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Gender gaps in recurrence and concentration of unemployment: Evidence from youth leaving France's education system

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Abstract

This study proposes a *welfare-based* analysis of the gender gap in unemployment by examining the gender differences in the concentration and repeated spells of unemployment using data from the French cohort survey ("Enquête Génération") regularly conducted by the French Center for Studies and Research on Qualifications (CEREQ). In fact, studies on the gender gap in unemployment have focused primarily on the unemployment rate, ignoring the welfare dimension of the issue. This former captures only the cross-section elements of unemployment, omitting its longitudinal and repetitive aspects, which are of crucial interest from a welfare perspective, especially if unemployment is measured over a period of time (say one year or more). Building upon previous research on the measurement of unemployment and on explaining recurrent spells of unemployment, we propose a welfare-based analysis of gender gaps in unemployment. Unemployment involves welfare loss that can be analyzed through its recurrence and concentration. Both recurrence and concentration of unemployment lead to unstable and difficult living conditions. We use (Shorrocks A, *J Eco Inequal* 7: 295–310, 2008b) index of unemployment and count data models to apprehend and model these two aspects of unemployment. Then, we apply a regression-based decomposition method to identify the factors behind the gender gaps in recurrent unemployment and concentration of unemployment among youth leaving the education system in France. The results suggest that the gender gaps in recurrent unemployment and concentration of unemployment result from differences in the way young females and males are treated in the labor market.

JEL Codes: J16; J64; J71; C41; D63

Keywords: Gender gap; Recurrence of unemployment; Concentration of unemployment; Gender discrimination

1 Introduction

In recent years, a large number of studies have examined gender gaps observed in the labor market. These studies largely concern three key variables: wages, participation rates, and unemployment (e.g., Altonji and Blank (1999); Ham et al. (1999); Blau and Kahn (2003); Azmat et al. (2006)). Concerning unemployment, the focus is on the gender gap in the rate of unemployment (the cross-sectional dimension of unemployment), which is

computed at a given point in time, omitting the *welfare* dimension of the question, which is of crucial interest from society's perspective in the long term.

Unemployment encompasses longitudinal and repetitive aspects, which are as important as the cross-sectional dimension, especially when unemployment is measured over a period of time. The rate of unemployment captures only those currently unemployed, omitting those about to leave unemployment and those on the verge of entering it. These points are very important from a welfare perspective as they concern the vulnerability to unemployment and the way unemployment is distributed across the population.

Recurrent unemployment is considered part of the cycle of labor market disadvantage and poverty in work. In the scarring literature, spell recurrence is considered a cause of low-paid work and unstable jobs (Arulampalam et al. (2001)), as well as a sign of vulnerability to unemployment. Further, the extensive literature on duration analysis¹, attempting to explain why some unemployed individuals in society have longer durations of unemployment than others, focuses on the fact that unemployment is also associated with social and psychological problems resulting from some of its effects such as loss of income, discouragement, degradation of skills and exclusion from the labor market in long-term unemployment.

For these reasons, the distribution of a given amount of unemployment across the population (concentration) is very important from a social welfare perspective. The unemployment rate does not tell us whether the same persons are unemployed all the time during a given period or whether the burden is more equally shared. By extension, any differences in the recurrence and concentration of unemployment between males and females is a crucial question from society's perspective. In this regard, a welfare-based analysis of the gender gap in unemployment is necessary to obtain an idea of the extent and sources of the differences in loss of welfare due to unemployment between males and females.

The lack of interest in welfare-based analysis of the gender gap in unemployment would be understandable if there were no gender differences in recurrent unemployment and unemployment concentration, or if there were no appropriate measures of these aspects of unemployment. Yet, as we observe in Section 2, a substantial gender gap exists in both the recurrence of unemployment and its distribution². Thus, we must ask the following question: Do recurrence and concentration of unemployment differ by gender? And if so, what are the sources of such disparities? As we observe in Section 2, the answer to the first question is yes. We have found, using data on school leavers from "Enquête Génération", or the cohort survey, in France during the period 1998-2008, that although recurrence of unemployment (vulnerability to unemployment) is higher for females, they have a lower unemployment concentration than their male counterparts. As argued by Basu and Nolen (2006)³, vulnerability is not necessarily a bad thing because it means more equity in the way unemployment is shared across the population.

The idea of taking into account the repeated unemployment spells and concentration of unemployment in the measurement of unemployment, evoked in Disney (1979) and before that by authors such as Clark and Summers (1979), Akerlof and Main (1980, 1981); Salant (1977), and Kaitz (1970) among others, has been formalized at the beginning of the 1990s by authors such as Paul (1992), Sengupta (2008), and Shorrocks (2008a, 2008b)⁴ using a normative approach similar to that used in measuring poverty and inequality. However, the controversy surrounding the definition of the length of an unemployment

spell complicates the issue for unemployment. There are three recognized and widely used definitions of unemployment duration: the interrupted length, the completed length and the duration experienced over a given period of time. More recently, many studies have followed this issue: Riese and Brunner (1998), Borooah (2002), Basu and Nolen (2006), Deutsch et al. (2008), and Nolen (2013). These studies all share the key idea that the nature of unemployment distribution across the population is as important as the proportion who are unemployed, which is the most widely used measure of unemployment. They propose composite indices that incorporate, in addition to the unemployment rate, components that take into account distributional considerations of unemployment, which are important from a social welfare perspective.

The analysis of recurrent spells of unemployment has been addressed in the literature from two different but related angles. It first gained interest among labor economists after Disney (1979) at the end of the 1980s, notably in the RFG (Federal Republic of Germany), where a number of authors undertook both descriptive and econometric studies of the recurrence of unemployment. For the econometric element, some of these studies used count-data models (Andress (1989)), whereas others used hazard rate models (Groot (1989) and Gray (1989)) and qualitative response models (Steiner (1989); Stern (1989), and Winter-Ebmer and Zweimfiller (1992)) to test theoretical explanations.

Three fundamental theoretical explanations for repeated spells of unemployment have been tested: job search (impact of receipt of unemployment benefits), labor market segmentation (unstable labor market for a minority), and state dependence (past labor market career)⁵. The job search explanation comes from the fact that search models propose an explanation of entry into unemployment. In fact, in search models, unemployment benefits reduce the cost of unemployment and may cause a rise in the number of voluntary quits. This is questionable empirically as it is found to be insignificant in each of the aforementioned studies. The labor market segmentation theory advocates the existence of a dual labor market as a cause of repeated unemployment, as the secondary labor market is characterized by low-paid, unstable jobs. The state dependence theory explains repeated unemployment spells by the past labor market history of individuals. A long spell of unemployment and frequent unemployment spells can cause deterioration of human capital and demoralization, thus finally making the individual less employable. More recently, recurrent unemployment has been used in the scarring literature as an explanatory variable (Arulampalam et al. (2001)).

In the aforementioned literature, the effect of gender is addressed neither in the recurrence nor in the concentration of unemployment. Disney (1979) explores only the effect of age and Andress (1989) explains the reasons for females having been excluded from his sample by the fact that their labor market status is inextricably related to their husbands' and to their family responsibilities, reasons that do not hold for young persons, which is the group studied herein. The main objective of the present study is to propose a welfare-based analysis of the gender gap in unemployment, that is, an analysis of the gender gap in unemployment that extends beyond the gap in the unemployment rate. In fact, both recurrence and concentration are very important from society's perspective as they are symptomatic of unstable and difficult living conditions. In the present study, we attempt to disentangle the factors behind disparities in the recurrence and the concentration of unemployment between males and females over a period of ten years among a population of young persons having left the education system in France in 1998. It is widely known

that females' unemployment rate is higher than that of males, but is that true when taking into account the loss of well-being due to unemployment?

The paper proceeds as follows. Section 2 provides a descriptive analysis of the gender gaps in the recurrence and concentration of unemployment using the Shorrocks (2008b) index of unemployment. Section 3 contains an econometric analysis of the recurrence and the incidence of unemployment among young persons in France during the period 1998-2008. Before concluding in Section 5, Section 4 analyzes of the sources of gender disparities in repeated spells of unemployment and concentration of unemployment.

2 Overview of the gender gaps in recurrence and concentration of unemployment among youth leaving education in France

This section provides an overview of the gender gap in recurrence and concentration of unemployment using data on young persons in France. Data from "Enquête Génération" are used to gauge the extent of the differences in recurrence and concentration of unemployment between males and females among young persons having left the education system in France in 1998.

2.1 Measurement of recurrence and concentration

These two notions are jointly named in the study- though modeled separately- because both are related in a welfare perspective. Recurrent spells of unemployment or vulnerability to unemployment causes unstable living conditions but may decrease the level of concentration in the distribution of unemployment (Basu and Nolen (2006)). Recurrence and concentration in the present study are measured by considering a time period $[0, T]$. During this period, unemployment recurrence is measured using the number of unemployment spells that each individual experiences. This measurement has no normative connotation, but we measure the concentration in the unemployment distribution using the normative index of unemployment developed by Shorrocks (2008b).

The choice of this index is not arbitrary. It captures, in addition to the unemployment rate, the concentrations of both the qualitative and quantitative experiences of unemployment. The qualitative and quantitative experience of unemployment refer respectively to the unemployment status and the duration of unemployment -more specifically, whether the person has experienced unemployment, and if so how long he/she has been unemployed. The index addresses the way these are shared in society, in addition to the unemployment rate. This approach is very useful for comparing male-female differences in unemployment. It enables one to gauge gender differences in dimensions of unemployment other than the unemployment rate. In fact, limiting the issue of the gender differences in unemployment to only the gender gap in the unemployment rate may give a limited view of the extent of any gap (Bazen et al. (2013)). Other components of unemployment, however, are just as important as the unemployment rate. Such a limited analysis would also be out of step with the growing number of recent studies devoted to measures of unemployment beyond the unemployment rate⁶.

Unemployment, and by extension the gender gap in unemployment, is usually measured using the rate of unemployment ($h(t)$). Of course, at a given point in time, it is a good candidate for measuring unemployment. However, measuring unemployment over a time interval $[0, T]$ involves examining the longitudinal and repetitive

dimensions of unemployment. In this regard, using the average unemployment rate ($H = \frac{1}{T} \int_0^T h(t)dt$) is inappropriate, as it does not include those who are vulnerable to unemployment; that is, it ignores information on the way both qualitative and quantitative experiences of unemployment are distributed across the population. The average unemployment rate is an appropriate measure of unemployment during a given time period $[0, T]$ only if the experience of unemployment is equally shared qualitatively and quantitatively.

Shorrocks (2008b) proposes a measure of unemployment over the period $[0, T]$ that takes into account the concentration in the distribution of unemployment as well as the average unemployment rate. It is the product of three components and is given as follows:

$$U = SDH, \tag{1}$$

where S is the incidence component, D is the duration component, and H is the average unemployment rate.

This index of unemployment can be written as an equal equivalent spell duration, $t(A, P)$. The latter is the duration of unemployment, which if experienced by all members of the population (employed plus unemployed) would yield the same loss of welfare as that experienced from the actual distribution of durations. The welfare loss depends on the distribution of durations (A) and the proportion (P) of the labor force having experienced at least one spell of unemployment during the observed period. The index of unemployment can be re-written as the product of three components, each featuring a given aspect of unemployment.

$$U(A, P) = t(A, P) = \underbrace{\frac{t(A, P)}{P\tau(A)}}_{S_\alpha(A, P)} \underbrace{\frac{\tau(A)}{\mu(A)}}_{D_\alpha(A)} \underbrace{P\mu(A)}_H, \tag{2}$$

where:

- $\tau(A)$ is the duration that, if experienced by all members of the unemployed population would generate the same level of welfare loss as the duration that is observed.
- P is the proportion of the labor force that has experienced at least one spell of unemployment during the period of observation.
- A is the cumulative distribution function of durations, s . The latter is the proportion of time unemployed during the observed period and is distinguished from the incidence component of the Shorrocks index denoted S_α . The latter is obtained by dividing the total unemployment duration of each person by the length of the period of observation.
- $\mu(A)$ is the per capita duration ($\mu(A) = \int_0^1 sA(s)ds$).
- α is the aversion toward inequality parameter.
- $S_\alpha(A, P)$ gives the extent to which the qualitative experience of unemployment is unequally shared across the labor force, that is, the extent to which the total number of spells of unemployment have been experienced by only a small part of the population. In the present study it is called the concentration of qualitative experience of unemployment.
- $D_\alpha(A)$ gives the extent to which the quantitative experience of unemployment is unequally shared across the unemployed, that is, the extent to which the total duration of unemployment of the entire population of unemployed has been

experienced by only a small portion of them. In the present study it is called the concentration of quantitative experience of unemployment. It can be rewritten as:

$$D_{\alpha}(A) = \frac{\tau(A)}{\mu(A)} = 1 + \frac{\tau(A) - \mu(A)}{\mu(A)} = 1 + I(A), \quad (3)$$

where $I(A)$ is an inequality index. It is zero if the duration is equally shared. Otherwise, it is strictly positive and D is strictly greater than one.

- H is the average unemployment rate.

We next discuss the properties of this index. Let us suppose that everyone has experienced the same number of unemployment spells; in other words, unemployment experience is (qualitatively) equally shared across the labor force. In this case, $P = 1$ and $t(A, P) = \tau(A)$. Therefore, the incidence factor of the index (S_{α}), which measures the concentration of qualitative experience of unemployment, will be equal to one. The more inequality exists in the way the qualitative experience of unemployment is shared across the labor force - or when the unemployment spells are shared among a small number of persons - the higher is S_{α} . Thus, the more concentrated the qualitative experience of unemployment, the higher the value of the concentration index $S_{\alpha}(A, P)$.

Equivalently, if unemployment duration is equally shared across the unemployed (i.e., identical for each unemployed person), μ would be equal to τ ($I(A) = 0$) and the duration factor of the index would vanish from the unemployment index ($D_{\alpha} = 1$). Therefore, the index would reduce to the average unemployment rate (H) where the qualitative experience of unemployment is also equally shared in the population ($S_{\alpha} = 1$). The average unemployment rate is an appropriate measure of unemployment during a given period of time $[0, T]$ only if the experience of unemployment is both qualitatively and quantitatively equally shared.

Earlier we mentioned the welfare loss due to unemployment while defining the notion of equal equivalent spell duration. The index can tell us the equivalent of a given level of unemployment rate in terms of the welfare loss for the society. This welfare loss (L) is related to the equal equivalent spell duration as follows:

$$L(t(A, P)) = P \int_0^1 v(s) dA(s), \quad (4)$$

where $v()$ is the individual's welfare loss function. The choice of this individual welfare loss function should typically depend on the total duration of unemployment of the individual in question during the period $[0, T]$. The longer the duration, the higher the loss of welfare due to unemployment. This occurs because unemployment duration correlates with social and psychological problems at the individual level, and their consequences may be dramatic (including exclusion, riots) for the society as a whole. Furthermore, inter-comparability should also be considered as the loss of welfare should be more than proportionately increasing with longer duration of unemployment. For these reasons, the loss function, $v(s)$, should be a strictly increasing and convex function of durations.

Shorrocks uses the following individual loss function:

$$v(s) = s^{\alpha}, \quad (5)$$

where s is the proportion of time spent unemployed by the individual during the period of time $[0, T]$, and $\alpha > 1$ is the aversion toward inequality parameter. The higher the

value of α , the greater the importance attached to inequality in the measurement of unemployment experience.

This choice of welfare function is very convenient as it enabled Shorrocks to derive the incidence factor in the index that only depends on P . This former is now given by:

$$S_\alpha(P) = P^{\frac{1}{\alpha}-1}. \quad (6)$$

The higher the proportion of persons (P) having experienced unemployment at least once during the period $[0, T]$, the lower the degree of concentration in the distribution of qualitative experience of unemployment.

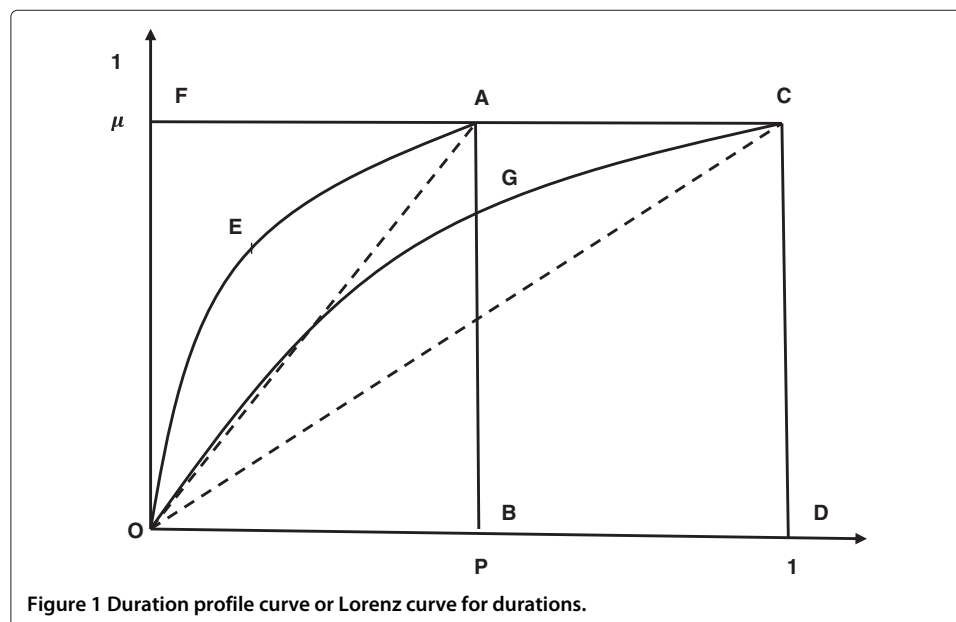
Another interpretation can be used to link the recurrence and concentration of unemployment. A high level of recurrence implies a low P as the same persons are unemployed repeatedly. Thus, the higher the recurrence of unemployment, the higher the degree of concentration. This phenomenon justifies the emphasis on governmental and international institutions' policies to reduce the vulnerability to unemployment or poverty. However, vulnerability, when it concerns the entire population, may cause a high P and is not necessarily a bad thing⁷ as unemployment is shared among a larger number of persons.

Using the same welfare loss function, $v(s) = s^\alpha$, the duration factor of the unemployment index takes the following form:

$$D_\alpha(A) = \left[\int_0^1 \left(\frac{s}{\mu(A)} \right)^\alpha dA(s) \right]^{\frac{1}{\alpha}}. \quad (7)$$

In the foregoing expression α is greater than one. The higher the value of this aversion parameter, the greater the importance attached to the inequality of the way durations of unemployment are distributed across the unemployed.

To summarize, Figure 1 depicts what Shorrocks (2008a) called a duration profile curve. The latter is a Lorenz curve for duration, that is, a Lorenz curve for which the diagonal ends at a point whose coordinates are $(1, \mu(A))$ if we consider the entire labor force and



$(P, \mu(A))$ if we consider only the unemployed. The duration profile curve corresponds to the curve OEAC. There are two extreme cases. The first case has no inequality either in the qualitative experience of unemployment or the quantitative experience of unemployment ($P = 1$ and $I(A) = 0$). Here the duration profile curve would be the straight line of perfect equality OC. The other extreme case has only one person experiencing unemployment, and so the duration profile curve would be FAC. If inequality is observed in both the qualitative experience of unemployment and the quantitative experience of unemployment ($P \in [0, 1]$ and $I(A) > 0$), the duration profile curve is given by OEAC. Another possible case has $P = 1$; that is, all individuals have been unemployed at least once. The duration profile curve in this case is given by the curved line OGC. In each of these cases, the extent of inequality increases when the curve shifts upward.

Thus, when the proportion affected by unemployment (P) increases, the distribution becomes less concentrated. The duration profile curve shifts to the right because unemployment is more equally shared. In fact, a given amount of unemployment is now shared among a larger number of persons. In the present study, we demonstrate that as the number sharing unemployment is more important for females, their concentration of unemployment is lower. This fact provides one important motivation of the present study because the use of the index has changed both the nature and the extent of the gender gap in unemployment. If females have a higher unemployment rate than males in the labor market, this is not the case in terms of inequality in the distribution of unemployment. It is therefore very important to measure the extent of the gap between men and women, and to identify the factors behind it.

2.2 Recurrence and concentration of unemployment among young persons

To gauge the extent of the recurrence and the concentration of unemployment, we need detailed information on the unemployment status for a given cohort over a long period of time⁸. This type of data provides precise information for each individual on the number and durations of unemployment spells experienced. Such data here are taken from the French cohort survey (“Enquête Génération” (EG)) regularly conducted by the French Center for Studies and Research on Qualifications (CEREQ). These surveys follow cohorts of young persons from the time of leaving the education system for a period of up to ten years, to collect information on sequences of labor market status and on the personal characteristics of individuals experiencing those sequences. This information is used by public and local authorities and other organizations to gauge -via indicators such as the unemployment rate and the employment rate- the insertion of young persons into the labor market according to their level of education, training, area of specialization, and other factors. The first survey was undertaken in 1997 for the cohort leaving education in 1992.

We use such data because they are more appropriate than those provided by the labor force survey for the measuring unemployment using the Shorrocks index. It provides detailed information on an individual's labor market situation during the survey period. This information enables us to record each individual's exact number of unemployment spells. Furthermore, the commonly known instability of young persons' labor market situation makes them the ideal population for studying vulnerability to unemployment. Young persons are most often not entitled to receive unemployment benefits, which makes the concentration measure among them more reliable. In fact, in countries

like France with a strong welfare system, it may be better for the society to concentrate unemployment in fewer persons and finance their welfare by taxing employed persons.

This study uses the EG for the 1998 cohort followed over ten years, during which individuals are interviewed three or four times. They are interviewed ten years after leaving the education system, having been interviewed three times previously: after three, five, and seven years. At the final interview roughly 16,000 individuals were contacted, of whom 11,137 participated, and this study used that sample. The eligibility requirements were as follows:

- enrolled in an educational institution in France during 1997-1998.
- left the education system in 1998 (calendar year from January to December)
- interrupted studies for a year or more before 1997-1998 (except for reasons of health or national service)
- no resumption of studies during the years following entry into the labor market
- aged thirty five years old or younger in 1998
- resident in France at the time of the survey (thus excluding persons pursuing studies abroad or going abroad for their first job)

Table 1 reports descriptive information on the recurrence and the concentration of unemployment among the population of young persons having left the education system in France in 1998. Our period of observation is 132 months, and is the value of T in Shorrocks's index. These persons have been followed as described from 1998 to 2008 and provide retrospective information on their labor market experience.

Among the 5517 males in our sample, 49.5% experienced unemployment. The rest experienced no unemployment during the observation period. This outcome reveals the extent to which the qualitative experience of unemployment is unequally shared across the labor force among young persons leaving school in France. The figures are very different for females. Fifty-eight per cent of females entering the labor market in 1998 had experienced unemployment at least once by the end of 2008: 8.5 percentage points (or 17%) higher than males. These figures differ greatly from the unemployment rate⁹ figures in Table 1: 8.1% and 6.1% for females and males, respectively. Such a difference between the mean unemployment rate and the percentage of persons having experienced unemployment is not unexpected given the length of the observed period. However, considering at the gender ratio, computed here using the level for females over that of males, we have a totally different result. The gender gap is slightly lower than the gender gap in the unemployment rate.

Table 1 Descriptive statistics

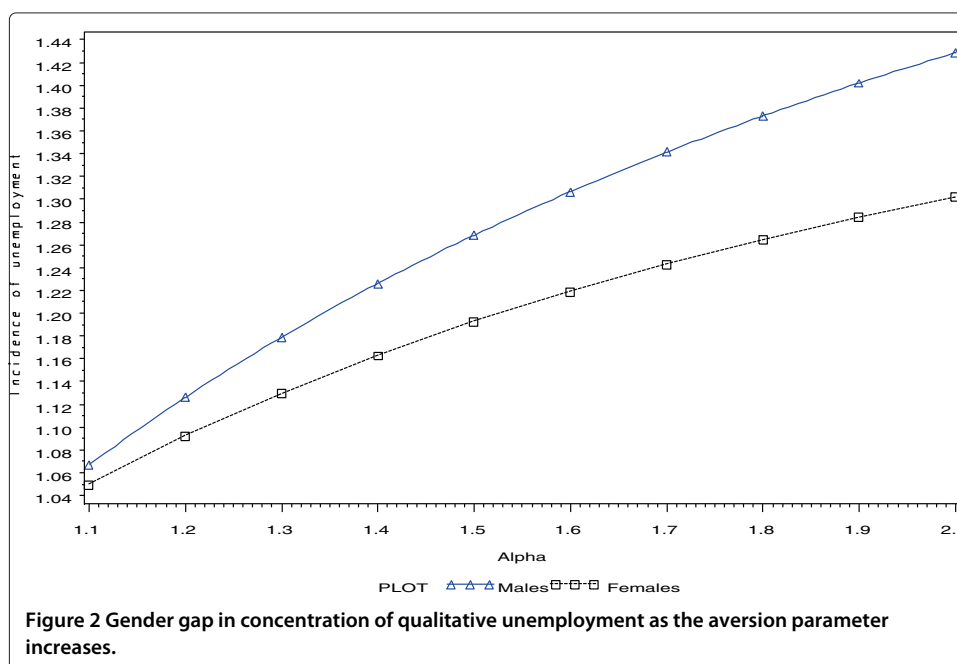
	Males	Females	Gender gap	Gender ratios
Average unemployment rates (H)	0.06	0.08	0.02	1.33
Incidence (at least one spell) (P)	0.495	0.58	0.085	1.17
Mean number of unemployment spells	1	1.23	0.23	1.23
Mean total duration in months (all spells)	8	10.63	2.63	1.33
Mean spell duration (in months)	8	8.57	0.57	1.07
Incidence factor ($S_{\alpha}(P, A)$ for $\alpha = 2$)	1.42	1.31	-0.11	0.92
Duration factor ($D_{\alpha}(A)$ for $\alpha = 2$)	1.61	1.57	-0.04	0.98
Concentration ($S_{\alpha} \times D_{\alpha}$ for $\alpha = 2$)	2.28	2.06	0.22	0.90
Shorrocks ($U = S_{\alpha} \times D_{\alpha} \times H$ for $\alpha = 2$)	0.14	0.17	0.03	1.21

Table 1 reports Shorrocks's measure of this concentration based on the incidence (P) - the proportion experiencing at least one spell of unemployment during the observation period. It depends on an aversion toward the inequality parameter, $\alpha > 1$. Equation 6 represents the index, called the incidence factor in Shorrocks (2008b). A low P means high inequality in the way the qualitative experience of unemployment is shared (S_α). Returning to our case, a low P means that unemployment is more concentrated among males, as the proportion, P , experiencing unemployment (49.5%) is lower than that for females (58%). Unlike the unemployment rate, the higher the incidence, the better it is from a welfare perspective.

According to Shorrocks (2008b), the choice of the appropriate value of alpha is normative. In the empirical part of the present study, we use the value 2. This choice is based on Layard (1981), who claims that the average cost of unemployment per unit of time (month here) is proportional to the proportion of time unemployed. When transposed into our case where the loss of welfare due to unemployment for an individual unemployed for s months is $v(s) = s^\alpha$, the corresponding value for our aversion parameter, α , is 2. This value suggests that the welfare loss of an extra month of unemployment is twice the unemployment duration.

The levels of concentration of qualitative experience of unemployment (i.e., the degree of inequality in the distribution of spells of unemployment (Table 1)) are 1.31 and 1.42 for females and males, respectively. The gap is still not negligible: 0.1084. The concentration of unemployment for males is 8% higher than that for females. This gap increases as the aversion parameter, α , increases as Figure 2 depicts. This outcome means that the more importance is attached to inequality in the distribution of unemployment, the more important is the gender gap in the concentration of unemployment.

As noted previously, the gender gap in concentration of unemployment is as important as the gender gap in unemployment rate. Yet few studies have addressed the gender gap in



concentration of unemployment (Bazen et al. (2013)). One purpose of the present study is to fill this gap. However, we are interested in not only measuring the gender gap in concentration of unemployment, but also to explaining this gap. For this purpose, the next two sections of the paper present an econometric analysis of the sources of the gap.

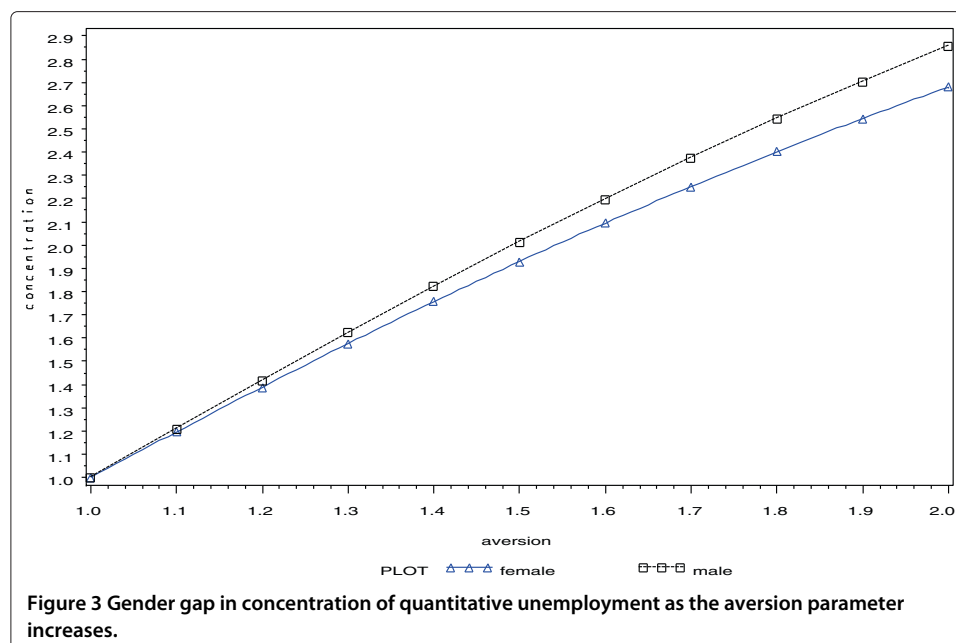
Previously, the analysis has addressed only the qualitative aspect of the unemployment experience (i.e., being unemployed or not). However, the unemployment experience also has a quantitative dimension. It is important to look at the way unemployment duration is shared across the unemployed population. In this regard, the Shorrocks A (2008b) index of unemployment encompasses a duration distribution component indicating the extent to which the quantitative experience of unemployment is unequally shared across the unemployed. Equation 7 represents this distribution. For $\alpha = 2$, the index can be written as follows:

$$D_{\alpha}(F) = \frac{(E(s^2))^{\frac{1}{\alpha}}}{E(s)}. \tag{8}$$

By using the sample estimates of $E(s)$ and $E(s^2)$, one can obtain the levels of concentration for $\alpha = 2$. These are 1.61 and 1.57 for males and females respectively. The gender gap in the concentration of quantitative unemployment is 0.04. This index of concentration can be computed for different values of α (see Figure 3). The picture is the same as that for the qualitative experience of unemployment. The gender gap increases as the aversion toward the inequality parameter increases.

Table 1 reports the total level of unemployment concentration obtained by the product of the incidence factor(s) and the duration factor(s) of the Shorrocks index in Table 1. These are 2.06 and 2.28 for females and males, respectively. The total gender gap in the concentration of unemployment is 0.22 and is due primarily to the gender gap in concentration of qualitative unemployment.

To obtain the value of the Shorrocks index of unemployment when $\alpha = 2$, the figures above are multiplied by the mean unemployment rate: $U = SDH$. As Table 1 reports,



the index is equal to 0.14 and 0.17 for males and females, respectively. These are clearly higher than the unemployment rates: 0.06 and 0.08 for males and females, respectively. Given that the Shorrocks index is expressed as an equal equivalent spell duration, these results mean that unemployment rates of 6% and 8% are equivalent to respectively 14% and 17% of 132 months of unemployment of the entire labor force (of males and females, respectively) in terms of the welfare loss involved. The gender gap in unemployment according to this unemployment index is 0.03 (21%) compared to a gap of 0.02 (33%) for the unemployment rate. The two percentage point difference in unemployment rate is equivalent, in terms of welfare, to roughly four months of unemployment for all females during the observed period.

Another key term in the present study is the notion of recurrent unemployment, or repeated spells of unemployment. It is measured here by taking the number of unemployment spells experienced by each individual in the labor force during the observed period (1998-2008). Over that period, 2732 and 3551 unemployment spells were recorded for males and females, respectively. We have seen that these unemployment spells were experienced by 49.5% and 58% of males and females, respectively. Table 1 reports that the mean number of unemployment spells is 1.23 and 1 for females and males, respectively. The gender gap is 0.23¹⁰. This figure might seem very small, given that it is less than one. However, this is not the case. To understand why, let us convert it in months of unemployment by assuming that males and females have the same mean of unemployment spell duration¹¹, let us say 10 months. The gap in total duration during the observed period would be 10 months times the gender gap in recurrent unemployment (0.23). The gap in the mean of total duration would then be 2.3 months, which is not negligible as a gender gap in unemployment duration.

In the present case, as Table 1 reports, the mean total duration is 8 months for males and 10.63 months for females. Based on Disney (1979), using the mean number of unemployment spells (1 for males and 1.23 for females), we obtain an estimate of the mean of unemployment spell duration by taking the ratio of the mean of total duration of unemployment and the mean of number of unemployment spells. This calculation gives 8 months and 8.57 months for males and females, respectively¹². The gender gap in mean duration, which was 2.6 months, becomes 0.57 months after correcting for repeated unemployment. This outcome indicates the importance of the gender gap in recurrent unemployment, in addition to any scarring effects as described in the introduction. However, recurrent spells of unemployment are not usually taken into account in duration analysis that focuses largely on the duration until the first exit. In our case, such an approach would be misleading, suggesting the existence of a gender gap of roughly three months whereas it is only half a month. The second objective of this study is to identify the factors causing the gender gap in the recurrence of unemployment. Sections 3 and 4 address this topic.

3 Explaining recurrence and concentration of unemployment

In this section, we undertake an econometric analysis of the causes of recurrent unemployment and the concentration of unemployment, using count-data models and a logit model, respectively. The use of a count-data model is more appropriate in the present case, given that the number of unemployment spells is used to model the recurrence of unemployment. Concerning the concentration, given that it directly depends on the

proportion of individuals having been unemployed at least once during the observed period, the use of logit model for the probability of having experienced more than one number of unemployment spells enables assessment of the causes of unemployment concentration. In fact, the higher this probability, the lower the level of unemployment concentration.

3.1 Recurrence

We estimate both a negative binomial and a hurdle model¹³. The regression variables are: gender, education, area of specialization, the reasons for leaving the education system, treatment in the labor market, age, region, career choices, career choices due family responsibilities, and ethnic origin. These explanatory variables are constructed of dichotomous variables, except for age (continuous number of years corresponding the age at the first interview). They are constructed as follows:

- Gender: indicator variable for the sex (female), taking the value one if the sex of the person is female and zero otherwise.
- Education: three categories: university education, secondary education, and primary education. Primary education serves as the reference category for the estimation.
- Area of specialization: four specialties have been created: general, tertiary or human science, industry or science, and health or social science. General education serves as the reference category.
- Reasons for leaving the education system: indicator for graduation before leaving the education system in 1998 (graduated), taking the value one if the person graduated before leaving the education system and zero otherwise; indicator for abandon of studies (quit) before completion of the degree, taking the value one if the person dropped out before the end of the expected term of the education and zero otherwise.
- Treatment in the labor market: indicators for the experience of discrimination. As types of discriminations we consider the indicators for discrimination due to personality, physical attributes, family responsibilities, and race. The “experience of discrimination” variable tells us whether the person interviewed has experienced discrimination. This information, as are many in this study, reflects the surveyed individuals’ accounts. Of course, given that discrimination is prohibited in France, the employer would have been penalized if discrimination could be proved. It may sound nonsensical (or redundant) to combine the types of discrimination and discrimination in the same regression, but here, discrimination includes the types of discrimination cited along with many others. It is a dichotomous variable that takes the value one if the individual feels that he/she has experienced discrimination - that is, judged by the employer (or potential employer) on the basis personal characteristics that are irrelevant to the skills required for the job.
- Career choices: indicator variable for apprenticeship training (apprenticeship), taking the value one if the person received an apprenticeship training and zero otherwise; the indicator for internship during the education (internship) takes the value one if the person has been in an internship during the education and zero otherwise; two dummy variables have been coded for professional reorientation during the period depending on whether it succeeded (professional reorientation and failed professional reorientation); the indicator variable for mobility in the job search

process takes the value one if the person has moved from the region where education was undertaken to find a job and 0 otherwise.

- Region: indicator for “Ile de France” as region where education was undertaken, taking the value one for an individual whose education was undertaken in Ile de France and zero otherwise.
- Career choices due to family responsibilities: two indicator variables for parental leave following the birth of the first (parental leave 1) and the second child (parental leave 2), taking the value one if the person takes, parental leave at the birth of the first or the second child and zero otherwise; two indicator variables for being employed at the birth of the first (employed 1) and the second child (employed 2), taking the value one if the person was employed at the birth of the first or the second child and zero otherwise; two indicator variables for having resigned at the birth of the first (resign 1) and the second child (resign 2), taking the value one if the person resigned at the birth of the first or second child and zero otherwise.
- Ethnic origin: two indicator variables for the birth place of the parents, indicating whether the parents are from non-European countries.

Table 2 reports means and standard variations of the variables. Table 3 reports the estimated parameters. Table 4 reports the marginal effects computed as the first derivative of the logarithm of the conditional expectation¹⁴. These results can be interpreted as the variation percentages of the number of unemployment spells following a unit variation of the explanatory variable in question.

We observe that the marginal effects are lower for the negative binomial model. This outcome means that not taking into account excess zeroes in the model causes to an underestimation of the explanatory variables’ marginal effects. This underestimation amounts to 33% difference in the marginal effect of the female dummy variable. Being female would increase the number of unemployment spells by about 30% during 1998-2008 for a young person having left the education system in 1998. With the negative binomial model, this figure rises to 40% after correcting for the excess zero problem. Given that excess zeroes are taken into account here by estimating a logit model, the marginal effect of the hurdle model is approximately equal to the sum of the marginal effects obtained for the count model and the logit model.

The lowest marginal effect is for the school leaving age variable, probably because many of the individuals in the sample belong to the same age category. Being one year older causes a 3.3% decrease in the number of unemployment spells. The most important variables other than gender are education level with primary level as the reference category, and the specialization of training with general education as the reference category. The role played by the experience of discrimination (other than gender discrimination), especially discrimination for physical and personality reasons, should also be noted. Young persons apparently suffer greatly from these experiences. The region where education was undertaken is also important, as are the reason for finishing education (have quit or graduated) or having made or tried a professional reorientation during the period, and the parents’ birth place.

As Table 4 reports, variables relative to education and area of specialization have negative effects on recurrent unemployment. Starting with education, the results reveal that persons with a secondary or a university degree have fewer unemployment spells

Table 2 Descriptive data

Variables	nb	Mean	std. dev..	min	max
nb. unempl. spells	10961	1.12	1.51	0	12
P	10961	0.54	0.50	0	1
Female	10961	0.50	0.50	0	1
Age	10961	21.77	2.98	14	35
University	10961	0.48	0.50	0	1
Secondary	10961	0.41	0.49	0	1
Industry or science	10961	0.31	0.46	0	1
Tertiary	10961	0.44	0.49	0	1
Health or social	10961	0.09	0.28	0	1
Learning	10961	0.18	0.38	0	1
Internship	10961	0.64	0.48	0	1
Graduated	10961	0.65	0.48	0	1
Quit	10961	0.38	0.48	0	1
Ile de France	10961	0.10	0.30	0	1
No movers	10961	0.98	0.12	0	1
Career transition	10961	0.27	0.45	0	1
Career transition trial	10961	0.14	0.34	0	1
Discrimination	10961	0.18	0.38	0	1
Discr. personality	10961	0.01	0.09	0	1
Discr. family	10961	0.04	0.20	0	1
Discr. race	10961	0.035	0.18	0	1
Discr. physical	10961	0.05	0.23	0	1
Parental leave 1	10961	0.07	0.25	0	1
Parental leave 2	10961	0.10	0.30	0	1
Resign 1	10961	0.03	0.16	0	1
Resign 2	10961	0.01	0.10	0	1
Employed 1	10961	0.51	0.50	0	1
Employed 2	10961	0.31	0.46	0	1
Mother birth place	10961	0.07	0.25	0	1
Father birth place	10961	0.07	0.26	0	1

than persons with a lower education level. The number of unemployment spells is roughly 50% and 35% lower for those with university and secondary education, respectively. Considering that the primary sector employs persons with higher education levels makes labor market segmentation an important determinant of recurrent unemployment.

Turning to the area of specialization, compared to a person with general education, a person with an industrial or scientific specialization, or tertiary, health and social science specializations, have lower recurrence. This finding is especially true for persons in the health and social specialization who rarely experience unemployment. The effect is much lower for the tertiary sector. The results obtained for educational and specialization variables suggest an important role played by these variables as an explanation for the recurrence of unemployment.

Examining the remaining variables, we observe that the following have a negative effect on recurrent unemployment: whether education was undertaken in the Paris region, not moving in the job search process, discrimination due to personality, discrimination due to race, labor market situation at the birth of the first and second child. All other variables

Table 3 Results for count data models

	Neg. Bin. model		Hurdle model		Logit model	
	Coef. Est.	Std. error	Coef. Est.	Std. error	Coef. Est.	Std. error
Constant	1.0939	0.1512	0.9958	0.2157	1.6623	0.2657
Female	0.3039	0.0280	0.1626	0.0382	0.5723	0.0505
Age	-0.0328	0.0059	-0.0178	0.0087	-0.0528	0.0096
University	-0.2896	0.0783	-0.4373	0.1070	-0.2749	0.1479
Secondary	-0.3652	0.1251	-0.2183	0.08328	-0.2199	0.0631
Industry or science	-0.1406	0.0625	-0.0439	0.0838	-0.2910	0.1163
Tertiary	-0.0414	0.0589	0.0609	0.0784	-0.2117	0.1116
Health or social	-1.1579	0.0922	-0.8465	0.1625	-1.5984	0.1460
Learning	-0.1718	0.0450	-0.1368	0.0622	-0.2259	0.0785
internship	0.0816	0.0338	-0.0260	0.0463	0.2416	0.0602
Graduated	-0.0658	0.0318	-0.0709	0.0444	-0.0458	0.0556
Quit	0.1835	0.0246	0.1104	0.0336	0.3216	0.0446
Ile de France	-0.2241	0.0420	-0.1746	0.0604	-0.3443	0.0702
No movers	-0.1444	0.0917	-0.1684	0.1237	-0.1567	0.1698
Career transition	0.3178	0.0254	0.2166	0.0342	0.5396	0.0475
Career transition trial	0.1810	0.0323	0.1302	0.0429	0.2993	0.0619
Discrimination	0.2452	0.0397	0.1996	0.0526	0.3516	0.0763
Discr. personality	-0.1943	0.1255	-0.3236	0.1741	-0.0863	0.2278
Discr. family	0.0792	0.0606	0.1136	0.0789	0.0501	0.1196
Discr. race	-0.0971	0.0674	-0.0983	0.0860	-0.0817	0.1398
Discr. physical	0.1488	0.0545	0.1498	0.0688	0.2260	0.1165
Parental leave 1	0.1364	0.0500	0.04144	0.0710	0.2542	0.0860
Parental leave 2	0.1299	0.0518	0.0291	0.0776	0.1754	0.0831
Resign 1	0.2989	0.0722	0.1551	0.0978	0.5824	0.1353
Employed 1	-0.4125	0.0297	-0.3210	0.0421	-0.5910	0.0512
Employed 2	-0.2364	0.0386	-0.1842	0.0583	-0.2837	0.0606
Mother birth place	0.1135	0.0624	0.1124	0.0829	0.1655	0.1194
Father birth place	0.0817	0.0616	-0.0308	0.0820	0.2944	0.1177
Dispersion	0.5176	0.0221	0.5352	0.0241	-	-
Loglikelihood	-8391.91		-8191		-6738	
NB. Obs.	10960		5883		10961	

have a positive effect on recurrent unemployment: having quit school before graduating, having made a professional reorientation, discrimination due to family responsibilities, discrimination for physical reasons, parental leave at birth of the two first children, resignation at birth of a child, and parents' background.

3.2 Concentration of unemployment

Unemployment concentration is measured using the incidence factor of the Shorrocks index of unemployment. This incidence factor, which gives the extent to which the qualitative experience of unemployment is distributed across the population of the labor force, depends on the proportion (P) of individuals having experienced at least one spell of unemployment during 1998-2008. The lower this proportion, the more concentrated the unemployment. To learn more about the determinants of concentration of unemployment, a logit model is estimated for the probability of having a positive number of unemployment spells - that is, having experienced unemployment at least once during the period of observation.

Table 4 Marginal effects

	NB model	Hurdle model	Logit model
Female	0.3039	0.4007	0.1221
Age	-0.0328	-0.0394	-0.0113
	Education level (primary as reference category)		
University	-0.2896	-0.4949	-0.0586
Secondary	-0.2199	-0.3544	-0.0779
	Area of specialization (general education as reference category)		
Industry or science	-0.1406**	-0.1681**	-0.0062**
Tertiary	-0.0414 ⁿ	-0.0443 ⁿ	-0.0451 ⁿ
Health or social	-1.1579	-1.4412	-0.3409
	Career choices		
Apprenticeship	-0.1718	-0.2194	-0.0482
Internship	-0.0816**	-0.0805**	0.0097**
Professional reorientation	0.3178	0.4301	0.1151
Failed professional reorientation	0.1810	0.2473	0.0638
No movers	-0.1444 ⁿ	-0.2183 ⁿ	-0.0334 ⁿ
Region	-0.2241	-0.3045	-0.0734
	Reasons of leaving education		
Graduated	-0.0658**	0.2506**	0.0686**
Quit	0.1835	0.0895	0.5153
	Treatment in the labor market		
Experience of discrimination	0.2452	0.3285	0.0749
Experience of discr. personality	-0.1943 ⁿ	-0.3052 ⁿ	-0.0184 ⁿ
Experience of discr. family	0.0792 ⁿ	0.1178 ⁿ	0.0107 ⁿ
Experience of discr. race	-0.0971 ⁿ	-0.1185 ⁿ	-0.0174 ⁿ
Experience of discr. physic	0.1488	0.2293	0.0482
	Career choices due to family		
Parental leave 1	0.1364	0.15257	0.0542
Parental leave 2	0.1299**	0.1050**	0.0374**
Resign 2	0.2989	0.3987	0.1242
Employed 1	-0.4125	-0.5409	-0.1260
Employed 2	-0.2364	-0.2846	-0.0605
	Ethnic origins		
Father birth place	0.1135*	0.1715*	0.0353*
Mother birth place	0.0817 ⁿ	0.1093 ⁿ	0.0628 ⁿ

All variables are significant at 1 per cent except ** 5 per cent, * 10 per cent and n not significant.

As we observed in Section 2, the sample estimate of this probability is 0.58 for females and 0.495 for males, which means that unemployment is more concentrated among males as the proportion involved in unemployment is lower compared to that of females. The difference in this proportion is estimated using the logit model to be 12 percentage points - that is, after taking into account of the explanatory variables - as shown in last column of Table 4. Being female would increase the probability of being unemployed at least once during 1998-2008 by 12 percentage points, other things being equal. Table 3 presents the results of parameters estimates. Concerning the determinants of this probability, the same interpretation as in the hurdle model holds even if the marginal effects differ in magnitude. A positive marginal effect means a negative effect on concentration. For example, being female increases vulnerability to unemployment by 12% compared to being male. In return, because of the negative relationship between

vulnerability and concentration, compared to males, females will have a lower level of concentration.

This section has described the importance of the gender perspective of the recurrence and the concentration of unemployment. Recurrence of unemployment is 40% higher for females overall, other things being equal. However, this makes concentration lower for females as being female would cause an increase of about 12 percentage points of the probability of experiencing unemployment during the observation period, which seems to correlate negatively with the level of concentration in the distribution of unemployment. In Section 4 we investigate these gender differences using a regression-based decomposition method.

4 Gender gap in recurrence and concentration of unemployment

We are concerned here with two different gaps: the gender gap in the number of unemployment spells and the gender gap in the incidence factor of the Shorrocks unemployment index. For this purpose, we use the Yun (2004)¹⁵ decomposition method to identify the factors contributing to the gender gap observed in both recurrence and concentration of unemployment.

Let us consider the two following functions, $F(X_F)$ and $M(X_M)$ representing the functions of individuals observed characteristics (X_F and X_M) to be decomposed for females and males, respectively. The Yun (2004) decomposition method can be expressed as follows:

$$\underbrace{\bar{F}(X_F) - \bar{M}(X_M)}_{\Delta O} = \underbrace{\sum_{k=1}^K W_{\beta}^k [\bar{F}(X_F) - \bar{M}(X_F)]}_{\Delta\beta} + \underbrace{\sum_{k=1}^K W_X^k [\bar{M}(X_F) - \bar{M}(X_M)]}_{\Delta X} \quad (9)$$

where $W_{\beta}^k = \frac{\bar{X}_F^k (\beta_F^k - \beta_M^k)}{\sum_{k=1}^K \bar{X}_F^k (\beta_F^k - \beta_M^k)}$ and $W_X^k = \frac{\bar{\beta}_M^k (\bar{X}_F^k - \bar{X}_M^k)}{\sum_{k=1}^K \bar{\beta}_M^k (\bar{X}_F^k - \bar{X}_M^k)}$ are the weight functions that sum to one and $\bar{G}(X_G) = \frac{1}{m} \sum_{i=1}^m G(X_{iG})$ with $G = F, M$. ΔO , $\Delta\beta$ and ΔX represent the overall gender gap and its unexplained and explained parts, respectively.

Applying this decomposition method to the mean number of unemployment spells¹⁶ for the population with a positive number corresponding to $E(n|X, n > 0)$, and to the incidence factor of the Shorrocks index, one obtains the corresponding respective G functions used for the decomposition:

$$G(X_{iG}) = \frac{\exp(X'_{iG} \beta_G)}{1 - (1 + a_G \exp(X'_{iG} \beta_G))^{-\frac{1}{a_G}}} \quad (10)$$

and

$$G(X_{iG}) = \left[\frac{\exp(Z'_{iG} \gamma_G)}{1 + \exp(Z'_{iG} \gamma_G)} \right]^{\frac{1}{2}} \quad (11)$$

where $G = F, M$.

Equation 11 is the incidence factor of the Shorrocks index when the aversion parameter, α , takes the value two. As stated earlier, this parameter should be strictly higher than one. And when it increases, more importance is attached to the inequality of the qualitative experience of unemployment or concentration of unemployment.

4.1 Gender differences in recurrence of unemployment

To perform the decompositions, the hurdle model is first estimated separately by gender. Table 5 presents the results. Table 6 reports the results of the decomposition of the gender gap in the mean number of unemployment spells for persons with a positive number, using equation 10.

The expected number of unemployment spells of females is 8% higher than that of males. However, it would decrease by roughly 12% if they were treated like males, that is, applying the estimated coefficients for males to female characteristics. In that case the gap would be negative and equal to the explained part of the decomposition - the part of the overall gap due to differences in observed characteristics between males and females. Thus, the gender gap in recurrence results primarily from discrimination against women as it is totally eliminated when they are treated like males.

The explained part of the decomposition (ΔX) can be interpreted as a decrease in the number of unemployment spells of males roughly 5% if they possessed the same characteristics as their female counterparts. This interpretation simply means that females have better characteristics than males. The gap would be equal to 0.1017.

The detailed decomposition enables a partition of the overall gap into the sum of the contribution of each explanatory variable. Each contribution can be split into the sum of contributions to the explained part (ΔX) and to the unexplained part ($\Delta\beta$). Here

Table 5 Estimates for the truncated negative binomial (Hurdle) model by gender

	Males		Females	
	Coef. Est.	Std. error	Coef. Est.	Std. error
Constant	0.7448	0.3216	1.2811	0.2852
Age	-0.0092	0.0135	-0.0234	0.0120
University	-0.5827	0.1712	-0.2934	0.1326
Secondary	-0.3877	0.1307	-0.0474	0.1029
Industry or science	-0.0447	0.1260	0.0393	0.1111
Tertiary	0.0384	0.1301	0.0713	0.0901
Health or social	-1.3341	0.4974	-0.7851	0.1765
Learning	-0.0959	0.0640	-0.1283	0.0758
Graduated	0.0044	0.0704	-0.1350	0.0565
Quit	0.1022	0.0509	0.1191	0.0445
Ile de France	-0.0105	0.0851	-0.3441	0.0861
No movers	-0.0602	0.1905	-0.2806	0.1622
Career transition	0.2516	0.0516	0.2005	0.0455
Career transition trial	0.1232	0.0677	0.1431	0.0547
Discrimination	0.2576	0.0782	0.1257	0.06559
Discr. personality	-0.7639	0.2829	0.0361	0.2233
Discr. family	0.0188	0.1873	0.1868	0.0887
Discr. physical	0.0899	0.1094	0.1551	0.0864
Employed 1	-0.4298	0.0640	-0.2274	0.0481
Employed 2	-0.1036	0.0858	-0.2072	0.0562
Mother birth place	0.1637	0.08476	-0.01386	0.0769
Father birth place				
Dispersion	0.5665	0.0449	0.4821	0.0819
Loglikelihood		-3687.85		-4484.6
NB. Obs.		2732		3151

Table 6 Decomposition of the gender gap in recurrence of unemployment

	ΔO	$\Delta\beta$	ΔX
Constant	0.49983	0.49983	0
Age	-0.2868	-0.2840	-0.0028
Education level (primary as reference category)			
University	0.0860	0.1241	-0.0381
Secondary	0.1374	0.1351	0.0023
Area of specialization (general education as reference category)			
Industry or science	0.0208	0.0093	0.0115
Tertiary	0.0300	0.0197	0.0103
Health or social	-0.0185	0.0310	-0.0495
Career choices			
Apprenticeship training	0.0054	-0.0029	0.0083
Region	-0.0269	-0.0269	0.00005
No movers	-0.2021	-0.2021	0.00001
Professional orientation	-0.0168	-0.0157	-0.0011
Failed professional orientation	0.0054	0.0032	0.0022
Reasons of leaving education			
Graduated	-0.0813	-0.0815	0.0002
Quit	0.0014	0.0064	-0.0050
Treatment in the labor market			
Experience of discrimination	-0.0176	-0.0313	0.0137
Experience of discr. personality	0.0079	0.0071	0.0008
Experience of discr.family	0.0129	0.0128	0.0001
Career choices due to family			
Employed 1	0.0482	0.0946	-0.0464
Employed 2	-0.0376	-0.0286	-0.0090
Ethnic origins			
Mother birth place	-0.0141	-0.0137	-0.0004
Total	0.1593	0.2610	-0.1017

a given variable's positive sign of the contribution to the overall gap means that the variable contributes to increasing the size of the gender gap in number of unemployment spells. This case applies to the following explanatory variables: education, area of specialization (except for health and social sciences), apprenticeship training, dropping out of school, failed professional reorientation, experience of discrimination due to the personality or to physical or family charges, and being employed at the birth of the first child. The remaining variables contribute to reducing the size of the gender gap.

The most prominent factors other than the constant term are leaving school age, education and specialty of education, graduated before leaving the education system, and whether the educational institution is located in the Paris region, and whether they are movers in the job search process. Most of the age variable's contribution to the gender gap in recurrent unemployment results from differences in age effects on recurrence, which is higher for females. Remember that the older females are, the lower the recurrence. The contribution of education to the gender gap is positive, which means that if a man and a woman have the same level of education, the level of recurrence is higher for the latter. This phenomenon results largely from the differences in the effects of education on recurrent unemployment and would be even higher if women did not have a higher level

of education than men. This is also true for the area of specialization and the remaining variables. A professional reorientation has a greater effect on the recurrence level of females than that of males, as do dropping out, experiencing discrimination for physical reasons and being employed at the birth of a child.

It is well established that young persons are more vulnerable to unemployment. However, this study suggests that this phenomenon occurs more among females than males. The resulting gender gap in recurrence seems, according to our findings, to stem from discrimination against women in the labor market. If young females are more vulnerable to unemployment than males, it is not because they are less educated or less qualified than their male counterparts. The main reason is differences in treatment in the labor market.

4.2 Gender differences in concentration of unemployment

Table 7 reports the results of the decomposition of the gender differences in the incidence factor of the Shorrocks index of unemployment, revealing that unemployment is more concentrated among males, or, equivalently using Shorrocks terms, the qualitative experience of unemployment is more unequally distributed among males. The overall gap

Table 7 Decomposition of the gender gap in concentration of unemployment

	ΔO	$\Delta \beta$	ΔX
Constant	-0.2131	-0.2131	0
Age	0.0506	0.0382	0.0124
Education level (primary as reference category)			
University	0.0940	0.0936	0.0004
Secondary	0.0155	0.0256	-0.0101
Area of specialization (general education as reference category)			
Industry or science	-0.0353	-0.0030	-0.0323
Tertiary	0.0520	0.0458	0.0062
Health or social	0.076	-0.0017	0.0777
Career choices			
Apprenticeship	-0.0297	-0.0085	-0.0212
Internship	-0.0739	-0.0731	-0.0008
region	0.0034	0.0037	-0.0003
Professional orientation	0.0044	0.0033	0.0011
Failed professional orientation	-0.0004	0.0023	-0.0027
Reasons of leaving education			
Graduated	-0.0680	-0.0724	0.0044
Quit	-0.0139	-0.0226	0.0087
Treatment in the labor market			
Experience of discrimination	-0.0107	0.0020	-0.0127
Career choices due to family			
Parental leave 1	-0.0000	0.0069	-0.0069
Parental leave 2	-0.0123	0.0211	-0.0334
Resign 1	-0.0089	-0.0062	-0.0027
Employed 1	0.0314	-0.0057	0.0371
Employed 2	0.0256	0.0123	0.0133
Ethnic origins			
Father birth place	0.0021	0.0029	-0.0008
Total	-0.1078	-0.1488	0.0410

is 0.11 and means that concentration of unemployment for males is 8% higher than that of females. This percentage would be even higher if the latter were treated like males - 0.15 instead of 0.11. The explained part of the overall decomposition of the gender gap in concentration is estimated to be 0.041, which means that males concentration of unemployment would increase slightly (roughly 3%) if they possessed the same characteristics as females. The low value of the explained part relative to the unexplained part of the decomposition suggests that most of the gap results from differences in estimated coefficients between males and females (see Table 8).

Examining the individual contributions of the explanatory variables, we observe that the following variables contribute to increasing the size of the gender gap: age, education, area of specialization, career transition, Paris region as region of education, being employed at the birth of the first and second child, and the father's birth place. The rest contribute negatively to the gender gap in concentration between males and females.

Compared to the gender gap in recurrence of unemployment, the contributions of certain variables have the opposite sign, indicating that the variables in question play two different roles in the gender gap in recurrence of unemployment and the gap in the concentration of unemployment. This is the case with age, being specialized in health or social sciences, apprenticeship, dropping out, professional orientation, and being employed at the birth of the first or second child.

To conclude this section, one can say that the difference in the way females and males are treated in the labor market makes females more vulnerable to unemployment

Table 8 Estimates for the Logit model by gender

	Males		Females	
	Coef. Est.	Std. error	Coef. Est.	Std. error
Constant	1.6026	0.2945	2.3108	0.3062
Age	-0.0528	0.0139	-0.0585	0.0134
University	-0.0713	0.2055	-0.6344	0.2264
Secondary	-0.3184	0.1721	-0.5488	0.1977
Industry or science	-0.1884	0.1627	-0.0912	0.1809
Tertiary	-0.0425	0.1648	-0.2900	0.1531
Health or social	-1.6032	0.2813	-1.5648	0.1916
Learning	-0.3584	0.1059	-0.0943	0.1237
Internship	0.0243	0.0890	0.3821	0.0826
Graduated	-0.2405	0.0778	0.1165	0.0798
Quit	0.2308	0.0600	0.4545	0.06777
Ile de France	-0.2814	0.0970	-0.4068	0.1015
Career transition	0.5565	0.0645	0.5159	0.0709
Career transition trial	0.3252	0.0867	0.2739	0.0890
Discrimination	0.4172	0.0848	0.3871	0.0770
Parental leave 1	0.3889	0.1413	0.1342	0.1100
Parental leave 2	0.5257	0.1996	0.1295	0.0987
Resign 1	0.2228	0.2659	0.7233	0.1612
Employed 1	-0.6181	0.0709	-0.5859	0.0754
Employed 2	-0.2396	0.0856	-0.3488	0.0869
Father birth place	0.4516	0.1210	0.3221	0.1253
Loglikelihood	-3511.85		-3190.3	
NB. Obs.	5517		5444	

with a higher degree of recurrence. However, this same difference of treatment gives them an advantage over males for concentration. In fact, unemployment is more equally shared across the female population. The research carried out in the present study is in compliance with the Helsinki Declaration.

5 Conclusions

This study's purpose is to provide a welfare-based analysis of the gender gap in unemployment among young persons leaving the education system in France by examining the gender gap in recurrence and concentration of unemployment. In fact, studies on the gender gap in unemployment have focused primarily on the unemployment rate, leaving aside the welfare dimension of the issue. However, this measure captures only the cross-section elements of unemployment, and therefore ignores the longitudinal and repetitive aspects, which are of crucial interest from a welfare perspective, especially if unemployment is measured over a period of time (say one year or more).

This study has found a positive correlation between vulnerability to unemployment and variables such as dropping out of school, professional reorientation, discrimination for family responsibilities or physical reasons, parental leave, resignation, and parents' ethnic origin. Persons for whom these variables takes the value one are more vulnerable to unemployment. On the basis of these findings, policies for providing guidance and assistance to young persons about to leave the education system or already in the labor market may help to reduce their vulnerability to unemployment, concerning their career choices in particular. Further, young persons with family responsibilities need protection against types of discrimination that are specific to them. However, urging young persons to acquire work experience (internship, apprenticeship) before entering the labor market, and obtaining a university or secondary degree before leaving the education system may help to reduce vulnerability as the latter correlate negatively with the recurrence of unemployment.

It is well known that young persons have an unstable start in the labor market, which explains their high recurrence. However, this study's results suggest that this phenomenon results not only from their youth status. We have found that this recurrence differs across gender. Other factors also affect recurrence: education level, area of specialization, career choices, ethnic origin, discrimination, and family responsibilities. Little of the recurrence can be attributed to the youth status of individuals having left the education system and entered the labor market. And certain measures such as those listed above, could be implemented to deal with recurrent unemployment in young persons. The recurrence of unemployment can have social and psychological costs and is therefore likely to affect negatively the well-being of young persons as it can cause difficult living conditions through a cycle of low-paid and unstable jobs.

This study's results also reveal differences in the way females and males are treated in the labor market according to their age, level of education, area of specialization, career choices, and family responsibilities, which cause gaps in the recurrence and concentration of unemployment observed between males and females. A higher recurrence entails a lower concentration in the distribution of unemployment in society. The female population, which is more vulnerable to unemployment, is the population where unemployment is more equally shared though both recurrence and concentration involve a welfare loss.

Endnotes

¹E.g. Lancaster (1979); Lancaster T (1990); Nickell (1979); Singer (1984a,1984b); Heckman (1984a,1984b); Chamberlain (1985); Kiefer (1988).

²The purpose of the study is illustrated through a population of young persons leaving the education system in France in 1998, which we follow for a period of ten years.

³See also Nolen (2013) where, in addition to the individual, the households is taken into account in the measurement of unemployment. His measure is based on the literacy literature (Basu and Foster (1998), Mitra (2002)).

⁴The two studies by Shorrocks date back to the 1990s but have only been published in 2008. Thus, their place in the chronology.

⁵Some of these studies also use individual characteristics, notably vocational training, which seemed significant as an explanation of recurrent unemployment in Andress (1989).

⁶See Paul (1992), Sengupta (2008), Shorrocks (2008a), 2008b), Riese and Brunner (1998), Borooah (2002), Basu and Nolen (2006), Deutsch et al. (2008), and Nolen (2013), among others.

⁷See Basu and Nolen (2006) and Nolen (2013) for additional details on this point.

⁸This kind of information is not provided in regular labor force surveys. Many of the studies cited here exhibit some data limitation causing them to settle on hazard rate and qualitative response modeling with sampling biases as they use only those who are employed with past unemployment histories. This limitation occurs in Groot (1989); Gray (1989); Steiner (1989); Stern (1989), and Winter-Ebmer and Zweimfiller (1992).

⁹The average unemployment rate is obtained by taking the product of the proportion of persons having experienced unemployment at least once during the observing period and the proportion of time an individual spent unemployed on average during that same period ($P\mu(F)$).

¹⁰The gender gap throughout this study is computed as females minus males.

¹¹The mean of unemployment spell duration differs from the mean of total duration of unemployment, which is equal to the former multiplied by the mean of the number of unemployment spells.

¹²These figures on unemployment duration can be considered the per capita durations as the base used is the total labor force (employed plus unemployed). To obtain the numbers in Table 1 for those with positive durations, one divides by the incidence (P).

¹³See Bauer and Sinning (2012) and Cameron and Trivedi (1998) for details on count data models. See also Lambert (1992) for the treatment of excess zero.

¹⁴Formulas for the conditional expectations can be found in Bauer and Sinning (2012) and Cameron and Trivedi (1998).

¹⁵This method is a generalization of the Oaxaca (1973) and Blinder (1973) decomposition method.

¹⁶Decomposing the per capita number of spells with the Yun's method would be difficult as it is computed using two series of approximately same regressors with different vectors of parameters. For that reason, only the mean over persons with positive number of spells is considered for the regression-based decomposition.

Competing interests

The IZA Journal of European Labor Studies is committed to the IZA Guiding Principles of Research Integrity. The author declares that he has observed these principles.

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