year before the first interview and have not been dismissed for economic reason. Independent variables include socio-demographic and job characteristics, year and region fixed effects. OLS estimation. Weighted estimates.

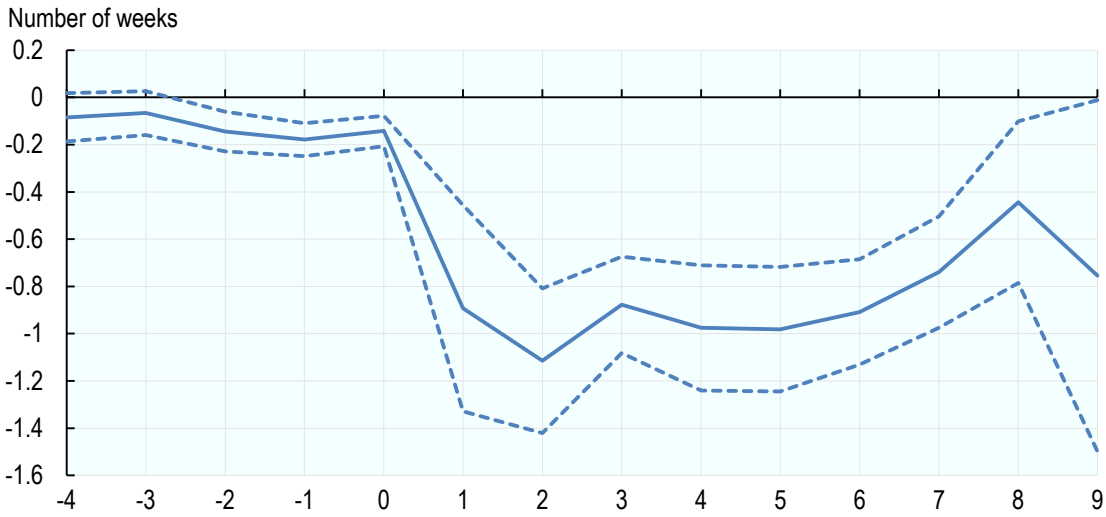
Source: Enquête Emploi (2003-11)

103. A similar analysis shows that there is no effect of displacement on the incidence of unsocial working hours. In particular, displacement does not significantly increase the incidence of unconventional workings hours, such as evening or night work, or working on the weekend. This is probably due to unconventional working hours being associated with certain occupations, but not with job tenure.

6.3 The non-monetary compensation: holiday entitlement

104. Figure 11 shows that displaced workers have fewer days of paid holidays once re-employed then comparable non-displaced workers. In the quarters prior to displacement, the difference compared to non-displaced workers is very small, suggesting that the amount of bias of OLS coefficient is small. Displaced workers who get into jobs within the year following displacement have one week less of paid holidays than non-displaced workers. However, the effect of displacement on holiday entitlement does not appear to be long-lasting, as two years after displacement displaced workers have only a half of a week less of paid holidays than non-displaced workers. These results are robust to introducing individual fixed effects (See Appendix A4). OECD (2013) finds that the incidence of paid leave is lower after displacement in a number OECD countries for which data are available, including Korea and Australia.

Figure 11. **Change in holidays entitlement**



Note: The dependent variable measures the number of weeks of paid leave. Baseline value (i.e. at t = 0): 5.2 weeks. The coefficients of a set of binary variables indicating the distance to displacement event are graphed. The control group includes those employed one year before the first interview and have not been dismissed for economic reason. Independent variables include socio-demographic and job characteristics, year and region fixed effects. Tobit regression model.

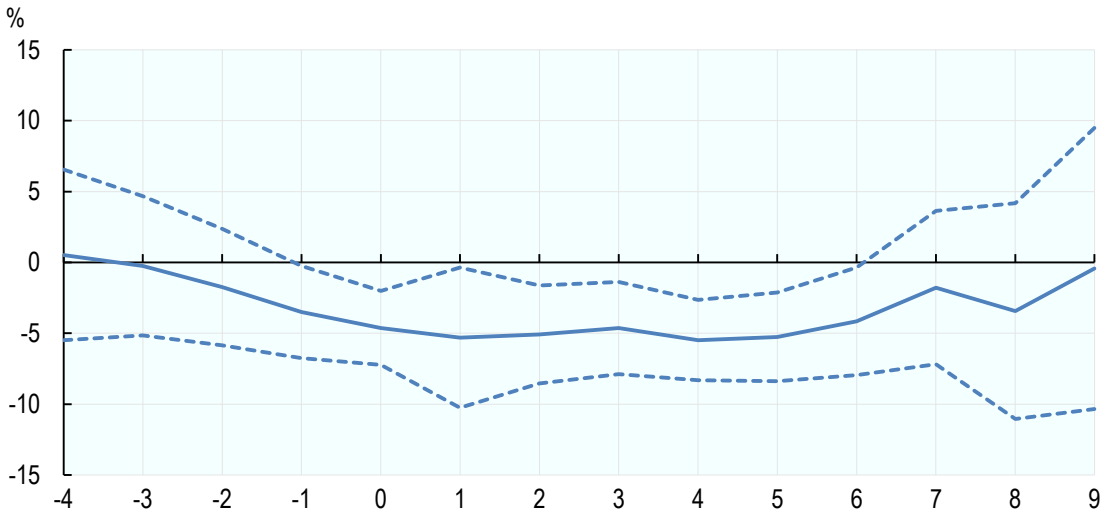
Source: Enquête Emploi (2003-2011)

6.4 Managerial position

105. Examining the effects of job displacement in the United States, Brand (2006) finds that displaced workers have lower job autonomy and authority once re-employed than in their previous jobs. An indicator variable equal to one if the employee holds a managing position[33] and zero otherwise, is used here to measure job authority and autonomy. Figure 12 shows that displaced workers are slightly less likely to hold a managerial position once re-employed than non-displaced workers. The effect of displacement on job authority/autonomy appears to be transitory, as two years after displacement there is no significant difference compared to non-displaced workers. This measure of job authority is a bit crude, as the number of managed employees is unknown. Re-employed displaced workers who hold a managerial position might have lower job authority in the sense that they manage fewer employees than if they had not been dismissed.

33. i.e. if the employee is managing at least one other staff member.

Figure 12. **Managing position**



Note: The dependent variable equals one if the worker is managing a team. Baseline value (i.e. at t = 0):21.3%. The coefficients of a set of binary variables indicating the distance to displacement event are graphed. The control group includes those employed one year before the first interview and have not been dismissed for economic reason. Independent variables include socio-demographic and job characteristics, year and region fixed effects. Marginal effects of a logit regression model are reported. Weighted estimates.

Source: Enquête Emploi (2003-11)

CONCLUSION

106. The empirical analysis presented in this paper sheds light on the short and medium term consequences of redundancies on workers' labour market prospect in France. Making use of 2003-2011 data from the French Labour Force Survey, we first document the overall incidence of displacement for permanent workers and how it varies for different groups of workers. However, the main focus of the analysis is to explore the costs borne by displaced workers, including by elucidating the mechanism driving earnings losses and by examining the consequences of displacement for various other aspects of job quality. Displaced workers are shown to suffer significant earnings losses relative to comparable non-displaced workers, which are due, in part, to sometimes long spells of non-employment before getting back into employment. Re-employed displaced workers also earn lower monthly wages than if they had not been displaced, with one-half of the fall in monthly wages being attributed to shorter hours and the remaining half to lower hourly wage rates. Professional downgrading is unlikely to explain much of the fall in hourly rates, as only few displaced workers are re-employed in occupations requiring fewer years of education or lower skills than their pre-displacement occupations. The lack of experience in the new occupation and the loss of firm-specific human capital and rents associated with long job tenure are probably the main drivers of the fall in hourly wage rates. This result is consistent with Lefranc (2003), who, using a different approach, highlights the role the loss of accumulated firm-specific earnings potential in explaining earnings losses.

107. While most of the prior displacement literature focuses on the earnings losses, we show that other aspects of job quality are also impacted by displacement. Workers dismissed for economic reasons, once re-employed, are more likely to work part-time, have fewer paid holidays and have a lower chance of holding a managerial position than comparable non-displaced workers, although these effects appear to be transitory. In addition, and most importantly, displaced workers face considerable job insecurity once re-employed. Two years after having been dismissed for economic reasons, they are seven times more likely to lose their job than comparable permanent workers who were not dismissed for economic reason in the first place. Two years after displacement, only 30 per cent of the workers who lost permanent jobs are re-employed under an open-ended contract. The duality of the labour market makes the cost of losing a permanent job potentially very high and what is lost in terms of job security and earnings potential is unlikely to be easily found again.

108. The time spent in non-employed also has consequences for individual well-being that are additional to the fall in earnings while out of work and then once re-employed, although these possibilities are not analysed here. Other researchers have shown that unemployment may entail a loss in self-confidence and negatively impact individual health. In addition, displacement may affect the other members of the house-hold. Measuring such externalities could help understand the full cost of job loss and could be a subject for further research, particularly in France.

109. Several policy implications can be drawn from the findings presented in this study. For example, it is shown that older workers have very poor re-employment prospects after having been made redundant. This pattern is worrisome because the retirement age is likely to be increased over the next decades. Accordingly, particular attention should be paid to the labour market situation of older workers if poverty among the elderly is to be avoided. The surprisingly small incidence of professional downgrading following displacement may also have important implications for policy. For example, it may suggest that unemployment benefits are sufficient to allow displaced workers to search until they

find a job that matches their skills-set. Although cutting back unemployment would probably result in faster re-employment, it might also increase skills mismatch and therefore be detrimental to both workers and firms in the long run. This should be taken into consideration when discussing the effects of cutting back unemployment benefits. Increased search assistance potentially could help displaced workers to get back into jobs quickly, while maintaining or even increasing match quality. Finally, one must keep in mind that companies make use of means other than displacing permanent workers when reducing their workforces. Indeed, temporary and agency workers likely bear the brunt of the adjustment costs when employers encounter economic difficulties. Further research should aim to understand the impact of job loss among temporary workers.

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APPENDIX A DATA

Appendix A.1 The French Labour Force Survey (l'Enquête Emploi en continu)

110. **Identifying displacement:** Displacement events are identified when an individual, who was employed on permanent contract (*Contrat à durée indéterminée*) in the previous quarter, reports having left his previous job because he was dismissed for economic reasons. The variable *ACESSE* is used to identify dismissal for economic reasons when the respondents are not employed, while the variable *CIRC* is used to identify displacement for individuals who are back into work. The retrospective monthly calendar (variables *SP11* to *SP00*) is used to identify the quarter of displacement of those reporting having been made redundant within the year prior to the first interview. These variables describe the monthly labour market situation over the year prior the first interview. The variables contain six categories: employed, student, job seeker, retired, housewife, other NILF. If an individual reports to be employed in the fifth month before the interview and be unemployed in the fourth month, and additionally states that the reason for leaving his previous job is that he was made redundant, then this individual is identified as having been displaced two quarters before the first interview.

111. An integer variable indicating the number of quarters before or after displacement occurs is generated for all displaced workers. Each displaced workers is observed in six consecutive quarters, at some point during the period from four quarters before displacement until nine quarters after displacement, depending on when they lost their job. Given the nature of the data, displaced workers are only observed for part of the period, between four quarters prior to displacement and up to nine quite after displacement. Table A1 displays the number of displaced workers observed by quarters before and after displacement. The number of observations is lower at both ends.

Table A.1. **Number of displaced workers observed by quarter before and after displacement**

Quarter before or after job loss	Number of observations
-4	233
-3	441
-2	690
-1	926
0	1,203
1	1,611
2	1,679
3	1,751
4	1,674
5	1,438
6	1,161
7	753
8	452
9	172
Total	14,184

112. The individuals who report having been dismissed for economic reasons while being temporary workers in the previous quarter are discarded from the analysis, since it is not possible to know whether they were actually employed under permanent contract when they were dismissed. The sample is further restricted to individual less than 65 years old.

113. **Defining the control group:** The main purpose of this study is to analyse the cost of job displacement, as measured by the impacts of displacement on a number of employment and job quality outcomes. Most of the workers who are dismissed for economic reasons were employed by companies that had no choice but to downsize, either because of economic difficulties or the need to adapt to changing technologies. Provided data were available, one could compare the career path of workers that were made redundant to workers that were retained within the company. However, we want to capture the full impact of displacement, i.e. not only the pure effect of job loss but also of being employed in a firm facing economic difficulties. The appropriate comparison group should thus consist of otherwise comparable workers employed in firms that have no need to downsize. However, as the economic health of the firm is not observed, it was decided to use all the workers who potentially could be dismissed for economic reasons but were not. For reasons of comparability, the control group is limited to individuals employed under open-ended contracts (*Contrat à durée indéterminée*) in private or public companies. More precisely, the control group is made of nine cohorts of individuals who reported having been employed on a permanent contract in at least one quarter. The first cohort consists of workers employed under a permanent contract one year before the first interview and who are not dismissed for economic reason over the following quarter. The second cohort is made of those employed under a permanent contract three quarters prior to the first interview and who were not made redundant over the next quarter. And so on.

114. If in quarter t an individual is employed under a permanent contract and does not report having been dismissed for economic reasons in the following quarter (t+1), then he is assigned to the control group and the observation is assigned to the baseline cohort (t = 0) The individual then tracked for up to nine quarters (before or after displacement). Note that not all the individuals of the control group remain employed over the observation period, as they can leave their job for all sorts of reasons. All the cohorts are then pooled together. As a result, the same individual may appear several times in the sample. This is taken into account when computing standard errors. Note that workers in the control group who are subsequently made redundant are excluded from the control group.

115. **Wages:** Information on wages is available only at the first and last interviews. The respondents are asked about their wages, and can either answer the detailed value (*SALMEE*), or the band in which it lies (*SALMET*). The variable *SALRED* is then created by the INSEE and combines *SALMEE* and, when *SALMEE* is missing, imputed values using *SALMET*. Throughout this study the variable *SALRED* is used as a measure of monthly earnings. Although there is no direct information on the hourly wage rate in the LFS, the variable *NBHEUR* measures the number of hours corresponding to the monthly earnings and can be used to estimate the hourly wage rate. However, this variable is missing for next to 30 per cent of the individuals who declare positive earnings. The main issue with using this variable to compute hourly wage rate is that partial non-response is not random. Individuals who do not report the number of hours corresponding to their monthly earnings have higher earnings than those who do.

Appendix A.2 Descriptive statistics

Table A.2**. Baseline characteristics**

	Displaced			Displaced			Two sample t-test
	Observations	Mean	Standard deviation	Observations	Mean	Standard deviation	
Demographic characteristics							
Age	1207	41	10.7	75814	41.1	10.1	-0.29
Women	1207	0.43	0.49	75814	0.42	0.49	0.28
Upper teriary education	1207	0.1	0.3	75813	0.12	0.33	-2.88
Short tertiary	1207	0.1	0.3	75813	0.14	0.35	-4.01
Upper secondary	1207	0.18	0.38	75813	0.17	0.38	0.27
Vocational secondary	1207	0.31	0.46	75813	0.3	0.46	1
Lower secondary	1207	0.09	0.28	75813	0.07	0.26	1.76
Primary	1207	0.22	0.41	75813	0.19	0.39	2.48
Foreigner	1207	0.07	0.26	75814	0.05	0.22	3.08
Single	1207	0.37	0.48	75814	0.34	0.47	2.22
Married	1207	0.51	0.5	75814	0.57	0.49	-4.47
Widowed	1207	0.01	0.12	75814	0.01	0.11	0.71
Divorced	1207	0.11	0.31	75814	0.08	0.27	3.44
Baseline job characteristics							
Job tenure (months)	1204	107.9	111.6	75651	144.1	123.1	-11.12
Managers	1207	0	0.03	75814	0	0.05	-2.51
Professionals	1207	0.12	0.33	75814	0.17	0.37	-4.56
Technicians and associate professionals	1207	0.22	0.41	75814	0.21	0.41	0.4
Clerks	1207	0.14	0.34	75814	0.15	0.36	-1.58
Service and sales workers	1207	0.11	0.32	75814	0.11	0.31	0.42
Skilled agriculture and fishery workers	1207	0.01	0.09	75814	0.01	0.1	-0.69
Craft and related sales workers	1207	0	0.03	75814	0	0.05	-1.72
Plant and Machine operators	1207	0.3	0.46	75814	0.26	0.44	2.57
Elementary occupations	1207	0.1	0.3	75814	0.08	0.27	2.47
Agriculture	1206	0.01	0.1	75655	0.01	0.12	-1.38
Manufacturing	1206	0.32	0.47	75655	0.26	0.44	4.42
Construction	1206	0.12	0.33	75655	0.08	0.27	4.33
Wholesale and retail	1206	0.25	0.43	75655	0.21	0.41	2.9
Transport, communication and energy	1206	0.05	0.23	75655	0.09	0.28	-4.96
Finance and business services	1206	0.16	0.36	75655	0.19	0.39	-2.64
Other services	1206	0.09	0.28	75655	0.16	0.37	-8.8
Monthly wages	279	1735	1555	75372	1758	1253	-0.24
Holidays (week)	1203	5.01	0.94	75656	5.23	1.28	-7.82
Managerial position	684	0.14	0.35	41330	0.24	0.43	-7.73
Part-time	1207	0.11	0.32	75814	0.15	0.35	-3.66

Note: Baseline socio-demographic characteristics (at t = 0, that is in the quarter before displacement). Not all displaced workers are observed at t = 0. Out of the 2,364 identified displaced workers, only 1,207 are observed in the quarter prior to job loss. Only 279 of them are interviewed for the first time in the quarter prior to displacement in the first interview. Therefore the base line wage of displaced workers in known for only 279 of them. The pre-displacement wage of the 1207 workers displaced during the interview period is observed between four on one quarters before job loss in the first interview. Characteristics of non-displaced workers at t = 0 and in the first interview are reported.

Appendix A.3 Data on skills requirements

116. We use measures of skills required for different occupations derived from the United States Occupational Information Network (O*NET) survey. O*NET is an information tool designed to facilitate matches between job seekers and employers. The database contains numerical ratings for 239 job characteristics that are used to derive numerical indexes representing the required levels of seven skills (maths, verbal, general cognitive demand, interpersonal skills, craft, gross and fine physical skills) in each occupation, as well as the number of years of education generally required. While O*NET relates to occupations in the United States, Handel (2012) finds that there is substantial consistency in occupational skill scores across countries and substantial agreement across different skill databases. In this paper, occupations are classified using the International Standard Classification of Occupations (ISCO, 1998) at the two-digit level. As each occupational code is assigned a score for each of the seven skill requirements listed above, it is possible to calculate how a change in occupation following displacement translates into a change in skills use. See OECD (2013) for a more detailed description.

117. In this study, we particularly focus on two measures of change in skills requirement that are likely to be associated with lower earnings:

- **Lower education requirement:** a dummy variable equal to one if required education needed to be newly hired in the post-displacement job is lower than in the pre-displacement job.

- **Bad switch:** A binary variable indicating whether the change in occupation translates into a change in skill-set and a decrease in required education. A worker is defined as having switched skills-set if the main skill requirement based on its score before the occupational change moved down by at least two positions and its score changed by at least half of a standard deviation

APPENDIX B ANALYSING ATTRITION

Table B.1. **Probability of being interviewed for six consecutive quarters**

	(1) Variable		(2) Variable interacted with displaced	
	Coefficient	Robust standard error	Coefficient	Robust standard error
Displaced	-0.144	(0.104)	-	-
Women	0.00691**	(0.00309)	-0.00956	(0.0137)
Age	0.0257***	(0.000933)	0.00372	(0.00475)
Age squared	-0.000223***	(0.0000112)	-0.0000515	(0.0000545)
Foreigner	-0.0440***	(0.00581)	-0.0325	(0.0231)
Married vs. single	0.0254***	(0.00323)	0.00879	(0.0141)
Widowed vs. single	-0.0162	(0.0123)	-0.0116	(0.0473)
Divorced vs. single	-0.0474***	(0.00523)	0.0250	(0.0208)
Tertiary vs upper secondary educ	-0.0155***	(0.00334)	0.00223	(0.0130)
Secondary or less vs upper secondary educ	-0.0101***	(0.00364)	0.0157	(0.0178)
Managers vs machine/plant operators	-0.106***	(0.0245)	0.124	(0.123)
Professionals vs machine/plant operators	-0.0473***	(0.00507)	-05	(0.0217)
Technicians /assoc. prof. vs machine/plant operators	-0.0207***	(0.00435)	0.0120	(0.0179)
Clerks vs machine/plant operators	-0.00674	(0.00493)	-0.0118	(0.0216)
Services and sales workers vs machine/plant operators	-0.00467	(0.00524)	0.0112	(0.0232)
Agricultural workers vs machine/plant operators	0.00973	(0.0180)	-0.165**	(0.0825)
Craft and related sales vs machine/plant operators	-0.0691***	(0.0256)	-0.123	(0.112)
Elementary occ vs machine/plant operators	0.00872	(0.00534)	-0.0226	(0.0201)
Agriculture vs. manufacturing	-0.0429***	(0.0145)	0.0466	(0.0622)
Construction vs. manufacturing	-0.0189***	(0.00534)	-0.00585	(0.0191)
Wholesale/retail vs. manufacturing	-0.00970**	(0.00428)	-0.0174	(0.0173)
Transport, comm. vs. manufacturing	-0.00257	(0.00456)	-0.0404**	(0.0188)
Finance/business vs. manufacturing	0.00522	(0.00461)	-0.0325	(0.0203)
Other services vs. manufacturing	0.0105**	(0.00440)	-0.0511**	(0.0206)
Council tenant vs. homeowner	-0.0379***	(0.00387)	0.0486***	(0.0158)
Private tenant vs. homeowner	-0.162***	(0.00330)	0.0304**	(0.0149)
Rural vs urban	0.431***	(0.00406)	-0.0441***	(0.0166)
Quarter 2 vs. quarter 1	-0.0187***	(0.00355)	0.0180	(0.0150)
Quarter 3 vs. quarter 1	-0.00553	(0.00355)	0.0404***	(0.0153)
Quarter 4 vs. quarter 1	-0.0248***	(0.00373)	0.00476	(0.0160)

	(1) Variable		(2) Variable interacted with displaced	
	Coefficient	Robust standard error	Coefficient	Robust standard error
2004 vs. 2003	-0.0100*	(0.00609)	0.00645	(0.0240)
2005 vs. 2003	-0.0239***	(0.00572)	0.0255	(0.0233)
2006 vs. 2003	-0.00895	(0.00567)	0.0397*	(0.0230)
2007 vs. 2003	-0.00561	(0.00559)	0.0339	(0.0227)
2008 vs. 2003	0.00923	(0.00566)	0.0237	(0.0237)
2009 vs. 2003	0.0150***	(0.00532)	0.0147	(0.0216)
2010 vs. 2003	-0.00814	(0.00567)	0.00562	(0.0231)
Champagne-Ardennes vs Ile de France	-0.0235***	(0.00773)	0.0621*	(0.0332)
Picardie vs. Ile de France	-0.0435***	(0.00754)	0.0521*	(0.0309)
Haute-Normandie vs Ile de France	-0.0432***	(0.00743)	0.0912***	(0.0307)
Centre vs. Ile de France	-0.0279***	(0.00730)	0.0767**	(0.0306)
Basse-Normandie vs Ile de France	-0.0374***	(0.00856)	0.0487	(0.0381)
Bourgogne vs. Ile de France	-0.00275	(0.00788)	0.0554*	(0.0312)
Nord-Pas de Calais vs. Ile de France	0.0711***	(0.00561)	0.0707***	(0.0229)
Lorraine vs. Ile de France	0.00371	(0.00742)	0.0671**	(0.0305)
Alsace vs. Ile de France	0.0136*	(0.00755)	0.141***	(0.0321)
Franche-Comte vs. Ile de France	-0.0315***	(0.00837)	0.0989***	(0.0369)
Pays de la Loire vs. Ile de France	0.0256***	(0.00627)	0.0917***	(0.0285)
Bretagne vs. Ile de France	-0.00573	(0.00753)	0.0795**	(0.0357)
Poitou-Charentes vs. Ile de France	-0.00595	(0.00838)	0.0646*	(0.0355)
Aquitaine vs. Ile de France	-0.00355	(0.00724)	0.0439	(0.0315)
Midi-Pyrenees vs. Ile de France	-0.0347***	(0.00741)	0.05	(0.0343)
Limousin vs. Ile de France	-0.0528***	(0.00919)	0.120***	(0.0401)
Rhone-Alpes vs. Ile de France	-0.0180***	(0.00530)	0.00352	(0.0223)
Auvergne vs. Ile de France	-0.00901	(0.00915)	0.0586	(0.0407)
Languedoc-Rousillon vs. Ile de France	0.00386	(0.00803)	0.0887**	(0.0353)
Provence-Alpes-Côte d'Azur vs. Ile de France	0.0196***	(0.00592)	0.0669**	(0.0260)
Corse vs. Ile de France	0.0140	(0.0245)	-0.0259	(0.0938)
Constant	-0.0427**	(0.0195)		
Observations	127900			
R-squared	0.183			

Note: Linear probability model. Unweighed estimates. Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Source: Enquête Emploi 2003-11.

APPENDIX C RE-EMPLOYMENT CHANCES

Table C.1. **Factors affecting re-employment speed**

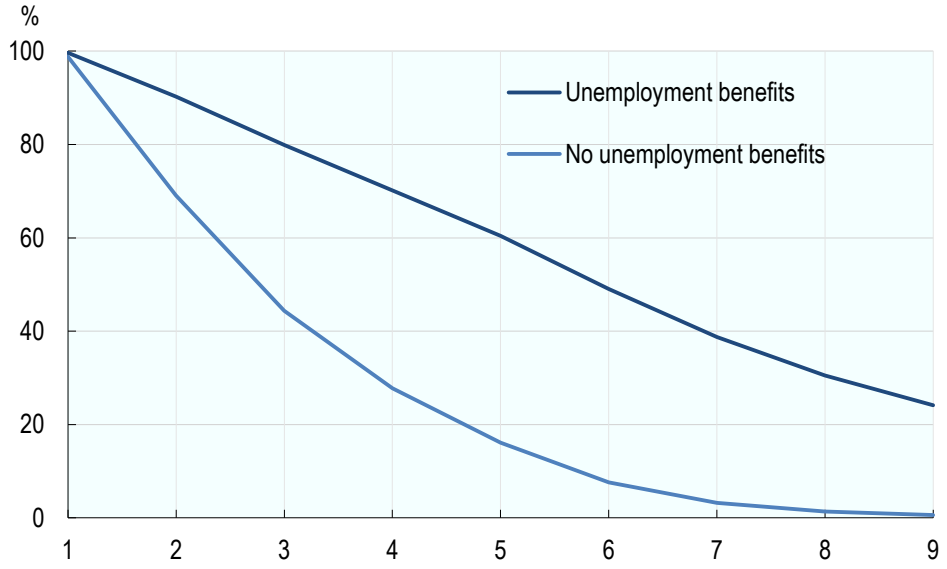
	Coefficient	Robust strandard error
Women	0.929	(0.087)
Less than 25 v 35-44	1.144	(0.153)
25-34 v 35-44	0.941	(0.0751)
45-54 v 35-44	0.848*	(0.0712)
55 or over v 35-44	0.166***	(0.185)
Foreign	0.927	(0.121)
Tertiary education vs upper secondary	0.919	(0.0715)
Lower secondary or primary vs upper secondary	1.01	(0.0858)
At least one child	1.105	(0.0938)
Women X Children	0.759**	(0.0981)
Unemployment benefits	0.325***	(0.0217)
Managers vs machine/plant operators	0.95	(0.207)
Professionals vs machine/plant operators	0.917	(0.0952)
Technicians /assoc. prof. vs machine/plant operators	1.017	(0.104)
Clerks vs machine/plant operators	0.823*	(0.096)
Services and sales workers vs machine/plant operators	0.969	(0.134)
Agricultural workers vs machine/plant operators	1.617	(0.635)
Craft and related sales vs machine/plant operators	1.033	(0.331)
Elementary occ vs machine/plant operators	0.891	(0.0904)
Agriculture vs. manufacturing	0.936	(0.364)
Construction vs. manufacturing	1.181*	(0.118)
Wholesale/retail vs. manufacturing	1.273***	(0.114)
Transport, comm. vs. manufacturing	1.113	(0.121)
Finance/business vs. manufacturing	1.207*	(0.128)
Other services vs. manufacturing	1.202	(0.158)
Observations	7581	-

Note: Cox proportional hazard model. The dependent variable is an indicator equal to one if the individual is employed, zero otherwise. Coefficients refer to proportional impact of on the hazard. Region and year fixed effects. There are up to six observations per individual. Robust standard errors in parentheses. Weighted estimates.

*** p<0.01, ** p<0.05, * p<0.1

Source: Enquête Emploi 2003-11.

Figure C1. **Unemployment and joblessness duration of short-tenured displaced workers**



Note: Adjusted survival curves calculated using a cox proportional hazards model. The sample is restricted to those who had less than one year of tenure in their previous job. The main variable of interest is a binary variable indicating whether individuals receive unemployment benefits. Independent variables include socio-demographic and former job characteristics, as well as the size of the town of residence and year and region fixed effects. The individual of reference is a prime age man, with upper secondary education, living with a partner in a big city, who used to work full-time as an unskilled employee in the manufacturing sector.

Source: Enquête Emploi (2003-2011)

APPENDIX D DIFFERENCES-IN-DIFFERENCES MODELS

Table D.1. **Heterogeneous effect of displacement: DiD model**

	Age		Gender		Education	
	Below 45	45 or over	Men	Women	Tertiary	Sec. or less
Monthly earnings ((Including zero earnings)	-973.1***	-1,365***	-1,251***	-1,007***	-1,603***	-1,028***
	(45.46)	(149.3)	(115)	(45.25)	(300.9)	(34.28)
Baseline wage (in Euros)	1667	1896	1971	1468	2391	1534
Change in %	-0.584	-0.72	-0.635	-0.686	-0.671	-0.67
Number of individuals	44,851	31,632	43,860	32,623	19,326	57,157
Observations	423,706	299,632	416,326	307,012	184,734	538,604
R-squared	0.005	0.017	0.009	0.006	0.007	0.009
Log monthly wage (Excluding zero earning)	-0.0724***	-0.283**	-0.152**	-0.127***	-0.290*	-0.0961***
	(0.0271)	(0.127)	(0.0752)	(0.037)	(0.171)	(0.024)
Difference	0.211		-0.025		0.073	
t-test	1.622		-0.298		-1.12	
Number of individuals	44,755	31,612	43,799	32,568	19,299	57,068
Observations	416,271	291,656	408,372	299,555	181,865	526,062
R-squared	0.033	0.011	0.024	0.025	0.023	0.025

Note: Coefficients are estimated using DID. The coefficients of a set of binary variables indicating the distance to displacement event are graphed. The control group includes those employed on a permanent contract in the baseline quarter and who have not been dismissed for economic reasons. Separated regressions are run for each demographic group. Independent variables include individual fixed effects, time varying characteristics and year fixed effects. Robust standard errors, clustered at the individual level, in parentheses. Weighted estimates.

*** p<0.01, ** p<0.05, * p<0.1

Table D.2. **Job quality: DiD models**

Quarters before and after displacement	(1) Part-time	(2) Weeks of paid holidays	(3) Managing position
-3	0.000194	-0.0769*	0.0327
	(0.00515)	(0.0464)	(0.0310)
-2	-0.00489	-0.114*	-0.00209
	(0.00786)	(0.0651)	(0.0344)
-1	-0.0132	-0.0857	-0.00655
	(0.0103)	(0.0707)	(0.0342)
0	-0.0194*	-0.0509	-0.0315
	(0.0107)	(0.0706)	(0.0338)
1	0.0385	-1.231***	-0.0553
	(0.0275)	(0.228)	(0.0424)
2	0.0534**	-1.221***	-0.0466
	(0.0263)	(0.183)	(0.0384)
3	0.0384	-0.898***	-0.0597
	(0.0249)	(0.167)	(0.0390)
4	0.0273	-0.844***	-0.0717*
	(0.0238)	(0.158)	(0.0393)
5	0.0278	-0.742***	-0.0637
	(0.0248)	(0.153)	(0.0402)
6	0.0155	-0.630***	-0.0591
	(0.0252)	(0.176)	(0.0404)
7	0.00826	-0.542***	-0.0282
	(0.0258)	(0.180)	(0.0416)
8	0.00353	-0.162	-0.0563
	(0.0277)	(0.212)	(0.0591)
9	-0.0176	0.00550	-0.0197
	(0.0303)	(0.264)	(0.0534)
R-squared	0	0.002	0.003
Number of individuals	79,112	78,225	43,303

Note: Coefficients are estimated using DID. The independent variable of interest is an indicator equal to one if the individual has been made redundant over the last six quarters. The control group includes those employed on a permanent contract in the baseline quarter and who have not been dismissed for economic reasons. Separated regressions are run for each demographic group. Independent variables include individual fixed effects, time varying characteristics and year fixed effects. Robust standard errors, clustered at the individual level, in parentheses. Weighted estimates.

*** p<0.01, ** p<0.05, * p<0.1