Unemployment Versus Inactivity: An Analysis of the Earnings and Labor Force Status of Prime Age Men in France, the UK, and the US at the Turn of the Century

Alena Bicakova[1]

Department of Economics
Johns Hopkins university
Baltimore, MD 21218

abicakova@jhu.edu
http://www.econ.jhu.edu/people/bicakova/

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Abstract

This paper focuses on the differences in earnings and labor force status of low-skilled prime age men in France, the United Kingdom, and the United States at the end of the 20th century, and their relation to the differences in wage dispersion. In the UK and the US, where the bottom of the wage distribution is more dispersed, the inactivity rate (sometimes called the not-in-labor force rate) among low-skilled men exceeds the percentage of the unemployed, whereas in France the opposite is true. This leaves the overall joblessness rate among the low-skilled in France similar to that in the US, and that in the UK about one third higher.

I use a partial-equilibrium job search model to provide a supply side explanation of the observed differences. An employed individual's decision whether to work or leave the labor force (be inactive) is affected by his wage. A jobless individual's decision whether to be unemployed and search for a job or be out of labor force is affected by his potential wage. In the UK and the US, where wages are flexible, skill-biased change in labor demand has had a negative effect on the wage of the low-skilled at the bottom of the wage distribution. With lower returns from employment, the low-skilled in the UK and the US are more likely to be inactive. I formulate a four-step econometric procedure to estimate the effect of the wage on the probability of being inactive, the probability of being unemployed, and the probability of being employed. The estimation uses data from the Luxembourg Income Study for France, the UK, and the US in selected years from the period 1994-2001.

I find a sizable and significant effect of the wage on inactivity in the UK and the US but none in France. The probability of unemployment as a function of the wage decreases more rapidly in the UK and the US than it does in France. The low-skilled in France face a relatively similar risk of unemployment irrespective of their earning capacity. In the UK and the US, unemployment is concentrated among the low-skilled at the very bottom of the wage distribution. The findings provide evidence against the commonly used argument that wage flexibility improves the employment prospects of individuals at the bottom of the wage distribution.

JEL classification: C25, J21, J31, J64

Keywords: Labor Force Status; Wage Elasticity; Prime age men;

1 Introduction

Labor markets in Europe and the US have both experienced negative trends over the past three decades: while unemployment has been on the rise in continental Europe, the US has seen a steady increase in wage inequality. It has been suggested (see e.g. Blank (1997)) that the two trends are consequences of the same global economic changes, namely, the gradual fall in the demand for low-skilled labor. Skill-biased technological progress, as well as the increase in international trade with the developing countries and the inflow of unqualified workforce through immigration, are the most often cited factors in causing the change in labor demand. This "unified theory"[2] uses a simple static model of labor supply and labor demand to explain the different consequences of the same economic change by the country-specific labor market institutions that affect wage flexibility. In countries like the US, where wages are flexible, the skill-biased change in labor demand decreased the relative wages of the low-skilled, causing a rise in wage inequality. In countries of continental Europe, with labor market institutions that prevent the downward adjustment of the wages of the low-skilled, the change resulted in higher unemployment. The so-called "trade-off theory", that argues that there is a trade-off between wage inequality and unemployment (or employment) depending on the degree of wage flexibility, has become widely acknowledged and is often invoked in both research and political contexts (see e.g. Krugman (1994), Blank (1997), and Jackman, Layard, Manacorda, Petrolgolo (1997)).

However, labor force participation and inactivity[3] have apparently never been discussed in connection with the trade-off hypothesis, despite the fact that they are integral part of the static model argument: assuming that the labor supply of the low-skilled is not perfectly inelastic, the fall in the relative wages[4] of the low-skilled will reduce their incentive to work and increase their withdrawal from the labor force. Such a consequence would weaken the commonly used argument that wage flexibility improves the employment prospects of individuals at the bottom of the wage distribution. The present paper suggests that, without taking into account the change in the labor force participation of the low-skilled, the trade-off theory remains incomplete.

It seems there is in general hardly any literature[5] that would analyze and compare the inactivity rates (among men in particular) across different countries. This is despite the fact that the inactivity rate among prime age men, the population group with typically the highest labor force participation, has already exceeded the unemployment rate in some countries, while

[2] The term was coined in Blank (1997).

[3] Throughout the paper, I use "inactivity," "out of labor force" and "non-participation" as synonyms for the labor force state of jobless individuals who are not unemployed.

[4] In the US, wages of the low-skilled have decreased even in absolute level. See e.g. Blank (1997).

[5] An exception are the widely studied cross-country differences in labor force participation of women.

it has stayed very low in others. It is in the US and the UK,[6] the two countries that have seen the highest raise in wage inequality (at the bottom of the wage distribution in particular), that the inactivity rates among prime age men have been increasing the most.[7]

There are also very few papers that would assess the validity of the trade-off theory for wage inequality and unemployment (or employment) using micro data, or at least data disaggregated by skills.[8]

The aim of this paper is to fill these gaps. Using micro data, I limit the analysis to three representative countries. I choose France as the high unemployment and low wage inequality country with the least flexible wages, the US as the high inequality and low unemployment country with the most flexible wages, and the UK[9] as the high inequality and medium unemployment country with wages less flexible than in the US but more flexible than in other European countries. As for the labor force status of the low-skilled prime age men in the three countries, in the UK and the US, their inactivity rate exceeds the percentage of the unemployed, whereas in France the opposite is true. This leaves the overall joblessness rate among the low-skilled in France similar to that in the US, and that in the UK about one third higher.

This paper considers all three labor force states (employment, unemployment, and inactivity) and analyzes how the probability of being in each one of them varies with wage. A joint analysis of earnings and labor force status allows me to document the employment prospects at different levels of the earning capacity, and thus to complement the numerous international-comparison studies of wage inequality with some evidence of the differences in inequality in the labor force status across the three countries.

In the theoretical section of the paper, I use a partial-equilibrium three state job search model to describe the distribution of people across the three labor force states. I derive the steady state proportions of people in employment, unemployment, and inactivity as a function of wage and other individual characteristics. I use the model to explain the observed variation in the labor force status of prime age men across the three countries, first on the basis of the differences in the relative earnings of people at the bottom of the wage distribution, and later (in Section 5.1 under "Additional Points") on the basis of cross-country differences in benefits available to the jobless. I illustrate the explanatory power of the model with calibrated results.

[6] See, for example, Murphy, Topel (1997) and Juhn, Murphy, Topel (2002) for the US, and Nickell, Quintini (2002) and Nickell (2003) for the UK.

[7] A fact that is consistent with the above stated suggestion that higher wage dispersion at the bottom of the wage distribution can drive away the low-skilled from the labor force.

[8] Fitoussi (1994), Blank (1995) and Card, Kramarz, and Lemieux (1999) are some of the few exceptions.

[9] The UK has been often classified together with the US as the high wage inequality country when compared to continental Europe. However, as already noted in Blank (1997), the UK already somewhat contradicts the trade-off hypothesis, as it suffered from both wage inequality as well as relatively high unemployment in past decades.

I also extend the theoretical model so as to capture the positive relationship between earning capacity and employability.

In the empirical section, I estimate the steady state proportions derived from the theoretical model and document the relationship between the wage and the respective probabilities of being employed, unemployed, and inactive. I use data from the Luxembourg Income Study for France, the UK, and the US in selected years from the period 1994-2001. To ensure that the results are not affected by cultural differences in female labor force participation across the three countries, I limit my study to men. I further narrow the population of interest to prime age men (25 and 54 year old) in order to rule out the effect of cross-country differences as regards institutions that determine the beginning and the end of the labor market career, that is, the educational and the retirement systems. In addition, prime age men represent a population subgroup of individuals who are relatively homogenous across the three countries and who are typically in the labor force.

The two key issues I am interested in are the following: First, is there a negative effect of wage on labor force withdrawal? In particular, can the low relative wages at the bottom of the wage distributions in the UK and the US explain the high inactivity rates among low-skilled prime age men in these two countries? Second, how do the probabilities of being unemployed, and employed, change with different wage levels? In particular, is the unemployment in France concentrated among people with the lowest earning capacity, whose potential wage offers are (as often argued) kept at an inadequately high level by labor market institutions such as high minimum wage or collective bargaining? I am going to propose the following answers: There is a significant negative effect of wage on inactivity of prime age men in the UK and the US, while there is none in France. There is also a negative relationship between the wage and unemployment, whose magnitude is the highest in the UK and among non-whites in the US.[10] The graph of the probability of being unemployed as a function of wage shows that in the UK and the US, unemployment is more concentrated among people with the lowest earning capacity than it is in France. The results suggest that, in addition to the well-documented wage inequality, the employment prospects and the risk of unemployment are also distributed more unequally in the UK and the US than in France: the people at the bottom of the wage distribution are paid relatively less and have a relatively higher probability of being jobless.

These findings support the view that the decline in relative wages of the low-skilled in the US and the UK has an impact on their labor force withdrawal, and therefore might be taken to justify the argument that the change in inactivity should be part of the trade-off theory. How-

[10] As will be explained later, I divide the US sample of prime age men by their ethnicity to whites and non-whites. I work with the two samples separately throughout.

ever, the results describing the distribution of the probability of being unemployed across the different levels of earning capacity in the three countries provide evidence against the original trade-off hypothesis, as both wages and probability of being unemployed are distributed more unequally in the UK and the US than in France.

The structure of the paper is as follows: In the two sections following the Introduction, I relate the paper to previous research and describe the main wage-affecting institutions and labor market outcomes of prime age men in the three countries of interest. The third section presents a theoretical model that provides the basis for the empirical analysis. The fourth section is empirical: I discuss the econometric procedure, describe the skill differentials in earnings and labor force status in the three countries based on the summary statistics from the data, and then present and interpret the estimation results. The fifth section, called "Additional Points," adds two more aspects to the present analysis: it explores the role of social transfers (such as unemployment benefits) and the role of disability as two other factors affecting the observed earnings and labor force status patterns. The sixth section is the conclusion. Data description, figures, supplementary results, and detailed theoretical derivations are included in the Appendix.

2 Previous Research

The international-comparison papers that explore the two consequences of the fall in the demand for low-skilled labor, i.e. rising unemployment and rising wage inequality, can be divided into two groups. Studies such as Nickell (1997), Blanchard, Wolfers (2000) and Bertola, Blau, and Kahn (2001) analyze the factors that determine the cross-country differences in unemployment at the aggregate level. On the other hand, studies such as Gottschalk and Joyce (1998) focus on the determinants of the cross-country differences in wage inequality. Only very few papers examine cross-country differences in earnings and labor force status jointly. Notable exceptions are Card, Kramarz, and Lemieux (1999) and Kahn (2000), who focus on earnings and employment at the same time, and Fitoussi (1994), who explores wage inequality and unemployment.

As has been already mentioned in the Introduction, very few papers (in particular papers using data disaggregated by skills) examine the validity of the theory that postulates a trade-off between the two consequences, i.e. between the rise in unemployment (or employment) and in wage inequality.[11] The present paper contributes to this research area by documenting whether

[11] Card, Kramarz, and Lemieux (1999), who study changes in earnings and employment in the US, Canada, and France, conclude that there is little support for the trade-off between changes in wage inequality and changes

there is any supporting evidence for the trade-off hypothesis to be found when using micro data.[12]

As mentioned above, literature that would consider the trade-off hypothesis in connection with the decline in labor force participation among low-skilled men is lacking. This paper estimates the effect of the wage on the probability of being inactive in order to determine whether there is support for the idea that wage flexibility, by allowing the relative wages of the low-skilled to fall, leads also to an increase in their non-participation.

An empirical analysis of the three labor force states is likely to be sensitive to the classification of the jobless into unemployed and inactive.[13] The question has been raised whether the distinction between these two labor force states is meaningful, in other words whether they are behaviorally different. The first paper to ask this question was Flinn and Heckman (1983), where the authors test whether the exit rate from unemployment to employment and the exit rate from inactivity to employment are the same. They reject the hypothesis and conclude that the two states are different, since the unemployed enter jobs more frequently than the inactive. Gonul (1992) performs a similar exercise and finds such a distinction for women but none for men. It has been suggested that non-participants consist of a highly heterogeneous group of people and that the dichotomous classification (employed in papers that test the difference) might be too crude. Benati (2001) finds that the inactivity rate changes over the business cycle. She shows that some jobless people search (are unemployed) in periods of expansion when the labor market prospects are good, but stop searching (become inactive) during recessions. She divides the non-participants into several groups to determine the degree of their labor market attachment. Jones and Riddell (1999 and 2002) explore the validity of the job search criterion for the ILO definition of unemployment, and find that other information, such as "desire to work," helps to identify a group of individuals who are marginally attached to the labor force but behaviorally distinct from both the inactive and the unemployed.

The theoretical model presented in Section 3 distinguishes between two types of non-participants, based on their preference for leisure or other non-market activities: the "true non-participants," who never leave inactivity, and "unattached non-participants," who are out

in employment.

[12] This paper compares the labor market outcomes of the low-skilled in *levels* at the end of the period for which the negative changes in labor demand have been documented. I am therefore not testing the trade-off hypothesis, as that would require comparing the *changes* over time. It should be also noted that the comparison of the final outcomes in levels provides evidence on the trade-off hypothesis only if the initial level of the labor market outcomes of the low-skilled, the negative change in labor demand that affected them, and the changes in the supply of skills and other relevant factors were similar across the three countries.

[13] The standard and widely used ILO definition of unemployment requires that an individual have no job, actively search for a job, and be available to start a job if offered. Whenever one of the conditions is not satisfied, the individual is classified as inactive.

of labor force, but if they receive a job offer they accept it and enter employment. In the empirical part of the paper I am limited by the information available in the data: I use the self-reported labor force status to divide individuals into employed, unemployed, and inactive. Previous research on the differences between the two labor force states suggests that the estimation results in this paper should be analyzed from a perspective that acknowledges that the boundary between the two states of non-employment is not straightforward. Section 5.1, "Additional Points," contributes to the research on differences between the two labor force states by exploring the likely effects of differences in social transfers to the jobless in France, the UK, and the US on the way the non-employed are distributed between unemployment and inactivity. While research focused on unemployment and inactivity has been growing, I do not know of any paper that would explore this issue in an international context.

2.1 Empirical Facts

France, the UK, and the US represent three countries with different labor market institutions, different wage inequality, and different distribution of prime age men across the three labor force states. An individual who is deciding whether to work or to leave the labor force (or, if jobless, whether to search for a job or not), as described in the theoretical model in Section 3, compares the expected pay-offs in each of the three states (employment, unemployment, and inactivity). The wage is the main component of instantaneous utility when employed. Unemployment benefits or other social transfers received by the jobless are the key monetary components of instantaneous utility when unemployed or inactive. I next briefly survey the institutions that affect the wage setting mechanisms in the three countries. The institutional differences concerning the existence, level, and duration of the social transfers in the three countries are discussed in Section 5.1, "Additional Points."

Even though all three countries have minimum wage legislation,[14] they differ in the levels of the minimum wage as well as the extent to which the minimum wage is binding: the ratio of the minimum to median wage ranges from 0.6 in France to 0.4 in the UK and 0.36 in the US. As indicated in Table 1, the minimum wage in France is the highest not only relative to the median but also in absolute terms, using both exchange rate and purchasing power parity conversion factor.

Wages in France are the outcome of collective bargaining that takes place at an industry level and covers almost all employees. The French wage-setting mechanism is substantially more

[14] The UK established its minimum wage for the first time in April 1999.

Table 1: Absolute and Relative Minimum Wages in 1995 and 2000

	In National Currency		In USD (xrate)		In USD (PPP)		Minimum/Median	
	1995	2000	1995	2000	1995	2000	1995	2000
France	36.98 FF	42.02 FF	7.41	5.9	5.88	6.92	0.59	0.61
UK*	none	3.6 GBP	none	5.45	none	5.62	none	0.42
US**	4.25 USD	5.15 USD	4.25	5.15	4.25	5.15	0.36	0.36

Source: OECD Statistics (minimum and median wages, PPP index); INSEE (French hourly minimum wage); PWT Version 6.1 (exchange rate); own calculations. The quantities are in the current 1995 and 2000 values.
* The minimum wage in the UK increased to 3.7 GBP in October 2000.
** The minimum wage figure for the US is the federal minimum wage.

centralized than in the other two countries. Although union membership in France (around 10%) is lower than in the US (13%) and, in particular, in the UK (around 30%), French employees who are not members of the union are covered by the same wage-setting rules as the ones who are. These institutional differences imply that wages are likely to be more rigid and the wage distribution at the bottom more compressed in France than in the two other countries, with the UK being slightly less flexible than the US. Table 2 confirms that individuals at the bottom of the wage distribution in France are relatively better off than the ones in the UK and in particular the US: the median-to-10th percentile ratio ranges from 1.6 in France through 1.8 in the UK to 2.2 in the US. The 90th-to-10th percentile ratio follows the same pattern. Even though the wage distribution in the UK is more unequal at the bottom, the 90th-to-50th percentile ratio shows that it is more compressed at the top when compared to France.

Table 2: Wage Inequality Indicators

	P50-P10 RATIO		P90-P10 RATIO		P90-P50 RATIO	
	1995	2000*	1995	2000*	1995	2000*
France	1.59	1.59	3.31	3.28	2.08	2.06
UK	1.81	1.8	3.39	3.39	1.87	1.88
US	2.21	2.15	4.72	4.76	2.13	2.21

Source: OECD Statistic, gross earnings.
* The most recent data available for France were for 1998.

Differences in labor taxation are likely to have further impact on relative net earnings. Table 3 describes wage taxation in the three countries in 1995 and 2003. The total tax rate on the gross wage was very similar across the three countries in 1995, and only a few percent higher in France in 2003. Thus, the relative net wages (of the average production worker who is single and without children) compare more or less the same as the gross wages across the three countries.

The main difference is in the total tax wedge, where France imposes a substantially bigger tax burden on employers than the other two countries, therefore increasing the total labor cost.

Table 3: Wage Taxation

	Income Tax*		Total Employee's Contributions*		Total Tax Wedge**	
	1995	2003	1995	2003	1995	2003
France	8.8	13	27.4	27	49.1	48
UK	18.1	16	26.7	24	33.4	31
US	18.2	16	25.8	24	31.0	29

Source: OECD Taxing Wages, Payroll Taxes - Economic Outlook 2003. The rates are for a single person without children at the average production level of earnings.
* % of gross wage, ** % of labor costs

The jobless rate and the distribution of jobless prime age men between unemployment and inactivity over the period 1990-2003 are presented in Table 4. The average unemployment rate

Table 4: Non-employed Prime Age Men in the US, the UK and France

YEAR	Unemployment Rate			Inactivity Rate			Total Jobless Rate		
	USA	UK	FR	USA	UK	FR	USA	UK	FR
1990	4.6	5.6	5.9	6.6	5.2	4.6	10.9	10.5	10.2
1991	5.9	7.6	6.0	6.9	5.5	4.7	12.4	12.7	10.4
1992	6.7	9.9	6.8	7.0	6.0	5.0	13.2	15.3	11.5
1993	6.0	10.4	8.1	7.4	6.6	5.1	13.0	16.3	12.8
1994	4.9	9.8	9.6	8.3	7.0	4.9	12.8	16.1	14.0
1995	4.4	8.5	8.8	8.4	7.3	5.1	12.4	15.2	13.5
1996	4.2	8.0	9.3	8.2	8.0	4.8	12.1	15.4	13.7
1997	3.7	6.7	9.6	8.2	8.4	5.2	11.6	14.5	14.3
1998	3.3	5.4	9.2	8.2	8.6	5.5	11.2	13.5	14.2
1999	3.0	5.4	8.9	8.3	8.4	5.9	11.1	13.3	14.3
2000	2.9	4.8	7.5	8.4	8.1	5.8	11.1	12.5	12.9
2001	3.7	4.1	6.3	8.7	8.7	5.9	12.1	12.4	11.8
2002	4.8	4.4	7.0	9.0	8.8	6.1	13.4	12.8	12.7
2003	5.2	4.2	7.4	9.4	8.6	6.1	14.1	12.4	13.0

Source: OECD Statistics, own calculations. The unemployment rate is defined in the standard way: percentage of unemployed in the labor force. The inactivity and total non-employment rates have total population in the denominator.

over this period was 7.9% in France, 6.8% in the UK, and 4.5% in the US. The average inactivity rate ranks the three countries in the opposite order, with 8.1% in the US, 7.5% in the

UK, and 5.3% in France. This leaves the average rate of the overall non-employment among prime age men at approximately 12% in the US, 13% in France, and slightly over 14% in the UK.

3 Theoretical Model

The following section is based on the model by Pietro Garibaldi and Etienne Wasmer, as it appeared in Garibaldi and Wasmer (2001, 2003a, 2003b, 2003c). Although the specification of the model varies across the four papers, the basic structure remains the same: it is typically a general-equilibrium job search model that specifies an individual's and a firm's optimization problem and assumes a particular wage setting process (bargaining or matching).

As the main focus of this paper is on individuals, I have no data on firms, and I am comparing three different countries, I prefer to leave the demand side unspecified, rather than to assume a particular wage setting mechanism. I therefore adopt only the supply side part of their model. The main difference is that I allow individuals who are inactive to receive job offers, which is not possible in the Garibaldi-Wasmer model.[15] I assume that the rate at which job offers arrive to individuals who are out of labor force is slower than if they are unemployed and actively searching for the job.[16] In this respect I am adding a new transition to the ones allowed in Garibaldi and Wasmer, namely, from inactivity to employment.

3.1 General Set-up and the Two Reservation Values of Leisure

I formulate a partial-equilibrium three state job search model to explore the incentives that determine whether an individual works, and if not, whether he searches for a job. I use the model to explain the observed proportions of individuals in employment, unemployment, and out of labor force. Individuals are classified as unemployed and inactive according to the ILO definition: the unemployed search for a job, whereas the inactive do not.

An individual receives wage w when employed. He receives the full value of leisure[17] x if

[15] The only exception is Garibaldi and Wasmer (2003c). There is a wide range of potential extensions, covered at the end of the papers by Garibaldi and Wasmer. In Garibaldi and Wasmer (2003c), there is section *7.3 Further Issues* where they present how the model changes if one assumes an endogenous search effort. This extension implies that "true" nonparticipants are at the corner solution of the optimal search effort with $s = 0$, while the remaining jobless individuals have a positive search effort. However, only s above a certain threshold can be detected. Individuals with s above this threshold are classified as unemployed, while those with s below are classified as inactive. There are only two value functions in the suggested model, that is, for employment and non-employment.

[16] This assumption is consistent with Flinn and Heckmann (1983).

[17] Leisure in this model refers to any alternative to market employment, whether it is true leisure, home production, or other non-market activities including illegal work in shadow economy.

he is out of labor force, and the same value reduced by the proportion s, $(1 - s) \times x$, when he is unemployed (s represents the cost of searching). The value of leisure when employed is normalized to zero. The value of the social transfers received if unemployed is b^U, and it is b^N if out of labor force. Individuals are heterogenous in x, as some prefer leisure more than others, or some are more efficient in home production than others. At each point in time, each individual has a particular value of x. This value changes over time and the new value of x, drawn from some distribution, arrives at a given rate. Based on the current value of x, the expected values of being in one of the three labor force states (employment, unemployment, inactivity) are $W(x), U(x), N(x)$ respectively. Individuals move between the three states over time. The model implies that there will be two "reservation values" of x, namely x_l and x_h, that will divide individuals into three intervals on x.

x_h is defined by $W(x_h) = N(x_h)$
x_l is defined by $U(x_l) = N(x_l)$

Individuals with $x > x_h$ will be always inactive. Individuals with $x < x_l$ will be either employed or unemployed but never out of labor force. Individuals with $x \, \epsilon \, [x_l, x_h]$ will be either employed or out of labor force but never unemployed.

There is only one wage rather than a wage offer distribution: all the jobs offered to the non-employed pay the same wage w. Unemployed individuals who receive a job offer (paying the wage w) will always accept: $\forall x < x_l : W(x) > U(x)$. Individuals who are inactive will accept only if their $x < x_h$. Thus, w is a parameter of the model.[18] As each individual is always offered and paid the same wage, there is no on-the-job search in the model.

The transitions of the three types of individuals (based on their value of x) among the three labor force states are as follows:

- Individuals with $x > x_h$ are always out of labor force. They are "true non-participants". When an individual receives this value, he will leave his state (employment or unemployment) for inactivity and stay there. He will never accept any job offer unless his x changes.
- Individuals with $x < x_l$ will never be out of labor force. If they are employed and get dismissed they start searching (become unemployed). If they are unemployed and receive

[18] The wage corresponds to the individual's earning capacity. In the basic model, individuals are heterogenous only in their preference for leisure, but they have the same values of w as well as all the other parameters. Therefore the model in this form should be only applied to a relatively homogenous skill-group. See Section 3.3 for further discussion.

a job offer they accept it and start working. A non-participant that receives such a small value of x will leave for unemployment, an employed person that receives this value will stay employed.

- Individuals with $x \epsilon [x_l, x_h]$ behave in the following way: If they are employed and get dismissed they become inactive. If they are out of labor force and receive a job offer they accept it. They are never unemployed. If an individual is previously employed and receives such value of x, he will stay employed. If he is previously unemployed, and receives this value, he will become inactive. If he is inactive and receives this value, he will stay inactive (but only until he receives a job offer.)

The parameters of the model are:

w wage

x leisure, value of home production

s fraction of forgone leisure if searching (i.e. if unemployed)

r subjective discount rate

λ arrival rate of new value of leisure (Poisson distribution)

δ exogenous job separation rate (Poisson distribution)

p^U arrival rate of new job offer if searching (Poisson distribution)

p^N arrival rate of new job offer if OLF (Poisson distribution), $p^U > p^N$

$F(x)$ distribution of value of leisure in population (negative exponential)

b^U value of total social transfers received if unemployed

b^N value of total social transfers received if inactive

Individuals can be hit by λ in all three labor force states. They can be hit by δ when employed and then move either to unemployment or to inactivity, depending on their current value of x. If unemployed, they can be hit by p^U and move to employment. If inactive, they can be hit by p^N but accept the job offer only if their current $x < x_h$. The model is described by the following value functions, describing the expected value of being in one of the three labor force states: employment ($W(x)$), unemployment ($U(x)$), and inactivity ($N(x)$):

$$
\begin{aligned}
(r+\lambda)W(x) &= w + \lambda \int_x \max[W(x\prime), N(x\prime)]\, dF(x\prime) + \delta \big(\max[U(x), N(x)] - W(x)\big) \\
(r+\lambda)U(x) &= b^U + (1-s)\, x + \lambda \int_x \max[U(x\prime), N(x\prime)]\, dF(x\prime) + p^U (W(x) - U(x)) \\
(r+\lambda)N(x) &= b^N + x + \lambda \int_x \max[U(x\prime), N(x\prime)]\, dF(x\prime) + p^N \big(\max[W(x), N(x)] - N(x)\big)
\end{aligned}
$$

From the three value functions, we can derive[19] the following two equations:

$$\frac{x_h - x_l}{r + \lambda + p^N + \delta} = \frac{s \times x_l - (b^U - b^N)}{p^U - p^N} \tag{1}$$

$$x_h = w - b^N + \frac{(1-s)\lambda}{r + \lambda + p^U + \delta} F(x_l) + \frac{\lambda}{r + \lambda + p^N + \delta} \big(F(x_h) - F(x_l)\big) \tag{2}$$

Equations (1) and (2) determine the equilibrium threshold values x_l and x_h that divide individuals into three groups according to their preference for leisure.

The comparative static exercise presented in Section C.4 of the Appendix shows that the wage has a positive effect on both values x_l and x_h. The magnitude of the effect on x_h is bigger than that on x_l. Individuals with a high actual or potential wage require a higher value of leisure to make them leave employment or unemployment for inactivity.

3.2 Transitions and the Steady State Proportions

There are five states based on the current value of x and the current labor force state:

E_t true employment: individuals who are employed and have $x < x_l$

E_u unattached employment: individuals who are employed and have $x \epsilon [x_l, x_h]$

U unemployment: individuals who are unemployed (by definition their $x < x_l$)

N_u unattached nonparticipation: individuals who are inactive and have $x \epsilon [x_l, x_h]$

N_t true nonparticipation: individuals who are inactive and have $x > x_h$

[19] See Section C.1 of the Appendix for the derivation of the value functions, and parts C.2 and C.3 for the derivation of the equations 1 and 2 that characterize the solution.

The non-zero transitions between the five states are:

$$
\begin{aligned}
P_{E_tN_t} &= P_{E_uN_t} = P_{UN_t} = P_{N_uN_t} = \lambda \left(1 - F(x_h)\right) \\
P_{E_tU} &= P_{E_uN_u} = \delta \\
P_{UE_t} &= p^{\,U} \\
P_{N_uE_u} &= p^{\,N} \\
P_{E_tE_u} &= P_{UN_u} = P_{N_tN_u} = \lambda \left(F(x_h) - F(x_l)\right) \\
P_{N_uU} &= P_{N_tU} = P_{E_uE_t} = \lambda\, F(x_l)
\end{aligned}
$$

The probabilities of staying in each of the five states are:

$$
\begin{aligned}
P_{E_tE_t} &= 1 - \delta - \lambda \left(1 - F(x_l)\right) \\
P_{E_uE_u} &= 1 - \delta - \lambda \left(1 - F(x_h) + F(x_l)\right) \\
P_{UU} &= 1 - p^{\,U} - \lambda \left(1 - F(x_l)\right) \\
P_{N_uN_u} &= 1 - p^{\,N} - \lambda \left(1 - F(x_h) + F(x_l)\right) \\
P_{N_tN_t} &= 1 - \lambda\, F(x_h)
\end{aligned}
$$

When the population size has been normalized to one: $E_t + E_u + U + N_u + N_t = 1$

The changes over time in the stock of individuals in the respective states are governed by the following equations:

$$
\begin{aligned}
\tfrac{dE_t}{d\tau} &= \left(P_{E_tE_t} - 1\right) \times E_t + P_{E_uE_t} \times E_u + P_{UE_t} \times U + P_{N_uE_t} \times N_u + P_{N_tE_t} \times N_t = \\
&= \Big(-\delta - \lambda \left(1 - F(x_l)\right)\Big) \times E_t + \lambda\, F(x_l) \times E_u + p^{\,U} \times U \\
\tfrac{dE_u}{d\tau} &= \left(P_{E_uE_u} - 1\right) \times E_u + P_{E_tE_u} \times E_t + P_{UE_u} \times U + P_{N_uE_u} \times N_u + P_{N_tE_u} \times N_t = \\
&= \Big(-\delta - \lambda \left(1 - F(x_h) + F(x_l)\right)\Big) \times E_u + \lambda \left(F(x_h) - F(x_l)\right) \times E_t + p^{\,N} \times N_u \\
\tfrac{dU}{d\tau} &= \left(P_{UU} - 1\right) \times U + P_{E_tU} \times E_t + P_{E_uU} \times E_u + P_{N_uU} \times N_u + P_{N_tU} \times N_t = \\
&= \Big(-p^{\,U} - \lambda \left(1 - F(x_l)\right)\Big) \times U + \delta \times E_t + \lambda\, F(x_l) \times \left(N_u + N_t\right) \\
\tfrac{dN_u}{d\tau} &= \left(P_{N_uN_u} - 1\right) \times N_u + P_{E_tN_u} \times E_t + P_{E_uN_u} \times E_u + P_{UN_u} \times U + P_{N_tN_u} \times N_t = \\
&= \Big(-p^{\,N} - \lambda \left(1 - F(x_h) + F(x_l)\right)\Big) \times N_u + \delta \times E_u + \lambda \left(F(x_h) - F(x_l)\right) \times \left(U + N_t\right) \\
\tfrac{dN_t}{d\tau} &= \left(P_{N_tN_t} - 1\right) \times N_t + P_{E_tN_t} \times E_t + P_{E_uN_t} \times E_u + P_{UN_t} \times U = \\
&= \Big(-\lambda\, F(x_h)\Big) \times N_t + \lambda \left(1 - F(x_h)\right) \times \left(E_t + E_u + U + N_u\right)
\end{aligned}
$$

In steady state, there is no change in the proportion of individuals across the five states. The steady state distribution can be therefore derived by setting the above equations equal to zero.

The steady state proportions are given by:[20]

$$
\begin{aligned}
E_t &= \frac{F(x_l)\Big(\lambda\big(1-F(x_h)\big)(p^U-p^N)+\lambda F(x_l)(p^U-p^N)+p^N(\lambda+p^U)+p^U\delta\Big)}{D}\\
E_u &= \frac{\big(F(x_h)-F(x_l)\big)\Big(\lambda\, F(x_l)\big(p^U-p^N\big)+p^N(\delta+\lambda+p^U)\Big)}{D}\\
E &= E_t+E_U=\frac{F(x_l)\big(p^U-p^N\big)(\lambda+\delta)+F(x_h)p^N(\delta+\lambda+p^U)}{D}\\
U &= \frac{F(x_l)\Big(\delta+\lambda\big(1-F(x_h)\big)\Big)(\delta+\lambda+p^N)}{D}\\
N &= N_t+N_U=\big(1-F(x_h)\big)\ +\ \frac{\big(F(x_h)-F(x_l)\big)\Big(\delta+\lambda\big(1-F(x_h)\big)\Big)(\delta+\lambda+p^U)}{D}
\end{aligned}
$$

where

$$
D=\lambda F(x_l)\ (p^U-p^N)+\Big(\delta\ +\ \lambda\big(1-F(x_h)\big)+p^N\Big)(\delta+\lambda+p^U)
$$

Recalling that both x_l and x_h are increasing in wage, it is straightforward to see that the proportion of true non-participants $N_t = \big(1-F(x_h)\big)$ decreases with wage, while the proportion of individuals with $x < x_l$, $\big(E_t + U\big) = F(x_l)$, increases. What happens to the remaining $\big(E_u + N_u\big) = F(x_h) - F(x_l)$ depends on the assumption about the distribution F and the rest of the parameters. I have shown (see Section C.4 of the Appendix for details) that $\frac{dx_h}{dw} > \frac{dx_l}{dw} > 0$. Assuming, however, a negative exponential distribution for F implies $f(x_l) > f(x_h)$, so that the total effect of wage on the proportion of people in $\big(E_u + N_u\big)$ is ambiguous. The same holds for the steady state proportions of people in the three labor force states E, U, and N.

The steady state proportions derived in this section can be also interpreted as the steady state probabilities of being in one of the three states of employment, unemployment, and inactivity. They are functions of the wage and the other parameters of the model. The effect of the wage on the three probabilities is the main focus of the empirical analysis of this paper.

3.3 Calibration Results and the Extended Model

I calibrate the model to match the observed cross-country differences in the distribution of the low-skilled across the three labor force states. Figure B.2 in Section B of the Appendix shows how the three proportions vary with the wage. As the wage increases, it pays more to work as

[20] See Section C.5 of the Appendix for the derivation.

well as to search for a better paid work. Therefore, the proportion of the inactive decreases.[21] The figure suggests that, other things being equal, in countries with relatively low wages, the inactivity rate can exceed the percentage of people who are unemployed, whereas in countries with relatively high wages the reverse is true. In this very crude sense, the model can match the observed differences between the US, where high inequality leaves the individuals at the bottom of the distribution with relatively low wages and where the inactivity rate is higher than the percentage of people who are unemployed, and France, where the wage distribution is compressed from below by a relatively high minimum wage and collective bargaining mechanisms and where the the percentage of the unemployed is above the inactivity rate.

It should be noted that the comparison only holds for a homogenous group of individuals (e.g. the low-skilled) for whom only the wage differs, while all the other parameters of the model are the same. In addition, the model (and the figure) neglects the fact that earning capacity, as reflected by the wage, is likely to be correlated with employability. The figure shows a comparative static result: the effect of wage when all the other parameters of the model (including the hiring and firing rates) remain constant.

As I do not wish to impose any assumptions on the particular form of the demand side and wage setting mechanisms for the three different countries, I extend the model to capture the relation between earning capacity and employability by allowing the arrival rate of job offers and the job separation rate to be a function of wage. The parameters then become:

$$\begin{aligned} p^U &= tanh\,(a \times w) \\ p^N &= tanh\,(b \times w) \\ \delta &= exp\,(-c \times w) \end{aligned}$$

where a, b and c are positive constants. I am thus imposing my prior expectation that there would be a positive relationship between the arrival rate of job offers and earning capacity, and a negative relationship between the firing rate and earning capacity. The extended model generates patterns similar to the ones estimated in the empirical analysis, where both probabilities, to be inactive and to be unemployed, decrease with wage (see Figure B.4 in the Appendix). The issue is further discussed in Section 5.1,"Additional Points", where I focus on the role of social transfers, as the other key factor besides wage that determines the relative pay-offs in the three states.

[21] Increasing amount of individuals who were truly inactive either become unattached inactive or unemployed. Part of the new unattached inactive receive job offers and get hired. In addition, some of the unattached employed become attached employed, so that, if dismissed, individuals become more often unemployed than inactive.

4 Empirical Analysis

This empirical section is organized as follows: First I explain the econometric model I am estimating. Then I briefly describe the data and present the key summary statistics on skill differentials of prime age men. The last part consists of the estimation results and their interpretation.

4.1 Econometric Model

I approximate the three steady state probabilities of being in one of the labor force states, as derived in the theoretical part of the paper (Section 3.2), by flexible functions of linear indices, using the standard multinomial logit specification. Besides individual characteristics, the main variable of interest that enters each probability is the wage. The three probabilities to be estimated are of the form:

$$Prob(E|X_i, W_i) = \frac{\exp(X_i\tilde{\beta}^E + \tilde{\alpha}^E\, W_i)}{\exp(X_i\tilde{\beta}^E + \tilde{\alpha}^E\, W_i) + \exp(X_i\tilde{\beta}^U + \tilde{\alpha}^U\, W_i) + \exp(X_i\tilde{\beta}^N + \tilde{\alpha}^N\, W_i)}$$

$$Prob(U|X_i, W_i) = \frac{\exp(X_i\tilde{\beta}^U + \tilde{\alpha}^U\, W_i)}{\exp(X_i\tilde{\beta}^E + \tilde{\alpha}^E\, W_i) + \exp(X_i\tilde{\beta}^U + \tilde{\alpha}^U\, W_i) + \exp(X_i\tilde{\beta}^N + \tilde{\alpha}^N\, W_i)}$$

$$Prob(N|X_i, W_i) = \frac{\exp(X_i\tilde{\beta}^N + \tilde{\alpha}^N\, W_i)}{\exp(X_i\tilde{\beta}^E + \tilde{\alpha}^E\, W_i) + \exp(X_i\tilde{\beta}^U + \tilde{\alpha}^U\, W_i) + \exp(X_i\tilde{\beta}^N + \tilde{\alpha}^N\, W_i)}$$

where X is a vector of individual characteristics and W is the natural logarithm of the individual's actual wage or potential earning capacity. By definition, the three probabilities add up to one. Dividing the ratios by $\exp(X_i\ \tilde{\beta}^E + \tilde{\alpha}^E\ W_i)$ yields the necessary normalization:

$$\begin{aligned}
Prob(E|X_i, W_i) &= \frac{1}{1 + \exp(X_i\beta^U + \alpha^U\, W_i) + \exp(X_i\beta^N + \alpha^N\, W_i)} \\
Prob(U|X_i, W_i) &= \frac{\exp(X_i\beta^U + \alpha^U\, W_i)}{1 + \exp(X_i\beta^U + \alpha^U\, W_i) + \exp(X_i\beta^N + \alpha^N\, W_i)} \\
Prob(N|X_i, W_i) &= \frac{\exp(X_i\beta^N + \alpha^N\, W_i)}{1 + \exp(X_i\beta^U + \alpha^U\, W_i) + \exp(X_i\beta^N + \alpha^N\, W_i)}
\end{aligned}$$

where the no-tilde coefficients express the deviation from the original coefficients of the employment index $\exp(X_i\ \tilde{\beta}^E)$. Since the wage is not observed for individuals who are not employed, the direct estimation of the three equations above is not feasible. Therefore, as part of the model, I estimate a wage equation to predict potential wages for non-workers.

The estimation procedure consists of four steps: First, I estimate the reduced form of the multinomial logit model (integrating out the error term from the wage equation) and predict for each individual the probability of being in each of the three states. Second, I estimate a wage equation from the observed wages of individuals who are employed. I follow the method of Lee (1983) to correct the selection bias in the wage equation, using the probabilities from the first step multinomial logit model. Next, I use the wage equation to predict potential wages for the non-workers. Finally, I use the predicted wages as the right-hand side variable in the original multinomial logit model of the three probabilities in order to estimate the relationship between earning capacity and the labor force status.

4.1.1 First Step: Reduced Form Probability Model

I specify the following wage equation:

$$W_i = Z_i \gamma + \varepsilon_i$$

I use this wage equation to express the three probabilities as a function of factors determining wage:

$$Prob(E|X_i, Z_i) = \frac{1}{1 + \exp\left(X_i\beta^U + \alpha^U(Z_i\,\gamma) + \alpha^U\,\varepsilon_i\right) + \exp\left(X_i\beta^N + \alpha^N\,(Z_i\,\gamma) + \alpha^N\,\varepsilon_i\right)}$$

$$Prob(U|X_i, Z_i) = \frac{\exp\left(X_i\beta^U + \alpha^U(Z_i\,\gamma) + \alpha^U\,\varepsilon_i\right)}{1 + \exp\left(X_i\beta^U + \alpha^U(Z_i\,\gamma) + \alpha^U\,\varepsilon_i\right) + \exp\left(X_i\beta^N + \alpha^N\,(Z_i\,\gamma) + \alpha^N\,\varepsilon_i\right)}$$

$$Prob(N|X_i, Z_i) = \frac{\exp\left(X_i\beta^N + \alpha^N\,(Z_i\,\gamma) + \alpha^N\,\varepsilon_i\right)}{1 + \exp\left(X_i\beta^U + \alpha^U(Z_i\,\gamma) + \alpha^U\,\varepsilon_i\right) + \exp\left(X_i\beta^N + \alpha^N\,(Z_i\,\gamma) + \alpha^N\,\varepsilon_i\right)}$$

Substituting the wage equation for wage introduces an error term ε, interacted with the corresponding labor force state index coefficient. This error term is unobserved and causes the three expressions for the probabilities to be correlated. I assume a particular distribution for the error term from the wage equation and integrate it out. I estimate the model by maximum likelihood.

The log-likelihood function of the first stage is:

$$\begin{aligned}\ln(L) = \sum_{i=1}^{N} D_i^E \times \ln\Big(\int_{-\infty}^{\infty} Prob(E|X_i, Z_i) f(\varepsilon) d\varepsilon\Big) \\ + D_i^U \times \ln\Big(\int_{-\infty}^{\infty} Prob(U|X_i, Z_i) f(\varepsilon) d\varepsilon\Big) \\ + D_i^N \times \ln\Big(\int_{-\infty}^{\infty} Prob(N|X_i, Z_i) f(\varepsilon) d\varepsilon\Big)\end{aligned}$$

where D_i^j is an indicator variable for individual i being in the state j. I assume that wages are distributed log-normally, implying that ε_i follows a normal distribution $N(0, \sigma^2)$. The integrals in the likelihood function do not have a closed form solution, and therefore have to be evaluated numerically. I use the Gaussian-Hermite quadrature to approximate the integrals in the likelihood function.[22] See Section C.6 of the Appendix for more details.

4.1.2 Second Step: Wage equation

The wage equation is estimated on the subsample of individuals who are currently employed. Therefore, the expected wage of the selected sample is:

$$E(W_i|D_i^E = 1) = Z_i\,\gamma + E(\varepsilon_i|D_i^E = 1) \qquad \text{where} \qquad E(\varepsilon_i|D_i^E = 1) \neq E(\varepsilon_i) = 0$$

I correct the potential bias caused by the selection to employment using a method originally derived by Lee (1983) who suggests to control for the omitted term in the following way:

$$W_i = Z_i\,\gamma + \delta\,\frac{\phi\Big(\Phi^{-1}\big(Prob(E|X_i, Z_i)\big)\Big)}{Prob(E|X_i, Z_i)} + \nu_i \qquad \text{where} \qquad E(\nu_i) = 0$$

[22] The Luxembourg Income Study typically grants researchers only an indirect access to the data - researchers send their codes to a computer in Luxembourg to receive the results. The only available software for doing so is STATA, SAS, and SPSS. Although STATA, which I am using, allows me to perform the estimation procedure described in the text, it does not - as compared to Gauss or Matlab - have an in-built function for numerical integration. This is why I program the numerical approximation myself, using the Gaussian-Hermite quadrature. I am using 8 abscissas to evaluate the integrals.

Taking into account the heteroskedasticity that arises in the model due to the correction of the selection bias, as well as any other potential forms of heteroskedasticity, I estimate the standard errors using the Huber-White formula for the covariance matrix.

4.1.3 Third Step: Predicting Wages

Next, I use the estimated wage equation to predict each individual's potential wage:

$$\hat{W}_i = Z_i\,\hat{\gamma}$$

4.1.4 Fourth Step: The MNL With Predicted Wages

Finally, I estimate the original probability model using the predicted wages to proxy earning capacity for all individuals in the sample:[23]

$$\begin{aligned}
Prob(E|X_i,\hat{W}_i) &= \frac{1}{1+\exp(X_i\beta^U+\alpha^U\,\hat{W}_i)+\exp(X_i\beta^N+\alpha^N\,\hat{W}_i)} \\
Prob(U|X_i,\hat{W}_i) &= \frac{\exp(X_i\beta^U+\alpha^U\,\hat{W}_i)}{1+\exp(X_i\beta^U+\alpha^U\,\hat{W}_i)+\exp(X_i\beta^N+\alpha^U\,\hat{W}_i)} \\
Prob(N|X_i,\hat{W}_i) &= \frac{\exp(X_i\beta^N+\alpha^N\,\hat{W}_i)}{1+\exp(X_i\beta^U+\alpha^U\,\hat{W}_i)+\exp(X_i\beta^N+\alpha^N\,\hat{W}_i)}
\end{aligned}$$

As the estimated coefficients and corresponding marginal effects are outcomes of a complex four step procedure (involving use of a generated regressor, i.e. the predicted wage, in the last step), I use bootstrapping to estimate their standard errors.

The second and fourth steps of the procedure require each a specific exclusion restriction: there has to be at least one variable in X that is not in Z, and at least one variable in Z that is not in X. Marital status, the presence of children, immigration status, disability status, and an indicator whether the household comprises a single individual are used in the probability model but excluded from the wage equation. It is far more challenging to find the exclusion

[23] As I am using predicted rather than actual/potential wages, the prediction error becomes part of the error term. This alters the distribution of the error term and creates a problem of misspecification in the MNL model. The Monte Carlo simulation shows that the measurement error in a regressor in the MNL model biases the coefficient toward zero. Therefore the estimates should be interpreted (in the absolute value) as the lower bounds of the true coefficients. Simulation results are available from the author on request.

restrictions for the probability model - variables present in the wage equation but not (once I control for the wage) in the probability model. The usual exclusions, such as industry or occupation indicator, are not feasible in this context, as the information does not have a clear meaning for the unemployed and the inactive, and also is typically missing for these two groups. I use the urban indicator[24] and the three dummy variables describing the education level as exclusion restriction for the probability model.[25] The model is estimated separately by country. In the case of the US, I estimate the model by ethnicity, defined as white and non-white.

4.2 Data Issues

Microeconomic analysis of labor force status and earnings of prime age men with a special focus on the low-skilled requires representative and sizable datasets that would include a sufficient number of individuals from the group of interest and be comparable across the three countries.[26] The data used in this paper come from the Luxembourg Income Study.[27] I selected the most recent datasets available: 1995 for France, 1999 for the UK, and 2001 for the US. Figure B.1 in Section B of the Appendix shows the unemployment rate of prime age men in the three countries in the years 1990-2003, with the points indicating the reference period of the three datasets. It suggests that the UK and the US were experiencing a period of boom in the years at the end of the century, when the surveys were conducted, while the data for France come from the more recessionary years of the mid-1990s.

Although labor force status is self-reported,[28] the distribution of prime age men across the three states is fairly representative when compared to the OECD data based on the ILO definition of unemployment for the corresponding year. The information about labor force status

[24] As the unemployment rate often has regional character, I prefer to use the indicator for the degree of urbanization of the place of residency, rather than a variable describing geographical location.

[25] I have tested the validity of the exclusion restrictions in my model by leaving them one by one in the respective equation they were excluded from and checking their significance. The results are mixed. Although the coefficients are most often insignificant, there are cases - for some of the countries or datasets - where they are significant. I decided to keep the estimation framework for all the datasets the same and use these exclusion restrictions throughout the entire analysis. Although most of the exclusion restrictions were chosen by a priori assessment of their relevance, the education variables were excluded from the last step probability model as the result of their insignificant and unstable coefficients. The key results - the wage coefficients - were robust in both significance and magnitude to any of the above mentioned specifications.

[26] This is the main reason (together with the limited availability of panel data for France) why I use cross-sectional data to answer the stated questions.

[27] The LIS harmonizes data from different national household budget surveys in order to facilitate comparative research. See Section A of the Appendix for list of the original surveys.

[28] Individuals who report anything else than being (self-)employed or unemployed are considered inactive.

Table 5: Educational Attainment of 25-64 old by ISCED in 2001

	Lower Secondary Or Less	Upper Secondary Postsecondary	Tertiary
FR	36	41	23
UK	17	57	26
US	13	50	37

Source: OECD, Education at a Glance (2002), Indicator A3, Table A3.1a
http://www.oecd.org/dataoecd/7/32/1962549.xls

reflects the current situation, while earnings refer to the preceding year. The hourly wage was constructed using annual earnings together with usual weekly hours and the number of weeks worked. The wage in the US and the UK is reported as gross earnings, while in France it is reported net of mandatory taxes at source. France, however, is the only OECD country where income taxes are not deducted at source. The wage is therefore reported net of the payroll taxes (employee's social security and other contributions) but before the income tax is paid. Payroll taxes are deducted by a constant percentage, irrespective of the wage level.[29] In 1995 the total employees' contributions were around 18 %. The difference between the gross and net earnings in France does not affect the present analysis, as relative wages stay the same. Whenever I make cross-country comparisons of the exchange rate or purchasing power parity converted wage levels, I add the payroll taxes back in as specified.

The definition of skills in this paper is based on educational attainment. I divide individuals into three skill groups: low, medium, and high. I employ two different approaches to construct the three groups. First, I use the International Standard Classification of Education (ISCED 1997) and define the low-skilled as individuals who completed lower secondary education or less; medium skilled as individuals who completed upper secondary education or post-secondary non-tertiary education; and high skilled as individuals who completed tertiary education.[30]

Table 5 summarizes the educational attainment by ISCED classification of individuals between 25-64 years of age for the three countries in 2001, based on OECD data. Although the ISCED classification is a useful tool that allows detailed comparisons of various national

[29] There is a maximum limit on the amount paid as the payroll taxes, so the tax rate at high levels of income is effectively lower. This fact is likely to have only negligible impact, and is therefore not taken into account in the present analysis.

[30] I use LIS standardized education variable that corresponds to this classification for France and the US. For the UK, I use the two kinds of information available - age at which the individual left education and the general type of certificates obtained - to construct this measure.

educational systems, it has been criticized for not reflecting the actual abilities that students at different levels are equipped with.[31] The second concern is that the ISCED classification generates very uneven skill distributions across different countries: the proportion of the low-skilled (defined as individuals who attained the lower secondary education level or less) in population in countries of continental Europe is twice as high as in the US or the UK.[32] I find it conceptually wrong to make a cross-country comparison of earnings and labor force status of the low-skilled when the group forms less than 20% of the population in some countries (and is likely to consist of individuals at the margin of the labor market), while in other countries the group forms almost 40% of the population (a substantial part of the workforce).

I therefore apply a second definition, based on the equal skill distributions across countries: I rank the population of interest (prime age men) by their educational attainment and define the low-skilled as the lowest 40%, the high skilled as the upper 30%, and the middle skilled as those in between.[33] In the estimation procedure, I further divide the approximately 40% of the low-skilled by separating the group of the least educated that in the UK and the US corresponds to the ISCED classification (individuals with lower secondary education or less, which corresponds to the high school drop-outs in the US), and in France to individuals that have no diploma or certificate from any education level. Section A of the Appendix includes further details on the data construction.

4.3 Skill Differentials in Labor Force Status and Wages

Summary statistics from the three datasets further document what has been already suggested in Section 2.1, based on aggregate data from the OECD: inactivity among prime age men exceeds unemployment in the UK and the US, while the opposite is true for France. The statistics in this section are disaggregated by education, and therefore reveal the differences in labor force status across different skill levels.

[31] Papers like Blau and Kahn (2004) or Devroye and Freeman (2002) use the International Adult Literacy Survey to make sure that the education attainment variable is correctly standardized across countries: in this survey individuals in different countries are classified according to their test scores on a standardized tests rather than according to the country-specific levels of education they have achieved.

[32] It has also been suggested that the higher earnings inequality in the US and the UK is partly driven by the fact that the skills are also distributed more unequally in these countries. However, Devroye and Freeman (2002) find that only 7% of the cross-country difference in wage inequality can be explained by skill inequality.

[33] The percentage split is more or less determined by the educational systems and the limited information on education in the datasets: e.g. in the US sample, among the low-skilled, I can only distinguish high-school drop-outs (about 14%) from high school graduates (about 32%); if I therefore need to specify n% of the least skilled, it is either 14% or 46 %.

Table 6: Labor Force Status of the Low-skilled

SAMPLE	ISCED: Lower Secondary or Less				45 % LEAST EDUCATED			
	E(%)	U(%)	N(%)	% in sample	E(%)	U(%)	N(%)	% in sample
FR 1995	86.5	9.9	3.6	41	86.5	9.9	3.6	41
UK 1999	66.0	8.8	25.2	17	77.6	7.1	15.3	43
US 2001	77.4	7.3	15.3	14	83.6	5.8	10.7	46
US W	72.7	6	21.3	7	85	4.7	10.3	39
US NW	79.9	8	12.1	29	81.6	7.3	11.2	61

Note: The first three columns titled E, U, and N represent the proportion of the low-skilled in employment, unemployment, and inactivity. They add up to 100, the total that represents $n\%$ of the total prime age men as indicated in the fourth column.

Table 6 shows that the employment rate of the low-skilled, defined as the 40% of the least educated, is much lower in the UK, but more or less the same in the US and France (the difference is 3% in favor of France). The US has the lowest percentage of the unemployed among the low-skilled (5.8%), France has the highest (9.9%). The UK has the highest inactivity rate (15.3%). The US and the UK have both twice as many low-skilled non-participants as unemployed, while in France the reverse is true. For France the proportional definition of the low-skilled coincides with the ISCED definition. For the UK and the US, however, the first three columns of the table suggest that unemployment and inactivity are highly concentrated among the least skilled, as defined by the ISCED classification (with lower secondary education or less). There is a substantial racial gap in the US in education, with only 7% of high school drop-outs among white Americans compared to 29% among the non-whites; the low-skilled non-whites are also more likely to be unemployed than their white counterparts. On the other hand, white high school drop-outs have 20% inactivity rate, the second highest after the corresponding skill group in the UK that has 25%.

Table 7 shows the distribution of the labor force status by four education categories that were used for the classification of education in the estimation procedure.[34] In the UK and the US, the ISCED classification of the lower secondary or less educational attainment corresponds to the *educ1* category, while in France it corresponds to the first two, *educ1* and *educ2*. From the perspective of the proportional classification of education, *educ1* and *educ2* form the low-skilled level (the approximately 40% least educated), and *educ3* and *educ4* form the medium and the high skill level respectively in all three countries. See Section A of the Appendix for

[34] Education enters the first stage multinomial model and the wage equation in the form of three dummy variables. The lowest level of education (*educ1*) is the omitted category.

Table 7: Labor Force Status Skill Differentials

	France 1995				UK 1999			
	educ1	*educ2*	*educ3*	*educ4*	*educ1*	*educ2*	*educ3*	*educ4*
E	80.02	89.91	90.65	93.37	65.96	85.16	91.18	93.2
U	15.16	7.16	7.27	5.32	8.81	6.04	3.6	3.12
N	4.81	2.93	2.08	1.3	25.23	8.8	5.22	3.68
%	14.1	27.25	26.13	32.51	16.93	26.15	25.9	31.02

	US white 2001				US non-white 2001			
	educ1	*educ2*	*educ3*	*educ4*	*educ1*	*educ2*	*educ3*	*educ4*
E	72.71	87.61	90.13	94.98	79.86	83.07	86.84	91.46
U	6.01	4.43	3.27	1.56	8.02	6.58	5.05	2.96
N	21.28	7.95	6.6	3.46	12.12	10.35	8.12	5.58
%	6.87	32.25	24.29	36.6	28.7	31.88	18.77	20.64

Note: Tables show the distribution of prime age men across the three labor force states (employment, unemployment, inactivity) in each of the four education categories. The last row shows the percentage of each education group in the total prime age men population.

more detailed description of the four education categories.

The distribution of employment across the skill levels is most unequal in the UK, followed by the US. While the proportions of prime age men in the two upper skill groups are similar across the three countries (though somewhat lower for the US sample of non-whites), the *educ2* category ranges from almost 90% in France to 83% among the US non-whites. The greatest difference, however, occurs among the least educated. The percentage of prime age men in the *educ1* group that are employed ranges from about 80% in France (and among the US non-whites)[35]) and 73% in the US to only 66% in the UK. In terms of the other two labor force states, the table just supports what has already been suggested: both unemployment and inactivity decline with educational attainment. Unemployment is the highest in France (with 15% of unemployed in the lowest education category) and the lowest in the US at all four education levels. France has the lowest inactivity rates at all skill levels. While the least skilled in the UK and the US are the most likely ones to be inactive (over 20%), inactivity at the other three education levels is higher among the US non-whites than in the UK and among the US whites.

Table 8 summarizes the differences in the median hourly wage levels, converted to 2000 US

[35] The relatively high percentage of employed among the least educated US non-whites is possibly a consequence of the fact that this group is much bigger - almost 30% of all non-white prime age men in the US - than the corresponding group in the other samples.

Table 8: Skill Differentials in Median Hourly Wage

SAMPLE	MEDIAN HOURLY WAGE RATE in 2000 USD				
	LOW	MEDIUM	HIGH	MEDIUM vs. LOW	HIGH vs. LOW
FR 1994 (xrate)	8.21	8.76	12.36	1.07	1.51
FR 1994 (PPP)	9.62	10.26	14.48	1.07	1.51
UK 1999 (xrate)	11.05	13.31	17.23	1.21	1.56
UK 1999 (PPP)	11.40	13.73	17.78	1.21	1.56
US 2001	12.77	16.35	22.60	1.28	1.77

Note: Table presents 2000 USD converted median hourly wages for each skill category (using the proportional classification of educational attainment into three levels). The wages for France and the UK are first converted to their 2000 value using the consumer price index from the Bureau of Labor Statistics for the US and OECD Main Economic Indicators for the UK and France, and then converted by the purchasing power parity index using the OECD PPP for GDP Historical Series for the 2000 value, or by the exchange rate XRAT from the Penn World Table database. As wages in the French dataset are reported net of the payroll taxes, I add back the 18% of the payroll tax to make the converted median wage levels comparable across countries.

dollars, across the three skill levels defined by the proportional classification of education. In absolute terms (whether using exchange rate or the purchasing power parity convertor), the median wage in France is lower than in the UK in all three education groups; the US has the highest median wage at all three levels. The medium-versus-low differential in France (1.07) is much lower than in the other two countries, with the US (1.28) being the most unequal. The high-versus-low differentials in France and the UK are fairly similar (about 1.5), as the more compressed top of the distribution in the UK cancels out with the more spread-out bottom. The same differential in the US is higher (1.77).

To summarize, low-skilled prime age men in France (regardless of the definition) are better off than their counterparts in the US and especially in the UK in terms of their employment prospects. In France, the low-skilled who do not work are more likely to be unemployed, while in the US and the UK they are more likely to be inactive. The absolute median wage levels are highest in the US and lowest in France. The low-skilled in France, however, have the highest relative wages, when compared to the medium and the high-skilled. The low-skilled in the UK come second, and the low-skilled in the US have the worst relative wages.

4.4 Estimation Results

The results from the model of the three probabilities of being in employment, unemployment, and inactive, estimated by the four-step procedure, are presented in Tables 9 to 12. The estimation output from the previous steps, the first stage model of the three probabilities and the wage equation, is presented in Tables B.1 and B.2 in Section B of the Appendix. The upper part of Tables 9 to 12 presents the coefficients in the unemployment index $X\beta^U$ and the inactivity index $X\beta^N$, relative to the employment index coefficients. The results show that there is a significant negative effect of the wage on inactivity in the UK and in the US, while there is no such effect in France. The coefficient for the UK is, in absolute value, twice as high as that for the US whites, which in turn is almost twice as high as that for the US non-whites. As for the effect of wage on the probability of being unemployed, the wage coefficient is negative and significant in all countries. The order of countries in terms of magnitude is similar to the wage coefficient in the inactivity index: the UK has the highest coefficient, followed by the US whites, the US non-whites, and France as the last.

The first rows of the lower part of Tables 9 to 12 present the marginal effects of wage on the three probabilities at the 25th percentile of the predicted wage distribution.[36] The reference individual is a forty-year-old man who is single, no children present in the household, native born, non-disabled, and shares household with at least one more person. Consistent with the magnitude of the coefficients, the biggest impact of wage on inactivity is in the UK, where 1% increase in wage at the 25th percentile (8.1 GBP per hour) reduces the probability of being inactive by 0.2 percentage points.[37]. The second biggest effect is among the US whites, but it is less than half of that in the UK: the 1% increase in wage reduces the probability of being inactive by 0.08 percentage points. For the US non-whites the effect is 0.07 percentage points, and in France there is no effect of wage on the probability of being inactive (both the coefficient and the marginal effects are insignificant at the 5% significance level).

The marginal effect of the wage on the probability of being unemployed is again the biggest in the UK, where 1% increase in wage is associated with a reduction in the probability of being unemployed by 0.27 percentage points. The US non-whites follow with 0.22 percentage-point reduction. Among the US whites and in France the effects are similar: the 1% increase in wage implies 0.12 and 0.13 percentage points lower probability of being unemployed in the two countries respectively.

As the three marginal effects add to one, the marginal effect of wage on the probability of being employed is the residual effect, which is always positive. It is highest in the UK (0.47 percentage point increase), followed by the US non-whites (0.28 percentage points), the US whites (0.2 percentage points), and France (0.15 percentage point). Comparing the overall sensitivity of the three probabilities to the wage, as given by the wage coefficients and the marginal effects,

[36] The distribution of wages predicted in the third step of the estimation procedure.

[37] In other words, 1 % wage increase would reduce the steady-state inactivity rate among the reference individuals at the 25th percentile by 0.2 percentage points

the UK is the most wage elastic, while France is the least.

I further illustrate the effects of the wage on employment, unemployment, and inactivity by graphing the three probabilities as a function of wage in Figure B.3 in Section B of the Appendix. The marginal effects are the slopes of the probability curves. The figures further support the conclusion that the wage matters for the inactivity of prime age men in the UK and the US, while it has no effect in France. In addition, they reveal how the three probabilities change with wage level. The probability of being unemployed at the country-specific official minimum wage (the lower limit of the wage range in the figures) is also higher in the UK and the US (reaching 40% for the UK and the US non-whites, and about 33% among the US whites) than in France (20%). The curve depicting the probability of unemployment is much steeper and its slope decreases more rapidly in the UK and the US than in France. The probability of being unemployed in the sample of the US whites reaches a similar slope as that in France around the 10th percentile of their predicted wage distributions. The level of the probability of being unemployed falls below that in France at wage level below the 10th percentile. The same probability for the US non-whites and in the UK are still slightly higher than that in France even at the median predicted wage (the upper limit of the wage range in the figure).

The predicted labor force status probabilities at the 10th and 25th percentile of the predicted wage distribution are given in Table B.3 in Section B of the Appendix. The difference between the two employment probabilities, describing the inequality in employment prospects between the two earning levels at the bottom of the wage distribution, is far the biggest for the UK (5.5 %), followed by the US (3.2 %), and only then by France (1.9 %). The difference between the two unemployment probabilities is almost twice as big in the UK (3.1 %) and among the US non-whites (2.5 %) than among the US whites (1.9 %) and in France (1.7 %), suggesting again that the risk of unemployment is distributed more equally in the latter two samples (France and US whites) than among the US non-whites and in the UK.

The marginal effects and the probabilities described above are pertinent to a particular reference person (as defined above). The scope of this paper does not allow me to present the results for other reference individuals. However, I survey next the marginal effects of the other individual characteristics that indicate in which direction the outcomes would change for a different reference person.

Tables 9 to 12 show that the effects of factors other than wage are fairly similar across the three countries. Age has a significant but relatively small positive effect on the probability of being unemployed and the probability of being inactive. The same holds for the immigration status in France, in the UK and among the US whites, but the effect is more substantial - in particular, on the probability of being unemployed in France (increase by 0.13 percentage points) and on both probabilities in the UK (increase by 0.1 percentage points each). Interestingly, however, the effect of immigration status has an opposite sign among the US non-whites: being a non-white immigrant reduces the probability of being unemployed or inactive when compared to a non-white native person.[38] As expected, disability has a strong positive effect on being inactive and a positive but mostly insignificant effect on the unemployment probability. The effect of disability on the observed distribution of labor force states among prime age men in the three countries is further discussed under "Additional Points" in Section 5.2. In the UK and France, an individual that forms a single person household has higher probability of being unemployed and lower probability of being inactive than the same individual that shares household with one or more other individuals.[39] In the two US samples both coefficients have a negative sign, suggesting that both the unemployed and the inactive are less likely to live on their own in the US.

What deserves emphasis are the results for family variables: although the presence of children is sometimes insignificant,[40] its negative effect together with the (always significantly) negative effect of being married on the probability of being inactive rule out the idea that the prime age men who are not in the labor force are mostly househusbands.[41] Marriage and the presence of children increases the probability of being employed, while reducing the other two by a similar magnitude. The exception is France, where being married reduces the probability of being inactive two to three times more than the probability of being unemployed.

The estimates from the model of the three probabilities also reveal that (with the exception of the opposite sign of the effects of single-person household and hugely different magnitude of the effect of disability) the two sets of coefficients for the probability of being unemployed and inactive are very similar. This may reflect the limitations of the self-reported nature of the labor force status information used in this analysis, but it also provides new evidence to the debate on whether unemployment and inactivity are distinct states, as discussed in Section 2.1.

[38] This point would require further investigation with a more detailed definition of race within the group of non-whites, which is beyond the scope of this paper. However, this result probably suggests that the native non-white population formed mostly by Afro-Americans and Latinos is doing worse in terms of employment prospects than the incoming non-white individuals such as immigrants from Asia.

[39] This indicator is likely to reflect higher individual expenses such as housing costs, as the single-person household doesn't enjoy the economy of scale of multi-person households. At the same time, the variable serves as a proxy for other financial sources or non-labor income potentially available from the other family or household members to the individual who shares household. The opposite signs of the two coefficients would be consistent with the idea that an individual who shares a household with others might be able to afford to be inactive, while a person living on his own must either be employed or search for a job to get his expenses paid.

[40] This is likely a result of the limited quality of the children variable that states whether children below 18 years of age are present in the household rather than whether an individual has his own children.

[41] It would require a dynamic analysis using panel data or at least a repeated cross-section to determine which way the causality goes: either husbands or fathers exert more effort to keep or find a job, or women tend to marry employed and "employable" men.

Table 9: The Three Probabilities Model: United States - Whites

Final Step MNL Coefficients	**UNEMPLOYMENT PROBABILITY**			**INACTIVITY PROBABILITY**		
	COEFF	SE	T-STAT	COEFF	SE	T-STAT
WAGE	-2.07	0.22	-9.44	-1.52	0.20	-7.47
AGE	0.02	0.01	3.64	0.04	0.01	5.91
MARRIED	-0.66	0.10	-6.70	-0.69	0.09	-7.61
CHILDREN	-0.15	0.10	-1.50	-0.45	0.09	-5.24
IMMIGR	0.36	0.20	1.83	0.47	0.17	2.82
1 - HH	-0.27	0.13	-2.08	-0.36	0.11	-3.22
DISABLED	1.38	0.15	9.02	3.97	0.08	47.42
CONSTANT	2.10	0.55	3.84	0.01	0.52	0.02

Note: Employment probability is the omitted category. Standard errors are bootstrapped with 200 replications. The names of the variables are self-explanatory (1-HH stands for a single person household). See Section A of the Appendix for exact definitions of the variables. The value of the likelihood-ratio statistic (with 14 degrees of freedom) is 3656.5 and the pseudo-R^2 is 0.25. The mean predicted probabilities fit well the proportions of the three states in the dataset, as well as within the four education categories.

Marginal Effects	**Prob(E)**		**Prob(U)**		**Prob(N)**	
	ME	T-STAT	ME	T-STAT	ME	T-STAT
WAGE	0.201	8.92	-0.117	-6.95	-0.084	-5.68
AGE	-0.003	-5.66	0.001	2.92	0.002	5.06
MARRIED	0.058	8.56	-0.028	-5.67	-0.030	-6.24
CHILDREN*	0.075	10.08	-0.033	-6.00	-0.042	-8.17
IMMIGR	-0.054	-2.78	0.022	1.49	0.032	2.28
1 - HH	0.032	3.55	-0.013	-1.99	-0.018	-3.11
DISABLED	-0.680	-53.87	-0.008	-0.98	0.688	46.73

Note: Unless stated otherwise, the base category is a forty-year-old man who is single, no children present in the household, native born, non-disabled, and shares household with at least one more person. His earning capacity is at the 25th percentile of the predicted wage distribution (15.3 USD hourly wage). Standard errors are bootstrapped with 200 replications. The names of the variables are self-explanatory (1-HH stands for a single person household). See Section A of the Appendix for the exact definitions of the variables.
* The reference individual is the same as above except for being married. The effect of children therefore captures the change of the probabilities from being married with no children present to being married with children present.

Table 10: The Three Probabilities Model: United States - Non-whites

Final Step MNL Coefficients	**UNEMPLOYMENT PROBABILITY**			**INACTIVITY PROBABILITY**		
	COEFF	SE	T-STAT	COEFF	SE	T-STAT
WAGE	-1.82	0.27	-6.79	-0.98	0.22	-4.54
AGE	0.02	0.01	2.49	0.02	0.01	3.26
MARRIED	-0.75	0.10	-7.17	-0.74	0.10	-7.38
CHILDREN	-0.01	0.11	-0.08	-0.23	0.11	-2.11
IMMIGR	-0.58	0.10	-5.86	-0.32	0.09	-3.41
1 - HH	-0.56	0.19	-2.91	-0.18	0.16	-1.11
DISABLED	1.35	0.19	7.20	3.83	0.11	33.96
CONSTANT	2.12	0.65	3.23	-0.46	0.49	-0.94

Note: Employment probability is the omitted category. Standard errors are bootstrapped with 200 replications. The names of the variables are self-explanatory (1-HH stands for a single person household). See Section A of the Appendix for exact definitions of the variables.
The value of the likelihood-ratio statistic (with 14 degrees of freedom) is 1790.5 and the pseudo-R^2 is 0.20. The mean predicted probabilities fit well the proportions of the three states in the dataset, as well as within the four education categories.

Marginal Effects	**Prob(E)**		**Prob(U)**		**Prob(N)**	
	ME	T-STAT	ME	T-STAT	ME	T-STAT
WAGE	0.281	6.87	-0.215	-4.96	-0.066	-2.67
AGE	-0.004	-3.40	0.002	2.01	0.002	2.60
MARRIED	0.117	9.83	-0.068	-6.22	-0.049	-5.62
CHILDREN*	0.128	8.45	-0.067	-5.37	-0.061	-5.45
IMMIGR	0.078	6.20	-0.057	-5.17	-0.022	-2.53
1 - HH	0.066	2.92	-0.057	-3.07	-0.010	-0.67
DISABLED	-0.625	-40.78	-0.059	-3.51	0.684	39.29

Note: Unless stated otherwise, the base category is a forty-year-old man who is single, no children present in the household, native born, non-disabled, and shares household with at least one more person. His earning capacity is at the 25th percentile of the predicted wage distribution (11.1 USD hourly wage). Standard errors are bootstrapped with 200 replications. The names of the variables are self-explanatory (1-HH stands for a single person household). See Section A of the Appendix for the exact definitions of the variables.
* The reference individual is the same as above except for being married. The effect of children therefore captures the change of the probabilities from being married with no children present to being married with children present.

Table 11: The Three Probabilities Model: France

Final Step MNL Coefficients	**UNEMPLOYMENT PROBABILITY**			**INACTIVITY PROBABILITY**		
	COEFF	SE	T-STAT	COEFF	SE	T-STAT
WAGE	-1.62	0.34	-4.79	-1.04	0.73	-1.43
AGE	0.02	0.01	2.37	0.13	0.02	8.04
MARRIED	-0.57	0.15	-3.82	-1.63	0.23	-7.09
CHILDREN	0.06	0.14	0.43	-0.43	0.28	-1.51
IMMIGR	1.08	0.13	8.18	1.16	0.23	4.96
1 - HH	0.58	0.19	2.99	-0.60	0.35	-1.73
DISABLED	-0.06	0.36	-0.17	3.87	0.23	17.18
CONSTANT	3.08	1.15	2.68	-4.94	2.69	-1.83

Note: Employment probability is the omitted category. Standard errors are bootstrapped with 200 replications. The names of the variables are self-explanatory (1-HH stands for a single person household). See Section A of the Appendix for exact definitions of the variables. The value of the likelihood-ratio statistic (with 14 degrees of freedom) is 723.2 and the pseudo-R^2 is 0.17. The mean predicted probabilities fit well the proportions of the three states in the dataset, as well as within the four education categories.

Marginal Effects	**Prob(E)**		**Prob(U)**		**Prob(N)**	
	ME	T-STAT	ME	T-STAT	ME	T-STAT
WAGE	0.151	4.18	-0.132	-3.87	-0.019	-1.08
AGE	-0.004	-4.37	0.002	1.80	0.003	4.55
MARRIED	0.054	4.85	-0.036	-3.44	-0.018	-4.09
CHILDREN*	0.052	3.81	-0.033	-2.62	-0.019	-3.91
IMMIGR	-0.163	-8.24	0.127	7.21	0.036	3.76
1 - HH	-0.051	-2.29	0.062	2.88	-0.011	-1.98
DISABLED	-0.452	-7.80	-0.049	-3.26	0.501	8.16

Note: Unless stated otherwise, the base category is a forty-year-old man who is single, no children present in the household, native born, non-disabled, and shares household with at least one more person. His earning capacity is at the 25th percentile of the predicted wage distribution (47.3 FF hourly wage). Standard errors are bootstrapped with 200 replications. The names of the variables are self-explanatory (1-HH stands for a single person household). See Section A of the Appendix for the exact definitions of the variables.
* The reference individual is the same as above except for being married. The effect of children therefore captures the change of the probabilities from being married with no children present to being married with children present.

Table 12: The Three Probabilities Model: United Kingdom

Final Step MNL Coefficients	UNEMPLOYMENT PROBABILITY			INACTIVITY PROBABILITY		
	COEFF	SE	T-STAT	COEFF	SE	T-STAT
WAGE	-2.89	0.32	-9.07	-3.01	0.37	-8.14
AGE	0.02	0.01	2.86	0.05	0.01	6.76
MARRIED	-1.45	0.12	-11.78	-1.32	0.16	-8.28
CHILDREN	0.34	0.10	3.26	0.39	0.13	3.08
IMMIGR	0.90	0.16	5.72	1.08	0.16	6.77
1 - HH	0.31	0.14	2.27	-0.36	0.18	-2.02
DISABLED	1.31	11.00	0.12	7.57	0.42	18.09
CONSTANT	3.41	0.62	5.51	1.95	0.72	2.69

Note: Employment probability is the omitted category. Standard errors are bootstrapped with 200 replications. The names of the variables are self-explanatory (1-HH stands for a single person household). See Section A of the Appendix for exact definitions of the variables.
The value of the likelihood-ratio statistic (with 14 degrees of freedom) is 4202.9 and the pseudo-R^2 is 0.37. The mean predicted probabilities fit well the proportions of the three states in the dataset, as well as within the four education categories.

Marginal Effects	Prob(E)		Prob(U)		Prob(N)	
	ME	T-STAT	ME	T-STAT	ME	T-STAT
WAGE	0.472	9.54	-0.270	-6.97	-0.203	-5.55
AGE	-0.005	-5.10	0.001	2.03	0.004	4.80
MARRIED	0.142	10.56	-0.085	-8.40	-0.057	-6.14
CHILDREN*	0.119	8.20	-0.073	-6.62	-0.046	-4.74
IMMIGR	-0.199	-6.36	0.099	3.84	0.101	4.11
1 - HH	-0.014	-0.72	0.040	2.49	-0.026	-2.35
DISABLED	-0.794	-58.74	-0.115	-11.00	0.909	104.86

Note: Unless stated otherwise, the base category is a forty-year-old man who is single, no children present in the household, native born, non-disabled, and shares household with at least one more person. His earning capacity is at the 25th percentile of the predicted wage distribution (8.1 GBP hourly wage). Standard errors are bootstrapped with 200 replications. The names of the variables are self-explanatory (1-HH stands for a single person household). See Section A of the Appendix for the exact definitions of the variables.
* The reference individual is the same as above except for being married. The effect of children therefore captures the change of the probabilities from being married with no children present to being married with children present.

To summarize the results:

1. The wage has a substantial negative effect on the probability of being inactive in the UK and a moderate negative effect in the US while it has no effect in France.

2. The effect of the wage on the probability of being unemployed is the biggest in the UK, followed by the US non-whites. The effect at the lowest wage levels is bigger among the US whites than in France, but they even out already at the 10th percentile of the predicted wages.

3. The curve of the probability of being unemployed is overall steeper in the UK and the US than in France, suggesting that there is greater inequality in the two countries not only in earnings but also in labor force status and especially in unemployment. It is the individuals at the very bottom of the wage distribution in the UK and the US that face a substantially higher probability of being unemployed than the rest of the population (of prime age men).

4. The probability of being unemployed for a single forty-year-old man whose earning capacity is at the level of the official minimum wage in the three countries is almost twice as high in the UK and the US than in France.

5. In the UK the three probabilities are overall the most wage elastic, while in France the wage elasticity is the lowest.

Although the results lead to unambiguous conclusions, the interpretation is not straightforward. The negative effect of wage on the probability of being inactive, on the one hand, depicts the supply side story of the true non-participants (N_t), suggesting that the wage increases labor force participation. On the other hand, in the light of the theoretical model from Section 3 (and in particular in its extension in 3.3 where the probabilities of hiring and firing are specified as flexible functions of wage), the empirical finding can also reflect the negative relationship between earning capacity and probability of getting fired, and the positive relationship between earning capacity and probability of getting a job offer. The negative effect of the wage on inactivity may also result from the fact that the unattached non-participants[42] that have higher earning capacity are more likely to be hired, and if employed, less likely to get dismissed.

The same interpretation applies for the shape of the curve of the probability of being unemployed (if there is a positive correlation between earning capacity and probability of being hired when unemployed, and negative correlation between earning capacity and probability of being fired).

The aim of this paper has been to estimate the effect of wage on the three probabilities of being employed, of being unemployed, and of being inactive, and in that way to explore the

[42] The ones that accept wage offers.

relationship between earnings and labor force status of prime age men for the three countries. It is a topic for future research to estimate the theoretical model in Section 3 in order to determine which of the interpretations is correct.

The overall findings provide evidence against the trade-off argument (as described in Section 2) implying that wage flexibility allows relative wages to fall but improves the employment prospects of individuals at the bottom of the wage distribution. The low-skilled in the US and the UK, the two countries where wages are flexible, have lower relative earnings as well as lower probability of being employed when compared with the low-skilled in France, a country where labor market institutions prevent wages from fully adjusting. However, as has been noted, this conclusion assumes that the situation prior to the skill-biased change in labor demand and the demand changes themselves were similar in the three countries, and the only other factor in which the countries differed were the institutions affecting wage flexibility.

5 Additional Points

5.1 The Role of Social Transfers

The main focus of the present analysis has been on the effect of the wage on the labor force status of low-skilled prime age men. As suggested by the theoretical model, there are factors other than the wage that affect relative well-being in the three labor force states, such as social transfers to the jobless. High unemployment benefits with long duration can increase the attractiveness of being unemployed as compared to being inactive for the group of the unattached non-participants (the individuals who would like to work and accept job offers but do not search for a job). Up to now, the theoretical model assumed the two types of benefits to the jobless, b^U in unemployment and b^N in inactivity, to be zero. This section focuses on the effect of social transfers on the labor force status of low-skilled prime age men. I first briefly describe the unemployment benefits and other transfers that are available to the jobless in the three countries. I then use the institutional information to calibrate the extended theoretical model. Finally, I discuss to what extent the cross-country differences in the benefit systems are likely to contribute to the observed patterns in the division of the jobless into unemployed and inactive.

There is unemployment insurance in all three countries.[43] The unemployment insurance

[43] There exist two types of unemployment benefits: Unemployment insurance (UI) is typically contribution-based, requires active job search and availability to start working; the amount is determined as a percentage of the previous wage and the duration is limited. Unemployment assistance (UA) is typically means-tested

Table 13:
Annual Amounts of Minimum and Maximum Unemployment Insurance Benefits (in PPP converted USD)

	1995		1999	
	Minimum	Maximum	Minimum	Maximum
France	7653	54067	8214	60184
UK	-	2415	-	4084
US	2184	15236	4524	15600

Source: Wages and Benefits (2002), OECD; Benefit Systems and Work Incentives (1998), OECD. Note that the annual minimum and maximum amounts also reflect the duration of the benefit receipt (only 6 months in the US and the UK).

rate as a percentage of previous earnings is 75% in France, 50% in the US, and it is a fixed amount in the UK (irrespective of a previous wage level). The duration of the unemployment insurance benefit in France is 60 months, with the rate gradually decreasing after the first 30 months of unemployment. In the UK and the US, the duration is six months. Table 13 shows the minimum and maximum amount of benefits paid as unemployment insurance. Corresponding to the rates, the highest average level is in France, then in the US, and the lowest and fixed in the UK.

There is unemployment assistance in the UK and in France but not in the US.[44] In France, after the 60-month period of the UI has elapsed, a jobless person who has worked for five years within the last ten years is eligible for a (much lower) fixed amount of unemployment assistance.[45] The duration of the unemployment assistance in France is unlimited. In the UK, unemployment assistance is means-tested but has no previous work requirements. It lasts as long as the eligibility criteria are satisfied and its maximum amount is equal to the amount of the unemployment insurance. In addition, the jobless in the UK also receive means-tested housing benefits, the level of which exceeds that of the unemployment-related transfers. In the US, there is no unemployment-related benefit available after the exhaustion of the six-month UI.[46] There are also no unemployment-related benefits available to individuals who do not meet the criteria to be eligible for the UI in the US. The only transfer available to those not eligible

(usually the only criterion for the receipt). The UA provides lower and often fixed amounts of benefits that are available to the unemployed after they have exhausted the UI or if they do not meet the UI eligibility criteria. The duration of the receipt of unemployment assistance is often unlimited.

[44] Some of the states in the US, however, have unemployment assistance for those ineligible for the UI.

[45] For comparison, the minimum amount of the UA benefit in France was 4023 USD (PPP converted) in 1995 and 5119 USD (PPP converted) in 1999.

[46] There is sometimes a several-weeks extension to the six month duration of UI during periods of recession in the US.

for the UI, or after the six-months UI benefits have been exhausted, is a social assistance that is much lower than the UI but also much lower than the transfers available to the long-term jobless in France or the UK[47].

The composition of the benefits available to the jobless and their timing over the period of joblessness in the three countries is therefore the following: For a single person without children the main source of income during the first months of unemployment in France and the US is unemployment insurance, while it forms only about 40% of income in the UK with the remaining 60% coming from housing benefits. After 60 months in France, the benefit income consists mainly of unemployment assistance (although in 1995, the housing benefits formed also about 30%). After 6 months in the US, the only benefit available is a substantially lower social assistance. After the first 6-months period in the UK, the composition of the benefit income stays the same (60% housing benefits and 40% unemployment or social assistance).

Table 14 shows the disincentives for the jobless to start working again as a result of high unemployment benefits relative to the level of potential earnings. In the first month of unemployment, the replacement rate is the highest in France. For an individual expecting to be paid the wage of an average production worker (APW), the replacement rate is the second highest in the US, followed by the UK; however, for the expected wage offer at the 66% of APW level the reverse is true. For the long-term unemployed, the disincentives to work, as reflected by the replacement rates, are highest in the UK, somewhat lower in France, and by far the lowest in the US.

Figure B.4 in Section B of the Appendix shows calibrated results from the extended theoretical model for four types of the unemployment and inactivity benefits. As the type and values of the social transfers vary with the duration of the joblessness, the calibration is always valid only for a subgroup of the jobless prime age men depending on their eligibility for the different transfers. Plot A reflects the situation of a long-term jobless in France, with the relatively low unemployment assistance normalized to 0.4 and no inactivity benefits. Plot B corresponds to both short term and long term jobless in the UK, as the unemployment insurance, subsequent unemployment assistance, as well as the social assistance are at a similar level set to 0.5. Plot C depicts the long-term jobless in the US, with very low social assistance (set to 0.2) available in both unemployment and inactivity. Plot D corresponds to the US short-term jobless that are eligible for unemployment insurance (UI set to 0.8 as compared to the social assistance in inactivity 0.2). A plot for the short-term jobless eligible for UI in France (setting UI to 1 and zero to inactivity benefit) looks very similar to plot A, only the probability of unemployment starts at slightly higher level and is somewhat steeper.

[47] Including the food stamps, the maximum amount in 1999 was 125 USD per month.

Table 14:
Net Replacement Rates for a Single Individual without Children at Two Levels of Previous After Tax Earnings

	INITIAL PHASE*				LONG TERM PERIOD**			
	APW level		66.7% of APW		APW level		66.7% of APW	
	1995	1999	1995	1999	1995	1999	1995	1999
France	76	71	85	78	43	30	57	43
UK	52	46	75	66	52	46	75	66
US	58	58	59	59	7	7	11	10

Source: Wages and Benefits (2002), OECD; Benefit Systems and Work Incentives (1998), OECD.
* including unemployment benefits, and family and housing benefits in the first month of benefits receipt; an individual assumed not eligible for any means-tested social assistance
** including means-tested social assistance (unemployment assistance in France), and family and housing benefits in the sixtieth month of benefit receipt

The estimation of the effect of the social transfers on the probability of individuals being in one of the three states would require a separate economic analysis. At this point, however, it is interesting to see how the institutional features crudely correspond to the observed patterns: at higher relative wages[48] and with high and never-ending unemployment benefits, prime age men in France either work or are unemployed, but they are almost never inactive; at somewhat lower relative wages, with lower unemployment benefits of unlimited duration available to unemployed and a similar amount of means-tested social assistance of unlimited duration available to the inactive (both accompanied by the housing benefits), the jobless prime age men in the UK are more or less split between unemployment and inactivity; at the lowest relative wages and with only UI that has very limited eligibility and duration, the jobless prime age men in the US are more likely to be inactive than unemployed. It seems that in the US (given the minimal amount of the social assistance) the jobless low-skilled who have some alternative[49] to the potentially unavailable or low-paid employment become inactive, while the low-skilled who have no alternative to draw upon stay unemployed, i.e. search for any job that could help cover basic living expenses.

This paper focuses primarily on the effect of the wage on the probability of being in each of the three labor force states. I have shown that the low wages at the bottom of the wage distribution can explain the high inactivity rates among prime age men in the UK and the US. I have also shown that wage has a similar negative effect on the probability of being unemployed

[48] "Relative" means relative to the other skill groups or to the median wage.
[49] Such as own savings, support from the family, home production, or shadow economy.

in all three countries. I have mentioned in Section 2 that the literature asks the question whether unemployment and inactivity are the same states. If the two states were the same and determined primarily by individuals' decisions (supply rather than demand), the negative effect of wage on the probability of being unemployed could be interpreted in the same way as the negative effect of the wage on inactivity - the wage increases the incentives to work. However, the estimated negative effect of the wage on the probability of being unemployed is similar in France as in the US and the UK, despite the relative wages of the low-skilled in France being higher than in the other two countries. This fact can be explained by the higher unemployment insurance benefits of much longer duration available in France that mitigate the high level of the wages of the low-skilled, leaving the overall disincentive to work, as expressed by the replacement ratio, similar as in the UK or even the US. If the unemployment and inactivity would be the same states and primarily supply driven, the wage would only affect the rate of the overall joblessness but the way the jobless individuals would split between the unemployed and inactive would be determined by the differences in the social transfers available in the two states: the jobless would be unemployed in France, indifferent between the two states in the UK and either unemployed (if eligible for the UI or with no other sources) or inactive in the US. Although this is an extreme view of unemployment and inactivity, it is clear that the social transfers are likely to have an explanatory power, in addition to the wage, for the observed cross-country differences.

5.2 The Role of Disability

In the previous section I have only focused on the social transfers to the jobless who are not disabled. The role of the disability status and disability benefits on labor force participation are considered next. Autor and Duggan (2003) show that the eligibility criteria for the receipt of the disability benefit in the US weakened in the last (2-3) decades, and the benefit rolls have been increasing. The authors suggest that the disability rolls can partly account for the increasing inactivity rate. Nickell (2004) documents the relation between disability and inactivity status for the UK. In this section, I briefly discuss the role of disability in the observed labor force status of low-skilled prime age men in the data for the three countries.

It is important to emphasize that the information on disability is self-reported in the UK and the US, while it reflects the actual receipt of a disability benefit during the previous 12 months in the French sample. There are 6.5% individuals reporting disability in the US sample of prime age men, 6.4% among whites and 6.8% among non-whites. The proportion of the disabled in the UK sample is 5.8%, and in France it is 4%. Table 15 shows that excluding the individuals who report disability from the sample changes drastically the distribution of prime

Table 15:
The Effect of Disability Status on the Observed Labor Force Status Proportions

	Prime Age Men (Total)						40% Least Skilled					
	All			Disabled Excluded			All			Disabled Excluded		
	E	U	N	E	U	N	E	U	N	E	U	N
France	89.8	7.7	2.4	91.7	7.4	0.9	86.5	9.9	3.6	89.5	9.7	0.9
UK	86.0	5.0	9.1	91.2	5.3	3.5	77.6	7.1	15.3	86.6	8.0	5.5
US W	89.9	3.2	6.9	94	3.1	2.9	85	4.7	10.3	91.8	4.7	3.6
US NW	84.6	6.0	9.5	89.1	5.9	5.0	81.6	7.3	11.2	87.3	7.3	5.4

Notes: The columns E, U, N summarize the proportion of employed, unemployed and inactive respectively. "All" refers to all prime age men in the sample.

age men across the three labor force states: the relative proportions of unemployed and inactive become reversed in the UK and the US, with the earlier now exceeding the latter. The change is even more pronounced when looking only at the 40% least skilled.

As the disability status indicator is not really comparable across the three countries (being self-reported in the UK and the US but disability-benefit based in France), it is not possible to draw any strong conclusions from the observed facts. However, it is clear that individuals who report disability play a key role in the high inactivity rates in the UK and the US. Whether there are more disabled prime age men that are primarily low-skilled and inactive, whether the disability benefits (providing there are weaker eligibility criteria) substitute other benefits to the jobless or provide an alternative to low-pay employment, or whether prime age men who are out of labor force tend to report health problems more frequently, would have to be determined by future research.

6 Conclusion

In this paper I have analyzed the differences in earnings and labor force status of low-skilled prime age men in France, the UK, and the US at the end of the 20th century: In the UK and the US, the bottom of the wage distribution is more dispersed, and the relative wages of the low-skilled therefore lower than in France. The inactivity rate among the low-skilled prime age men in the UK and the US exceeds the percentage of the unemployed, while in France the reverse is true.

I have presented a partial-equilibrium job search model as the theoretical framework for the analysis. I suggest a supply side explanation of the observed differences: the inactivity rate of the low-skilled is higher in countries with lower relative wages at the bottom of the wage distribution due to the effect of wage on the labor force participation. In the empirical part I estimated the effect of wage on the probability of being inactive, the probability of being unemployed, and the probability of being employed using data from the Luxembourg Income Study.

I have found a significant negative effect of the wage on the probability of being inactive for the UK and the US but none for France. The magnitude of this effect at the wage level corresponding to 25th percentile of the distribution of the potential wages of all prime age men (based on the wages predicted by the model) is substantial in the UK and moderate in the US: an increase of the wage by 1% reduces the probability of being inactive by about 0.2 percentage points in the UK, and by 0.08 and 0.07 percentage points among the US whites and the US non-whites respectively.

The effect of the wage on the probability of being unemployed is the biggest in the UK, followed by the US non-whites. The effect at the 10th percentile of the potential wages is similar for the US whites and for France. However, the curve of the probability of being unemployed is overall steeper in the UK and the US than in France, suggesting that there is greater inequality in the two countries not only in earnings but also in the probability of being unemployed. It is the individuals at the very bottom of the wage distribution in the UK and the US that face a substantially higher probability of being unemployed than the rest of prime age men in the population. The probability of being unemployed of a single forty-year-old man whose earning capacity is at the level of the official minimum wage in the three countries is almost twice as high in the UK or the US than in France. The overall wage elasticity of the three probabilities is highest in the UK and lowest in France.

In regard to social transfers and disability status, I suggest that the cross-country differences in the extent and structure of the benefits to the jobless further enhances the observed patterns of the distribution of prime age men between unemployment and inactivity. Disability status seems to have a substantial effect on the high inactivity rates in the UK and the US. However, as the the health status in the data for the two countries is self-reported, it cannot be determined whether health problems prevent the low-skilled prime age men from working, or whether inactive prime age men are more likely to report health problems.

I conclude that the high inactivity rate among low-skilled prime age men in the UK and the US are to at least some extent driven by the low relative earnings of the low-skilled in the two countries. At the same time, the probability of being unemployed is distributed more unequally across the different levels of earning capacity in the UK and the US than in France, suggesting that the UK and the US have not only greater earnings inequality, but also a greater inequality in the labor force status, and, in particular, unemployment. These findings provide evidence against the commonly used argument that wage flexibility improves the employment prospects of individuals at the bottom of the wage distribution.

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Appendix

A Data Appendix

The data used in the empirical analysis come from the Luxembourg Income Study. I select the most recent datasets available for the three countries: Wave IV for France, and Wave V for the UK and the US. The original datasets and the reference period of the two key variables (labor force status and wage) are described in Table A.1.

Table A.1: The Description of the Datasets and the Key Variables

	Original Survey	Reference Period	
		Current Status	*Wage*
France	Family Budget Survey	10/ 1994 - 10/ 1995 current situation	12 months prior to the interview 1993/94/95
UK	The Family Resources Survey	04/ 1999 - 04/ 2000 7 days ending last Sunday	12 months prior to the interview 1999/2000
USA	March Current Population Survey	03/ 2001 the survey week[1]	calendar year prior to the interview 2000

[1]I use the information from the Luxembourg Employment Study variables from the integrated LIS/LES dataset, because the LIS labor force state variable reflects the main activity during the preceding year rather than the current status. The former information would not be directly comparable with the point-in-time information for the other two countries, as short-term spells in any of the three states would be under-represented.

From each of the three datasets, I select prime age men (25 to 54 year old) that are neither currently enrolled in education, nor conscripts or in Armed Forces. I further divide the US sample regarding ethnicity into white and non-white. Throughout the entire analysis, I treat the two groups as separate samples.

The two variables of interest are labor force status and wage. While labor force status describes the current situation, wage refers to the preceding period. The labor force status is self-reported. Individuals who report anything else than being (self-)employed or unemployed (including laid off) are classified as inactive. Hourly wage was constructed as annual earnings over the product of usual weekly hours and number of weeks worked. In the UK sample, the earnings variable reports weekly wage and was therefore divided only by usual weekly hours. I eliminate any potential outliers - due to misreporting of the hours or weeks worked, due to the measurement error in wages, or due to variation in the usual weekly hours over the weeks worked - in the following way: I divide the sample into nine age-education groups - three age groups (of 25-34, 35-44, and 45-54 year old) times the three education categories (low, medium, high) based on the proportional classification. In each of the nine groups, I drop the wages that fall below the 5 and above the 95 percentile.

Because of the different timing of the information on the labor force status and on wages, it can happen that wage is observed for an individual currently unemployed (and therefore classified as unemployed), and it is not observed for an individual who has just started working (and is therefore classified as employed). To keep the analysis consistent, I use only the valid (not-dropped) wages observed for the individuals who are currently employed. The rest of the variables is defined as follows:

Definition of the Variables Listed in the Estimation Results

wage is the natural logarithm of the hourly wage rate in national currency units

age, agesq is the individual's age, and age squared / 100

married is a dummy variable that equals one if the person is married

children is a dummy variable that equals one if there are any children younger than 18 present in the household[50]

immigr is a dummy variable that equals one if the person was born outside the country of residence

1 - hh is a dummy variable that equals one if the person lives in a single person household

disabled is a dummy variable that equals one if the person reports any kind of disability or received a disability benefit in the previous 12 months

urban is a categorical variable indicating the urbanization (in an ascending order) of the place of the residence of the person

educ1-educ4 are dummy variables corresponding to the person's highest attained education level

The four education levels used in the estimation were constructed as follows: I order individuals according to their educational attainment. *educ1* and *educ2* together correspond to approximately 40% least educated individuals. *educ4* corresponds to the 30% most educated individuals, and *educ3* to the ones in between.

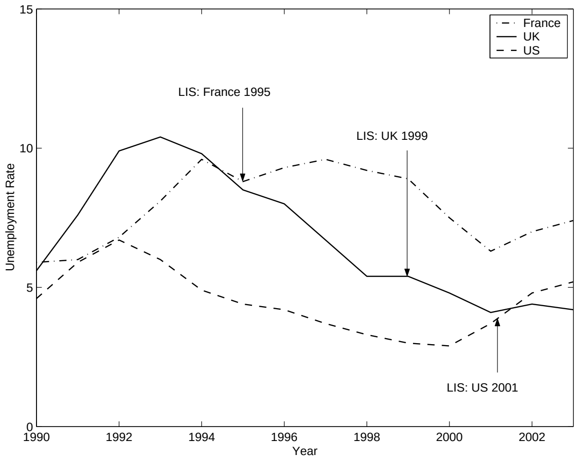
The *educ1* subgroup is based on the ISCED classification of lower secondary education attainment or less in the US and represents individuals with no education certificate in France and individuals with no education certificate who reported completing education before the age of 15 in the UK. It identifies the 15% to 20% least educated in the three countries - individuals who are at the bottom of the skill distribution.

The estimation results presented in the paper are robust to various sensitivity analysis including using different education classifications, using only wages of full-time full-year workers, or using different wage definition available in the LIS dataset.

[50] This, however, does not necessarily mean that these are children of the given person, as it is - in general - not possible in the LIS dataset to link children to their parents.

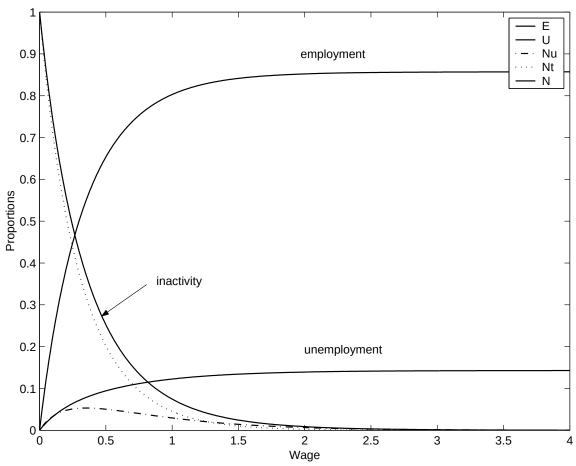
B Figures and Other Estimation Results

Figure B.1: Unemployment Rate - Prime Age Men in France, the UK and the US



Source: OECD Statistics. Unemployment rate is the standardly defined number of unemployed over the labor force of prime age men. Arrows show the year of the LIS datasets; in particular, the timing of the labor force status information.

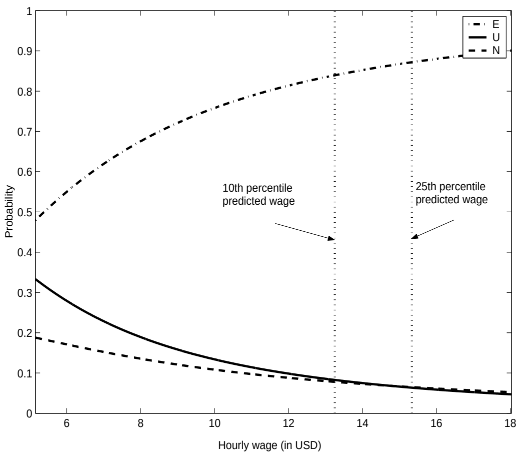
Figure B.2: Effect of Wage on Labor Force Status (Calibrated Results)



The figure depicts the results from the basic model calibrated with the following numbers: discount rate $r = 0.005$, cost of search $s = 0.5$, arrival rate of new value of leisure $\lambda = 0.01$, job destruction rate $\delta = 0.025$, parameter of the negative exponential distribution of leisure $B = 3$, arrival rate of of job offers if unemployed $p^U = 0.15$, and if inactive $p^N = 0.07$. The social transfers b^U and b^N are set to zero.

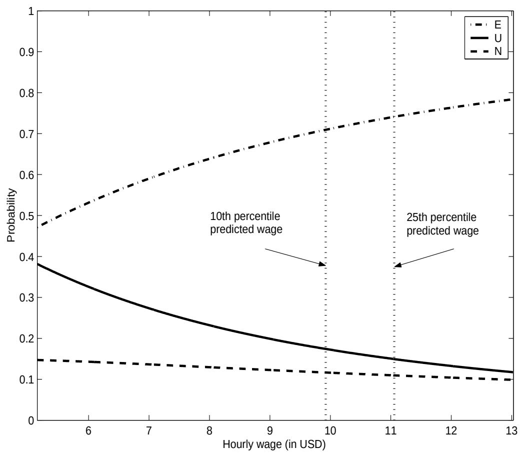
Figure B.3: Effect of the Wage on Labor Force Status for the Reference Individual

US White



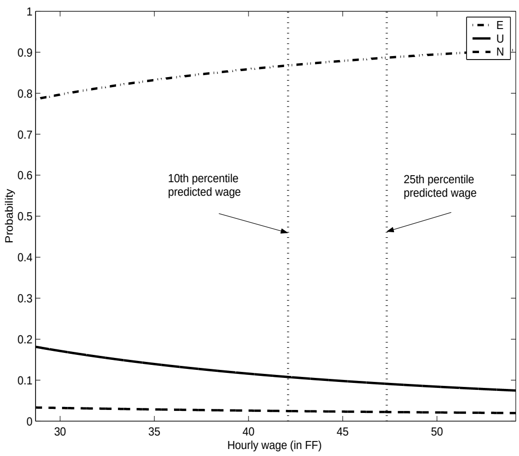
mw = 5.15 USD, med = 18 USD
$p10$ = 13.3 USD, $p25$ = 15.3 USD

US Non-white



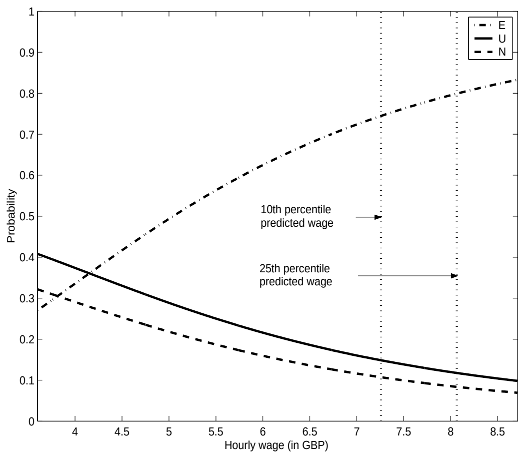
mw = 5.15 USD, med = 13 USD
$p10$ = 9.9 USD, $p25$ = 11.1 USD

France



mw = 28.7 FF, med = 54.2 FF
$p10$ = 42.1 FF, $p25$ = 47.3 FF

UK



mw = 3.6 GBP, med = 8.7 GBP
$p10$ = 7.3 GBP, $p25$ = 8.1 GBP

The scale of the x-axis: wage ranges from the statutory minimum wage mw to the median predicted wage in the sample, med. The dashed vertical lines show the 10th percentile ($p10$) and the 25th percentile ($p25$) of the predicted wage distribution respectively. The reference individual is a forty-year-old man who is single, no children present in the household, native born, non-disabled, and shares household with at least one more person.

Table B.1: Results from the First Stage MNL Model

MNL	France		UK		US W		US NW	
U eq	COEFF	SE	COEFF	SE	COEFF	SE	COEFF	SE
educ2	-1.25	0.396	-1.24	0.430	-0.95	0.420	-0.57	0.120
educ3	-0.90	0.324	-2.13	0.579	-1.45	0.534	-0.87	0.149
educ4	-1.69	0.479	-2.59	0.675	-2.42	0.697	-1.23	0.168
age	-0.17	0.121	-0.20	0.129	-0.22	0.111	-0.10	0.057
agesqr	0.23	0.158	0.24	0.163	0.28	0.142	0.13	0.073
married	-0.99	0.335	-2.34	0.605	-1.08	0.309	-0.75	0.113
children	0.01	0.201	0.47	0.175	-0.36	0.187	0.02	0.111
immigr	1.53	0.461	1.49	0.477	0.58	0.313	-0.63	0.109
1 - hh	0.68	0.346	0.27	0.211	-0.47	0.244	-0.56	0.190
urban	0.07	0.056	0.15	0.069	-0.02	0.024	-0.05	0.021
disabled	0.92	0.873	8.83	3.398	5.18	2.046	1.19	0.597
cons	-0.05	1.935	1.94	2.090	0.64	1.469	0.66	1.090
N eq	COEFF	SE	COEFF	SE	COEFF	SE	COEFF	SE
educ2	-0.87	0.476	-2.89	0.612	-1.60	0.488	-0.83	0.275
educ3	-0.62	0.415	-3.70	0.700	-2.03	0.565	-1.27	0.312
educ4	-0.85	0.509	-4.57	0.886	-2.69	0.689	-1.19	0.336
age	-0.37	0.175	-0.84	0.235	-0.54	0.133	-0.27	0.122
agesqr	0.63	0.226	1.12	0.305	0.72	0.173	0.37	0.156
married	-2.04	0.448	-3.70	0.802	-1.43	0.312	-1.48	0.250
children	-0.32	0.301	1.20	0.352	-0.69	0.237	-0.52	0.230
immigr	1.57	0.486	2.72	0.777	0.86	0.379	-0.70	0.229
1 - hh	-0.56	0.459	-0.50	0.465	-0.64	0.266	-0.22	0.375
urban	-0.11	0.088	0.24	0.141	-0.01	0.030	-0.02	0.046
disabled	4.84	0.985	25.86	6.751	9.41	2.626	23.44	77.952
cons	0.24	3.128	7.68	3.557	5.05	1.669	-10.90	58.630
sig1	2.47	1.029	2.65	1.065	2.92	1.276	-0.21	0.656
sig2	1.93	1.069	6.62	2.013	4.04	1.348	10.51	35.833
N	5671		11469		18402		8337	
Wald (11)	16.55		52.43		30.68		163.7	

Omitted category is employment. The value of the χ^2 distribution with 11 degrees of freedom at the 5% significance level is 19.68.

Table B.2: Results from the Wage Equation

ln(WAGE)	France		UK		US W		US NW	
	COEFF	SE	COEFF	SE	COEFF	SE	COEFF	SE
educ2	0.10	0.014	0.02	0.015	0.17	0.018	0.20	0.014
educ3	0.11	0.014	0.19	0.016	0.29	0.018	0.37	0.016
educ4	0.42	0.016	0.44	0.017	0.57	0.018	0.72	0.017
age	0.04	0.006	0.05	0.005	0.05	0.005	0.04	0.007
agesqr	-0.03	0.008	-0.05	0.006	-0.05	0.006	-0.04	0.009
urban	0.03	0.003	-0.02	0.004	0.03	0.002	0.01	0.003
lamb	-0.34	0.041	-0.43	0.046	-0.38	0.031	-0.12	0.041
cons	2.80	0.118	0.95	0.101	1.15	0.089	1.33	0.133
N	4075		7423		13498		6007	
R^2	0.39		0.30		0.30		0.31	

The dependent variable is the natural logarithm of hourly wage rate in national currency. The Huber-White formula was used to get the robust standard errors. *lamb* is the Lee term (computed from the first stage model of the three probabilities) that corrects the selection bias due to selection to employment. The wage equation is estimated on the subsample of individuals who are currently employed and have valid information about wage. See Section A of the Appendix for the details of the construction of hourly wages.

Table B.3: Predicted Labor Force Status Probabilities at Different Earning Levels

	$\hat{P}_E$			$\hat{P}_U$			$\hat{P}_N$		
	p10	p25	diff	p10	p25	diff	p10	p25	diff
FR	0.868	0.887	-0.019	0.108	0.091	0.017	0.025	0.022	0.002
UK	0.745	0.799	-0.055	0.148	0.117	0.031	0.107	0.084	0.023
US W	0.839	0.872	-0.032	0.083	0.063	0.019	0.078	0.065	0.013
US N	0.710	0.741	-0.032	0.174	0.149	0.025	0.117	0.110	0.007

The table shows the predicted probabilities for the reference individual at the 10th and 25th percentile of the predicted wage distribution and their difference. The reference individual is a forty-year-old man who is single, no children present in the household, native born, non-disabled, and shares household with at least one more person.

Figure B.4: Effect of Benefit Systems on Labor Force Status(Calibrated Results)

Figure A ($b^U = 0.4$, $b^N = 0$)

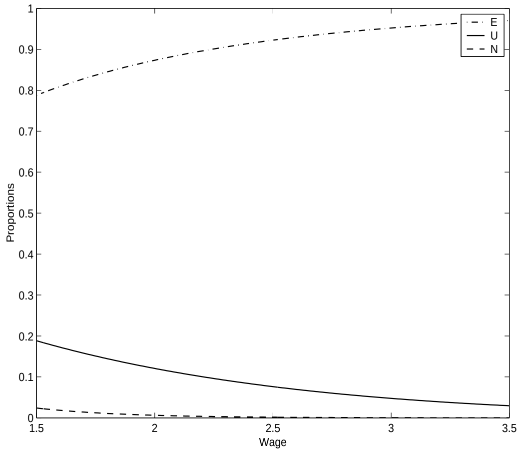


Figure B ($b^U = 0.5$, $b^N = 0.5$)

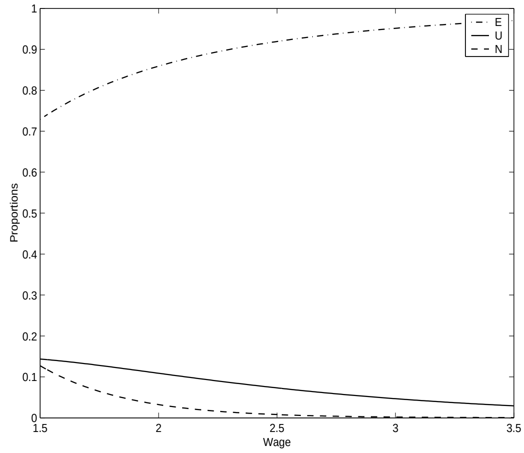


Figure C ($b^U = 0.2$, $b^N = 0.2$)

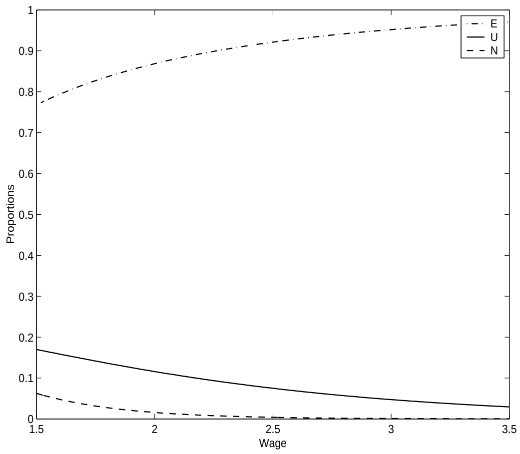
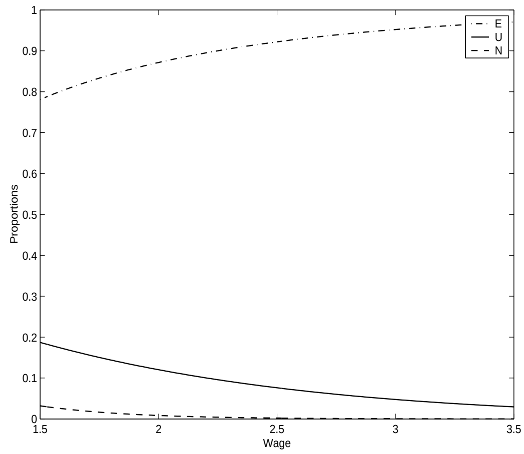


Figure D ($b^U = 0.8$, $b^N = 0.2$)



The figures depict the results from the extended model calibrated with the following numbers: discount rate $r = 0.005$, cost of search $s = 0.5$, arrival rate of new value of leisure $\lambda = 0.01$, job destruction rate $\delta = exp(-c \times w)$ with $c = 1$, parameter of the negative exponential distribution of leisure $B = 3$, arrival rate of of job offers if unemployed $p^U = tanh(a \times w)$ with $a = 1$, and if inactive $p^N = tanh(b \times w)$ with $b = 0.3$. The four figures vary in the values of the social transfers as specified.

C Technical Appendix

C.1 Value Functions Derivation

If working, an individual receives wage at the end of a small period of time ε. Further, an individual receives a new value of leisure $x\prime$ with probability λ, is dismissed with probability δ, and does not encounter any event with the remaining probability. Everything is discounted by the subjective rate r. The term $o(\varepsilon)$ represents the "negligible" probability that the two events happen at the same time.

$$W(x) = \Big(1 + r \times \varepsilon\Big)^{-1} \times \ \Big(w \times \varepsilon + \lambda \times \varepsilon \int_x \max[W(x\prime), N(x\prime)]\ dF(x\prime)$$
$$+ \delta \times \varepsilon \times \big(\ \max[U(x), N(x)]\ \big) + (1 - \lambda \times \varepsilon - \delta \times \varepsilon) \times W(x) + o(\varepsilon)\Big)$$

This further reduces to

$$W(x) \times \Big(r \times \varepsilon + \lambda \times \varepsilon + \delta \times \varepsilon\Big) =$$
$$w \times \varepsilon + \ \lambda \times \varepsilon \int_x \max[W(x\prime), N(x\prime)]\ dF(x\prime) + \ \delta \times \varepsilon \times \big(\max[U(x), N(x)]\big) + o(\varepsilon)$$

Dividing by ε and taking $\lim_{\varepsilon \to 0}$ we get

$$(r + \lambda + \delta)\ W(x) = \ w \ + \ \lambda \int_x \max[W(x\prime), N(x\prime)]\ dF(x\prime) + \ \delta\ \big(\max[U(x), N(x)]\big)$$

In a similar way I derive the other two value functions.

C.2 Deriving the Slope of the Surplus Function $S(x)$

Let's define a surplus function $S(x) = W(x) - \max[U(x), N(x)]$, then:

C.2.1 Low x Region

For $x \,\epsilon\, [x_{min}, x_l]$: $\quad S(x) = W(x) - U(x) \quad$ and $S(x) > 0$

Using the equations for $W(x)$ and $U(x)$

$$\begin{aligned}(r \ \ + \ \ \lambda)\ S(x) = \ & w - b^U - \ (1 - s)\ x \ + \ \lambda \int_{x_{min}}^{x_l} \big(W(x\prime) - U(x\prime)\big)\ dF(x\prime) \\ + \ \ & \lambda \int_{x_l}^{x_h} \big(W(x\prime) - N(x\prime)\big)\ dF(x\prime) + \ \lambda \int_{x_h}^{x_{max}} \big(N(x\prime) - N(x\prime)\big)\ dF(x\prime) \\ + \ \ & \delta\ \big(U(x) - W(x)\big) - \ p^{\,U}\big(W(x) - U(x)\big)\end{aligned}$$

That reduces to

$$(r \; + \; \lambda)\, S(x) = \; w - b^U - \; (1-s)\, x \; + \; \lambda \int_{x_{min}}^{x_l} \big(W(x\prime) - U(x\prime)\big)\, dF(x\prime)$$
$$+ \; \lambda \int_{x_l}^{x_h} \big(W(x\prime) - N(x\prime)\big)\, dF(x\prime) - (p^{\,U} + \delta)\big(W(x) - U(x)\big)$$

Using again the fact that $S(x) = W(x) - U(x)$:

$$S(x) = (r + \lambda + p^{\,U} + \delta)^{-1}$$
$$\Big(w - \; b^U - \; (1-s)\, x \; + \; \lambda \int_{x_{min}}^{x_l} \big(W(x\prime) - U(x\prime)\big)\, dF(x\prime) + \; \lambda \int_{x_l}^{x_h} \big(W(x\prime) - N(x\prime)\big)\, dF(x\prime)\Big)$$

Thus S(x) is linear in x on the interval $[x_{min}, x_l]$ and has a slope:

$$S^{\,\prime}(x) = -\frac{(1-s)}{r + \lambda + p^{\,U} + \delta} \tag{3}$$

C.2.2 Middle x Region

For $x \, \epsilon \, [x_l, x_h]$: $\quad S(x) = W(x) - N(x)$ and $S(x) > 0$

Using the equations for $W(x)$ and $N(x)$

$$(r \; + \; \lambda)\, S(x) = \; w \; - \; b^N - \; x \; + \; \lambda \int_{x_{min}}^{x_l} \big(W(x\prime) - U(x\prime)\big)\, dF(x\prime)$$
$$+ \; \lambda \int_{x_l}^{x_h} \big(W(x\prime) - N(x\prime)\big)\, dF(x\prime) + \; \lambda \int_{x_h}^{x_{max}} \big(N(x\prime) - N(x\prime)\big)\, dF(x\prime)$$
$$+ \; \delta\, \big(N(x) - W(x)\big) - \; p^N \big(W(x) - N(x)\big)$$

That reduces to

$$(r \; + \; \lambda)\, S(x) = \; w \; - \; b^N - \; x \; + \; \lambda \int_{x_{min}}^{x_l} \big(W(x\prime) - U(x\prime)\big)\, dF(x\prime)$$
$$+ \; \lambda \int_{x_l}^{x_h} \big(W(x\prime) - N(x\prime)\big)\, dF(x\prime) - (p^{\,N} + \delta)\big(W(x) - N(x)\big)$$

Using again the fact that $S(x) = W(x) - N(x)$:

$$S(x) = (r + \lambda + p^{\,N} + \delta)^{-1}$$
$$\Big(w - \; b^N - \; x \; + \; \lambda \int_{x_{min}}^{x_l} \big(W(x\prime) - U(x\prime)\big)\, dF(x\prime) + \; \lambda \int_{x_l}^{x_h} \big(W(x\prime) - N(x\prime)\big)\, dF(x\prime)\Big)$$

Thus S(x) is linear in x on the interval $[x_l, x_h]$ and has a slope:

$$S^{\,\prime}(x) = -\frac{1}{r + \lambda + p^{\,N} + \delta} \tag{4}$$

C.2.3 High x Region

For $x \epsilon [x_h, x_{max}]$: $S(x) = W(x) - N(x)$ and $S(x) < 0$

Using the equations for $W(x)$ and $N(x)$

$$\begin{aligned}(r + \lambda)\, S(x) = \; & w - b^N - x + \lambda \int_{x_{min}}^{x_l} \big(W(x\prime) - U(x\prime)\big)\, dF(x\prime) \\ + \; & \lambda \int_{x_l}^{x_h} \big(W(x\prime) - N(x\prime)\big)\, dF(x\prime) + \lambda \int_{x_h}^{x_{max}} \big(N(x\prime) - N(x\prime)\big)\, dF(x\prime) \\ + \; & \delta\, \big(N(x) - W(x)\big) - p^N \big(N(x) - N(x)\big)\end{aligned}$$

That reduces to:

$$\begin{aligned}(r + \lambda)\, S(x) = \; & w - b^N - x + \lambda \int_{x_{min}}^{x_l} \big(W(x\prime) - U(x\prime)\big)\, dF(x\prime) \\ + \; & \lambda \int_{x_l}^{x_h} \big(W(x\prime) - N(x\prime)\big)\, dF(x\prime) - \delta\big(W(x) - N(x)\big)\end{aligned}$$

Using again the fact that $S(x) = W(x) - N(x)$:

$$\begin{aligned}& S(x) = (r + \lambda + \delta)^{-1} \\ & \Big(w - b^N - x + \lambda \int_{x_{min}}^{x_l} \big(W(x\prime) - U(x\prime)\big)\, dF(x\prime) + \lambda \int_{x_l}^{x_h} \big(W(x\prime) - N(x\prime)\big)\, dF(x\prime)\Big)\end{aligned}$$

Thus S(x) is linear in x on the interval $[x_h, x_{max}]$ and has a slope:

$$S\,'(x) = -\frac{1}{r + \lambda + \delta} \tag{5}$$

The three consecutive slopes given by equations 3, 4, and 5 are increasing in x in absolute value.

C.3 Solving for the Equilibrium Threshold Values of Leisure

C.3.1 Lower Margin

By definition $U(x_l) = N(x_l)$, individuals with $x = x_l$ are indifferent between unemployment and inactivity, so that

$$\begin{aligned}& b^U + (1 - s)\, x_l + p^{\,U}\big(W(x_l) - U(x_l)\big) + \lambda \int_x \max[U(x\prime), N(x\prime)]\, dF(x\prime) = \\ & = b^N + x_l + p^N\big(\max[W(x_l), N(x_l)] - N(x_l)\big) + \lambda \int_x \max[U(x\prime), N(x\prime)]\, dF(x\prime)\end{aligned}$$

Using the definition of x_l and the fact that $W(x_l) > U(x_l)$:

$$p^U\big(W(x_l) - U(x_l)\big) = b^N - b^U + s \times x_l + p^N\big(W(x_l) - U(x_l)\big)$$

or

$$s \times x_l = (p^U - p^N)\big(W(x_l) - U(x_l)\big) + (b^U - b^N)$$

The equation above suggests that to be indifferent between unemployment and inactivity, the leisure forgone by searching if unemployed must equal the expected value of obtaining a job offer when unemployed net of the expected value of obtaining a job offer when inactive. There is a trade-off between current leisure forgone if unemployed (partly offset by potentially higher social transfers if unemployed) and the lower probability (lower arrival rate) of obtaining an offer if inactive.

The above can be expressed as:

$$W(x_l) - U(x_l) = S(x_l) = \frac{s \times x_l - (b^U - b^N)}{p^U - p^N} \tag{6}$$

Using the following equation for $S(x)$ for $x \epsilon [x_l, x_h]$

$$\begin{aligned} S(x) = (r + \lambda + p^N + \delta)^{-1}\Big(w - b^N - x \quad &+ \quad \lambda \int_{x_{min}}^{x_l} \big(W(x\prime) - U(x\prime)\big)\, dF(x\prime) \\ &+ \quad \lambda \int_{x_l}^{x_h} \big(W(x\prime) - N(x\prime)\big)\, dF(x\prime)\Big) \end{aligned}$$

we can express $S(x_l) - S(x_h) = \frac{x_h - x_l}{r + \lambda + p^N + \delta}$

As $S(x_h) = 0$ by definition, it follows that

$$S(x_l) = \frac{x_h - x_l}{r + \lambda + p^N + \delta} \tag{7}$$

Combining the two expressions for $S(x_l)$ given by equations 6 and 7 we get:

$$\frac{x_h - x_l}{r + \lambda + p^N + \delta} = \frac{s \times x_l + (b^U - b^N)}{p^U - p^N} \tag{8}$$

C.3.2 Upper Margin

Using the fact that $W(x_h) = N(x_h)$, or identically that $S(x_h) = 0$,

$$S(x_h) = (r+\lambda+\delta)^{-1}\Big(\; w \; - b^N + \; x_h \; + \; \lambda \int_{x_{min}}^{x_l} \big(W(x\prime) - U(x\prime)\big)\; dF(x\prime)$$
$$+ \; \lambda \int_{x_l}^{x_h} \big(W(x\prime) - N(x\prime)\big)\; dF(x\prime)\Big) = 0$$

gives the expression for x_h:

$$x_h = w - b^N + \lambda \int_{x_{min}}^{x_l} \big(W(x\prime) - U(x\prime)\big)\; dF(x\prime) + \lambda \int_{x_l}^{x_h} \big(W(x\prime) - N(x\prime)\big)\; dF(x\prime) \tag{9}$$

Using the general formula for integration by parts, we can evaluate the two integrals in equation 9.

First,

$$\int_{x_{min}}^{x_l} \big(W(x\prime) - U(x\prime)\big)\; dF(x\prime) \;\; = \;\; \int_{x_{min}}^{x_l} S(x\prime)\; dF(x\prime) \; =$$
$$= \; S(x_l)F(x_l) \;\; - \;\; S(x_{min})F(x_{min}) - \int_{x_{min}}^{x_l} S\,'(x)\; F(x\prime)$$

and using the fact that $F(x_{min}) = 0$:

$$\int_{x_{min}}^{x_l} \big(W(x\prime) - U(x\prime)\big)\; dF(x\prime) \; = \; S(x_l)F(x_l) \; + \; \frac{(1-s)}{r+\lambda+p^{\,U}+\delta}\; F(x_l)$$

Second,

$$\int_{x_l}^{x_h} \big(W(x\prime) - N(x\prime)\big)\; dF(x\prime) \;\; = \;\; \int_{x_l}^{x_h} S(x\prime)\; dF(x\prime) \; =$$
$$= \; S(x_h)F(x_h) \;\; - \;\; S(x_l)F(x_l) - \int_{x_l}^{x_h} S\,'(x)\; F(x\prime)$$

and using again the fact that $S(x_h) = 0$:

$$\int_{x_l}^{x_h} \big(W(x\prime) - N(x\prime)\big)\; dF(x\prime) \; = \; -S(x_l)F(x_l) \; + \; \frac{1}{r+\lambda+p^{\,N}+\delta}\; \big(F(x_h) - F(x_l)\big)$$

The expression for x_h given in equation 9 then becomes

$$x_h = w \; - \; b^N + \; \frac{(1-s)\;\lambda}{r+\lambda+p^{\,U}+\delta}\; F(x_l) + \frac{\lambda}{r+\lambda+p^{\,N}+\delta}\; \big(F(x_h) - F(x_l)\big) \tag{10}$$

Equations 8 and 10 form a system that determines the two equilibrium values of leisure as described in the text.

C.4 The Effect of Wage on the Two Leisure Margins

Rewrite equations 8 and 10 as

$$\begin{aligned}(p^U - p^N) \times x_h \quad &+ \quad (-1)\Big(s \times (r + \lambda + p^N + \delta) + (p^U - p^N)\Big) \times x_l \\ &+ \quad (r + \lambda + p^N + \delta) \times (b^U - b^N) = 0\end{aligned}$$

$$\begin{aligned}\frac{\lambda}{r + \lambda + p^N + \delta} F(x_h) - x_h \quad &+ \quad (-1) \frac{(p^U - p^N) + s \times (r + \lambda + p^N + \delta)}{(r + \lambda + p^U + \delta)(r + \lambda + p^N + \delta)} \lambda F(x_l) \\ &+ \quad w - b^N = 0\end{aligned}$$

I use the general formula for total differential of $G(x_h, x_l, z) = 0$, where z is a parameter of interest is

$$\frac{dG}{dx_h} \times \frac{dx_h}{dz} + \frac{dG}{dx_l} \times \frac{dx_l}{dz} + \frac{dG}{dz} = 0$$

Totally differentiating the two equations with respect to z:

$$(p^U - p^N) \times \frac{dx_h}{dz} + (-1)\Big(s \times (r + \lambda + p^N + \delta) + (p^U - p^N)\Big) \times \frac{dx_l}{dz} + \frac{dG}{dz} = 0$$

$$\Big(\frac{\lambda f(x_h)}{r + \lambda + p^N + \delta} - 1\Big)\frac{dx_h}{dz} - \frac{(p^U - p^N) + s \times (r + \lambda + p^N + \delta)}{(r + \lambda + p^U + \delta)(r + \lambda + p^N + \delta)} \lambda f(x_l) \times \frac{dx_l}{dz} + \frac{dH}{dz} = 0$$

Let's say the parameter of interest is w. The effect of wage on the two margins can be determined from the following linear system using Kramer's rule.

$$\begin{pmatrix} (p^U - p^N) & (-1)\big(s(r + \lambda + p^N + \delta) + (p^U - p^N)\big) \\ \Big(\frac{\lambda f(x_h)}{r+\lambda+p^N+\delta} - 1\Big) & (-1) \times \frac{(p^U - p^N) + s \times (r+\lambda+p^N+\delta)}{(r+\lambda+p^U+\delta)(r+\lambda+p^N+\delta)} \lambda\, f(x_l) \end{pmatrix} \begin{pmatrix} \frac{dx_h}{dw} \\ \frac{dx_l}{dw} \end{pmatrix} = \begin{pmatrix} 0 \\ -1 \end{pmatrix}$$

So that $\frac{dx_h}{dw} = \frac{(-1)\big(s(r+\lambda+p^N+\delta)+(p^U - p^N)\big)}{Det}$

and $\frac{dx_l}{dw} = \frac{-(p^U - p^N)}{Det}$

With $Det < 0$, and $p^{\,U} > p^{\,N}$, it follows that

$$\frac{dx_h}{dw} > 0, \quad \frac{dx_l}{dw} > 0, \quad \text{and} \quad \frac{dx_h}{dw} > \frac{dx_l}{dw}$$

C.5 Steady State Proportions

Setting $\frac{dN_t}{d\tau} = 0$ and using the fact that $E_t + E_u + U + N_u + N_t = 1$, we can derive the expression for N_t.

From $0 = \Big(-\lambda\, F(x_h)\Big) \times N_t + \lambda\,\big(1 - F(x_h)\big) \times \big(1 - N_t\big)$

we get that $N_t = \big(1 - F(x_h)\big)$.

Also note that

$$\big(E_t + U\big) = F(x_l)$$
$$\big(E_u + N_u\big) = F(x_h) - F(x_l)$$

It is straightforward to see that N_t decreases with x_h, and $\big(E_t + U\big)$ increases with x_l. $\big(E_u + N_u\big)$ increases with x_h, and decreases with x_l.

Setting $\frac{dE_t}{d\tau} = \frac{dE_u}{d\tau} = \frac{dU}{d\tau} = \frac{dN_u}{d\tau} = 0$ and substituting $N_t = \big(1 - F(x_h)\big)$, we have a linear system of four equations in four unknowns. The steady state proportions are the solution to this system.

$$T \times \begin{pmatrix} E_t \\ E_u \\ U \\ N_u \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ -\lambda F(x_l)\big(1 - F(x_h)\big) \\ -\lambda g\big(1 - F(x_h)\big) \end{pmatrix}$$

where matrix T is:

$$\begin{pmatrix} -\delta - \lambda\big(1 - F(x_l)\big) & \lambda F(x_l) & p^{\,U} & 0 \\ \lambda g & -\delta - \lambda(1 - g) & 0 & p^{\,N} \\ \delta & 0 & p^{\,U} - \lambda\big(1 - F(x_l)\big) & \lambda F(x_l) \\ 0 & \delta & \lambda g & -p^{\,N} - \lambda(1 - g) \end{pmatrix}$$

with $g = \big(F(x_h) - F(x_l)\big)$.

The solution to this system is

$$
\begin{aligned}
E_t &= \frac{F(x_l)\Big(\lambda\big(1-F(x_h)\big)(p^U-p^N)+\lambda F(x_l)(p^U-p^N)+p^N(\lambda+p^U)+p^U\delta\Big)}{D}\\
E_u &= \frac{\big(F(x_h)-F(x_l)\big)\Big(\lambda\, F(x_l)\big(p^U-p^N\big)+p^N(\delta+\lambda+p^U)\Big)}{D}\\
E &= E_t+E_U=\frac{F(x_l)\big(p^U-p^N\big)(\lambda+\delta)+F(x_h)p^N(\delta+\lambda+p^U)}{D}\\
U &= \frac{F(x_l)\Big(\delta+\lambda\big(1-F(x_h)\big)\Big)(\delta+\lambda+p^N)}{D}\\
N &= N_t+N_U=\big(1-F(x_h)\big)\;+\;\frac{\big(F(x_h)-F(x_l)\big)\Big(\delta+\lambda\big(1-F(x_h)\big)\Big)(\delta+\lambda+p^U)}{D}
\end{aligned}
$$

where

$$D=\lambda F(x_l)\;(p^U-p^N)+\Big(\delta\;+\;\lambda\big(1-F(x_h)\big)+p^N\Big)(\delta+\lambda+p^U)$$

C.6 Gaussian-Hermite Quadrature Approximation

I need to evaluate three terms of the following form:

$$\int_{-\infty}^{\infty} P(\varepsilon)f(\varepsilon)\,d\varepsilon$$

where:

$$f(\varepsilon)=\frac{1}{\sqrt{2\pi}\sigma}\exp\big[-\frac{1}{2}\big(\frac{\varepsilon}{\sigma}\big)^2\big]=\frac{1}{\sqrt{2\pi}\sigma}\exp\big[-\big(\frac{\varepsilon}{\sqrt{2}\sigma}\big)^2\big]$$

Making the transformation: $z=\frac{\varepsilon}{\sqrt{2}\sigma}$ and $d\varepsilon=\sqrt{2}\sigma\,dz$

$$f(\varepsilon)\,d\varepsilon=\tilde{f}(z)\,\sqrt{2}\sigma\,dz=\frac{1}{\sqrt{2\pi}\sigma}\exp[-(z)^2]\,\sqrt{2}\sigma\,dz=\frac{1}{\sqrt{\pi}}\exp[-(z)^2]\,dz$$

Thus the term to be evaluated becomes:

$$\int_{-\infty}^{\infty} P(\varepsilon)f(\varepsilon)\,d\varepsilon=\int_{-\infty}^{\infty}\tilde{P}(z)\,\frac{1}{\sqrt{\pi}}\exp[-(z)^2]\,dz$$

I use the Gaussian-Hermite quadrature to approximate:

$$\int_{-\infty}^{\infty} G(z)\exp[-(z)^2]\,dz\approx\sum_{k=1}^{K}w_kG(z_k)$$

The weights w_k, and the abscissas (points at which the function G is evaluated) z_k, are tabulated. I always use eight abscissas to evaluate the integrals. Function G corresponds to the expression for the probability multiplied by $\frac{1}{\sqrt{\pi}}$, and using the substitution $\varepsilon = \sqrt{2}\sigma\, z$.

For the probability of being employed, for example, function $G(z)$ becomes:

$$G(z) = \frac{1}{\sqrt{\pi}}\, P(z) = \frac{1}{\sqrt{\pi}} \times \frac{1}{1 + \exp(X_i\beta^U + \alpha^U\sqrt{2}\sigma\, z_i) + \exp(X_i\beta^N + \alpha^N\sqrt{2}\sigma\, z_i)} =$$

$$= \frac{1}{\sqrt{\pi}} \times \frac{1}{1 + \exp(X_i\beta^U + \sqrt{2}\sigma_1\, z_i) + \exp(X_i\beta^N + \sqrt{2}\sigma_2\, z_i)}$$

where $\sigma_1 = \alpha^U\,\sigma$ and $\sigma_2 = \alpha^N\,\sigma$

(σ_1, σ_2) represent two additional coefficients estimated in the first step.[51] In a similar way I specify the term for the probability of being unemployed and out of labor force.

[51] The structural parameters α^U, α^N, and σ are not identified in the first step of the estimation.