

Assessing Unemployment Traps in Belgium using Panel Data Sample Selection Models

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Abstract

In this paper we investigate whether unemployment traps exist and are significant in Belgium. In order to assess them we use panel data sample selection models. Specifically, we estimate a parametric random effects models composed by a wage equation and a selection equation by maximum likelihood techniques. The replacement ratios have been computed for every individual in the sample by using the predicted wages obtained from the estimation of the wage equation corrected for sample selectivity. The empirical analyses has exploited the data extracted from the waves 1993-1997 of the Panel Study of Belgian Household and has been led separately on (unbalanced) samples of men and women. The estimation results suggest significant differences in the behaviour of these two groups. The experience of long periods of unemployment in the past is particularly important: Long-term unemployed people have difficulties in re-integrating into the labour market and they obtain low salaries when they succeed in finding employment. Moreover, the computation of replacement ratios for all individuals highlights the importance of unemployment traps in the transition of women towards employment. Indeed, their expected wage is often lower than their income while being unemployed.

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1 Introduction

The combination of unemployment benefits, high labour taxes and social contributions, conditional transfers such as additional child benefits etc., can occasionally reduce the willingness of the (low-skilled) unemployed to find and/or to accept a job (OECD, 1996, 1999). Insignificant financial returns associated with job holding compared to unemployment benefits may affect the decision of moving into unemployment especially for the low-educated unemployed and thereby contribute to the persistence of unemployment. The situation in which households or individuals have no incentives (financial and/or non financial) to leave unemployment (for employment) is termed an “unemployment trap”.

For policy concerns, it is very important to investigate the existence and extent of unemployment traps. In this study we focus on this issue for Belgium, by analysing the (lack of) financial incentives to take employment for a group of unemployed workers.

The construction of the wages that unemployed people would earn when employed is crucial in the analysis of ‘financial’ unemployment traps, that is, unemployment traps stemming from the lack of financial incentives to take employment. Broadly speaking, we can distinguish two main approaches in dealing with them. The first one is based on ‘representative’ households or individuals (see OECD, 1996, 1999; and for Belgium see e.g. De Lathouwer, 2001; Defeyt, 1998). The second approach exploits real data in setting up empirical analyses. Our study is in the spirit of the second approach.

Most of the existing evidence concerning financial incentives comes from the first approach. These studies construct various categories of households by making assumptions about unemployment duration, family composition (singles, households with only one wage earner, households with two wage earners, single-parent families, etc.), the number and the age of the children (child care costs) and the level of wages. The idea behind the use of representative households is to compute the change in the household’s disposable income that would result from the transition to employment of the unemployed member. Households are trapped in unemployment if the ‘replacement ratio’ (disposable income in unemployment divided by disposable income in employment) is close to or above 100 per cent. For Belgium, the analysis with representative households show that unemployment traps arise mainly for single-parent families.

As to the second approach, some papers based on empirical data have recently computed the variation in the disposable income (individual or household’s disposable income) resulting from moving from unemployment

to employment (see e.g. Pedersen and Smith, 2001; Kyyrä, 1999; Gregg et al., 1999). For Denmark, Pedersen and Smith (2001) reports, based on a panel survey merged with administrative registers, that during the nineties a high percentage of the Danish unemployed were facing unemployment traps. To obtain this result, the authors used the unemployed workers' expectations about the wage rate they would be able to obtain in employment. For Finland, Kyyrä (1999) also reports that a significant percentage of unemployed individuals are unable to increase their household's disposable income by exiting to employment. This result is derived by estimating simultaneously, with maximum likelihood methods, a wage equation and a selection equation in a cross-section framework.

These two studies make use of longitudinal data. However, the problem of sample selection in the wage equation is not duly accounted for; given the panel structure of the data, a natural way to proceed is by estimating panel data sample selection models.

Sample selection models are frequently estimated in applied microeconomic work using cross-section data, but they are less frequently applied when panel data are available. The sample selection process is then supposed to be constant over time, and the argument crucial to this assumption is then that standard panel data estimators eliminate sample selection bias since they difference out both the unobserved individual-specific effect and the sample selection effect" (see Jensen et al., 2001).

Our paper differs from the two approaches described in many respects. First, differently from the first approach it does not use representative households but micro-data extracted from a survey (Panel Study of Belgian Households -PSBH). The analysis with "representative" households are very useful but they answer "only" to the following question : "What types of family have the highest probability to be trapped in unemployment?" Nevertheless, those studies do not suffer from incomplete income information, inaccuracy and measurement errors that are inherent to empirical work, especially to studies dealing with earnings. In this sense, we think that the two approaches should be looked at as complementary and not mutually exclusive. This leads us to obtain estimates of the "real-life" financial incentives. Second, compared to the second approach it accounts for a possible time-varying sample selection process.

The purpose of the present study is to investigate the financial rewards linked to the transition from unemployment to employment by using panel data estimation techniques and by correcting for the sample selection problem (Heckman, 1979) within that modelling framework. To this end, we estimate simultaneously by maximum likelihood a parametric panel data

random effects model composed by two equations: a wage equation and a selection equation¹. Indeed, in general there is no reason to believe that the sample selection process is time-invariant; unobservable time-varying variables may occur in both the selection equation and the equation of interest, and they may exhibit a complex correlation structure.

Financial incentives are measured through the estimation of the individuals' replacement ratios, defined as the ratio between the individual disposable income obtained when employed and the individual disposable income while unemployed for all the unemployment spells. It is clear that the observation of the wages is possible only for those individuals that have moved into unemployment (post-unemployment wages). To be able to compute the replacement ratio also for those remaining unemployed during the entire survey period we computed an expected wage as we show in section 4. In addition, for the unemployed that move into employment we can compare the observed individual replacement ratio with the estimated one. The observed replacement ratio is based on the observed wage earned by the individuals who move into work.

Besides financial incentives, we are interested also in non-financial incentives (e.g. the valuation of work, the day structure, the taste for social contacts, etc.) since these may also play a role in the job decision process and for some individuals they can overrule the effects of the financial incentives. Nevertheless our interest in non-financial incentives is limited by the available data.

The sample used in this paper is drawn from the waves 3 to 7 of the Panel Study of Belgian households (PSBH), 1994 to 1998, and is constructed by using the retrospective calendar of activity and the annual net income of the sampled individuals.

The paper proceeds as follow. Section 2 outlines the Belgian tax system and the Belgian unemployment insurance scheme. In Section 3, we discuss the results obtained by Belgian studies based on representative households. This section also takes a brief look on the recent empirical research; attention is also given to the different assumptions used to calculate expected wage for the unemployed. Section 4 describes the estimation techniques used in this study. Section 5 is devoted to the description of the dataset, section 6 reports and discusses the results obtained, and some conclusions are drawn in section 7.

¹Up to now few empirical studies have estimated a wage function on the grounds of Belgian data sets. Moreover, only one is based on a panel data set (see Laurent, 2001).

2 Tax and Unemployment insurance schemes in Belgium

The data were collected for the years 1993-1997². The following description of both the unemployment insurance scheme and the tax system concerns this period.

Four major reforms have been implemented since January 2000 on work incentives. First, the social security contributions paid by the employees have been reduced for low-income workers. This reform, extended in April 2000, is restricted to wage earners with a gross monthly wage below 1,338 euros. The payment of contributions to social insurance is reduced by an amount; the the reduction increases with the level of wages. At the minimum guarantee gross wage (1,103 euros) the decrease of social contributions is maximal (81.8 euros). After this level, the reduction tends progressively to zero: the new reform of the tax system that will be implemented in the year 2002 introduces a negative income tax for the low-income workers. This negative income tax will increase the net income of work. Second, child care costs are fully deductible since January 2000 (compared to 80 per cent in the past) but the tax exemption is limited to 11.1 euros by day and child (compared to 8.5 euros before). Third, since July 2000, long-term unemployed who accept a job located at more than 25 kilometers from their home receive an one-time subsidy of 743.7 euros. The same amount is allocated to single-parent unemployed who accept a job. And fourth, the legislation relating to additional child benefits has been modified in order to encourage the unemployed heads of household to accept temporary jobs (see Section 2).

The Belgian unemployment insurance scheme is characterized on the one hand by a generous level of benefits, especially for people with low income (high replacement rates), and on the other hand by an indefinite entitlement period. However, the unemployment benefits can be suspended for the unemployed who are living with a working partner or with their parents (“cohabitants”) depending on a certain number of conditions (for more details see De Greef, 2000). Nevertheless in order to be eligible for unemployment benefits, the unemployed must have been employed for a relatively long period in an international setting. More precisely, the entitlement to unemployment benefits depends on the employment experience (only for the wage earners), or on the studies, or on the fact that the worker has already received unemployment benefits in the past.

²All the amounts reported in this section are related to the year 1997.

The length of this employment varies with the age of the unemployed : for instance, on the first day of unemployment, individuals aged less than 36 years must have been employed for 312 days during the latest 18 months. To receive unemployment benefits the individual must be involuntary unemployed, available for the labour market, and actively seeking work. The level of unemployment benefits depends on four elements: The household type, the unemployment duration, the age, and the previous wage. Concerning the household composition, a distinction is made between heads of household, individuals who are living on their own, and those who are in families where other family members earn more than 170.7 euros monthly net or receive a substitution income (secondary earners). The three categories (“head of household”, “single” and “cohabitant”) receive different levels of unemployment benefits. Broadly speaking, the heads of household are entitled to a high level of benefits, the singles are qualified to a medium level of benefits and the cohabitants are receiving the lowest level of unemployment benefits. In addition, the amount of the unemployment benefits is constant over time for the heads of household (60 per cent of the previous wage) whereas it decreases for the singles (from 60 per cent the first year to 42 per cent from the second year) and for the cohabitants (from 55 per cent the first year to 35 per cent the first quarter of the second year and to a lump sum from the second quarter of the second year). The cohabitants experience three periods of subsidization but if they have been employed for more than 20 years they remain in the second period (35% of the previous wage).

As mentioned before, the amount of unemployment benefits depends on the previous labour earnings, but the amount is upwards and downwards bounded. For instance, the unemployment benefits for the heads of household is set between a maximum of 864.9 euros and a minimum of 759.3 euros. Finally, the level of benefits is based on the age. The unemployed aged more than 50 receive an additional amount. This supplement, conditional on the fact that the unemployed has worked more than 20 years, varies with respect to the type of family and the age of the unemployed.

Since 1987 the unemployed have the opportunity to increase their amount of unemployment benefits by working for several hours for an “Agence locale pour l’emploi” (in english “local agency for employment”)³. The jobs proposed by these local agencies are mainly housework and child care. The unemployed can work a maximum of 45 hours per month for these agencies.

³It is not really a job in the sense that the unemployed remains unemployed.

They receive 3.72 euros for each hour worked⁴.

The tax system consists of the social security contributions and a progressive income tax⁵. Social security contributions paid by the employees correspond to 13.07 per cent of gross earnings. Spouses are taxed separately but if the husband or the wife has no labour income or if the labour income of one of the spouses is less than 30 per cent of the household labour earnings, 30 per cent of the net household labour income (minus the labour income of the spouse) is attributed to this partner. The amount fictionally transferred to the spouse with low or no labour income is limited to 7,362.4 euros. Several tax allowances exist in the Belgian tax scheme. Each individual is granted a personal income exemption; the amount of this tax allowance depends on the family composition. If a married partner can not use his personal income tax exemption because his personal labour income is too low, this amount could be attributed to the spouse. The other main tax allowances are related to the number of children, child care costs, work related expenses. In addition, the amount of the tax exemption is higher for the replacement incomes (e.g. pensions, unemployment benefits) than for the labour earnings.

The tax schedule prevailing in Belgium in 1997 is detailed in Table 1 in Appendix A.

Table 1

The features of the existing tax scheme imply that when an unemployed individual moves into work, the fiscal burden increases more than the progressiveness of the tax scale : unemployment benefits - more generally replacement incomes - are facing a higher level of tax exemption than labour earnings. In addition, unemployed have not to contribute to the social security.

Financial traps occur when the gap between net wages and unemployment benefits is small. Nevertheless the difference between unemployment benefits and wages is not the only factor that matters. Some transfers - merely the additional child benefits and the supplementary interventions of the state in health care costs - are conditional on unemployment and disappear when the unemployed move into work. There are no housing benefits in Belgium but families with low incomes could benefit from a social housing for which they pay a moderate rent. Unemployed who are heads of

⁴The system of local agency for employment has been modified in 1994. Before 1994 the amount of hours worked was limited to 60 hours per month.

⁵A additional local income tax is levied on taxable income at an average rate of 7%.

households are entitled to additional child benefits after an unemployment duration of six months. These additional child benefits are withdrawn if the unemployed accepts a job for more than 14 days. When an unemployed moves into work he enjoys a tax allowance for each child. Nevertheless some households with low incomes do not pay taxes ; therefore they can not use this tax exemption (up to now there is no negative income tax in Belgium). In addition, if he loses his job the unemployed has to wait six months to be qualified again for these additional payments. The sudden removal of conditional transfers reduces work incentives especially for temporary jobs. The legislation concerning additional child benefits has been recently improved. First, since 2000 the unemployed who move into work and who lose their job during the first 6 months following unemployment are entitled to additional benefits without waiting again. Second, the unemployed who accept a temporary job (job duration less than 27 days) and for whom the unemployment duration is shorter than 6 months have to wait only 2 months after the end of their contract to be entitled to additional child benefits.

3 Financial incentives: previous evidence

Financial incentives are mainly studied in the US and in United-Kingdom where in-work benefits have been implemented. In-work benefits increase the work incentives of those with low potential returns in the labour market by raising the income gap between working and not working. A large part of the literature on work incentives deals with the impact of welfare transfers (and the modification in the eligibility requirements) on the labour supply of single-parent families.

Most of the existing evidence on financial incentives is based on simulations with representative households and/or individuals. Several authors (e.g. Saunders et al., 1989) have argued that replacement rates obtained on the grounds of representative households or individuals are of modest relevance to study the question of work incentives in the absence of statistics on the number of individuals in such hypothetical situations.

The key variable in the analysis of financial incentives consists in a net replacement rate from holding a job relative to collecting unemployment benefits⁶. Individuals are trapped in unemployment when this rate is close to or above 100 per cent. The net replacement rate can be computed at the individual level (OECD, 1999) but also at the level of the household.

⁶There are a lot of different replacement rates considered in the litterature (see Atkinson and Micklewright, 1991).

For instance, the individual replacement rate calculated by the OECD since 1961 is based on the earnings of an average production worker (APW)⁷. But the attention is often put on the disposable income of the households. Representative households are constructed on the grounds of various assumptions. These assumptions concern among others the unemployment duration, the family structure (singles, households with only one working partner, households with two wage earners, single-parent families, etc.), the number and the age of the children (child care costs) and the level of wages. Often the studies with “stylized” households take no account of commuting costs, additional intervention in health care, and social housing rents. These elements increase the occurrence of financial traps. Generally, the Belgian studies which use representative households (see e.g. De Lathouwer, 2001, and Defeyt, 1998) consider the following components to construct the disposable income of the households: wages, unemployment benefits, social contributions and taxes (with the allowance for children and the tax exemption for child care costs), child benefits, additional child benefits and child care costs. Replacement rates are computed at the same time for a maximal and a minimal unemployment benefit (see Section 2). The aim of analysis with ‘stylized’ households is to identify the types of family with the highest probability to be financially trapped.

The main results of the analysis based on “representative” households for Belgium are the following: First, concerning the transition from unemployment to full time work, the studies show that single-parent families and some households with only one source of income⁸ are more exposed to unemployment traps than others types of families. The gap between wage and unemployment benefit is obviously important, but, as explained before, the unemployment traps depend also on the removal of conditional transfers which occurs when the unemployed decide to work. This is the case of additional child benefits which disappear when the unemployed accept a job

⁷The average production worker is defined as ‘an adult full-time production worker in the manufacturing sector whose wage earnings are equal to the average wage earnings of such workers’. The replacement rate developed by the OECD takes no account of taxation, family and housing benefits. This index is calculated from an average of 18 ‘stylized’ individuals obtained by combining 3 unemployment durations (1 year, 2-3 years, 4-5 years), 3 household composition (single, married and head of household, married with an earning partner) and 2 wage levels (APW and 2/3 APW). The 18 ‘representative’ individuals are 40 years old and have a long work experience that avoids them to receive a lump sum unemployment benefit. Another index available since 1995 takes into account the effects of taxation and of others transfers (OECD, 1999).

⁸The one earner’s family that are entitled to a maximum level of benefits and that accept a job paid at the minimum wage.

for more than 14 days (see the changes in the legislation outlined in section 2). The additional child benefits are abolished for the time of work but also for the six first months of unemployment if the worker loses his job. This sudden removal does not favour the transition to employment and especially to temporary jobs. Second, the transition from unemployment to part-time jobs does not lead to a large increase in the disposable income, except for the singles. In addition, unemployed who are moving from unemployment into a part-time job never know a loss of income. This is due to the existence of a subsidy which guarantees the level of income. This mechanism called 'allocation de garantie de revenu' was implemented in 1993 in order to guarantee that unemployed who accept a part-time job obtain an income greater than the amount of unemployment benefits whatever the level of wage considered and the hours worked. If the level of the wage is lower than the level of the unemployment benefits, the workers receive the difference from the state. This difference is increased by a lump sum. The amount of this lump sum depends on the family composition: 134.1 euros for the heads of household, 107.3 euros for the singles and 80.5 euros for the cohabitants. However, the lump sum appears to be too small to influence significantly the transition from unemployment to part-time jobs. Moreover, because this subsidy disappears at 80 per cent of a full-time job, the transition from part-time to full-time is discouraged.

The analysis with representative households is relevant and rich of details, but the detection of financial traps by using representative households does not necessarily imply that individuals are really influenced by traps. Nothing is said about the real-life financial incentives; if you consider the same net income gap between work and unemployment, it may happen that one unemployed decides to move into employment whereas another refuses the job because the financial incentives are too low. The studies with representative households do not take the heterogeneity of individuals into account. Further, the unemployed are assumed to have a fully rational behavior, but this does not always correspond to reality because of a misunderstanding or a lack of knowledge concerning the rules of the tax and benefits systems.

Until now only a fairly small amount of research concerning the importance of financial incentives faced by the unemployed has been based on empirical data sets (see e.g. OECD, 2002; Pedersen and Smith, 2001; Kyyrä, 1999; Gregg et al., 1999; and Holm et al., 1999). The underlying assumption used to calculate the expected wages of individuals who are currently out of work is crucial to determine the financial returns associated with job holding. Different assumptions have been considered in the literature; the wages ob-

tained in the last job prior to unemployment (only if the unemployed have been employed before their unemployment spell, OECD, 1996, 1999), the unemployed's own expectations about the wages they would get in a future job (Pedersen and Smith, 2001), the average wage obtained by people who are in work, the expected wage adjusted for selectivity, the wage obtained by workers after an unemployment experience (post-unemployment wages), and the post-unemployment wages corrected for sample selection bias.

A large part of the literature on unemployment has conventionally assumed that the wages of the individuals that have experienced an unemployment spell are equal to those obtained by employed individuals with the same characteristics (e.g. Layard et al., 1991). This assumption presupposes that differences in wages are only due to differences in observed characteristics (e.g. age, sex, education). The correction for potential selection bias takes into account the fact that selection into employment is not random; we observe only the wages for those who are employed, i.e. for those for whom the wage exceeds the reservation wage. The correction for selection is implemented in order to avoid a potential bias caused by unobserved heterogeneity that affects both the probability of being in work and the wage level. If the decision to work is affected by the expected earnings, it is possible that individuals who are currently working have higher wages than the ones that would be obtained by the unemployed individuals.

Some authors (see e.g. Gregg et al., 1999, and Kyrrä, 1999) argue that the use of average or expected wages - even if they have been adjusted for selectivity - to study the financial incentives faced by the unemployed may produce upward-biased estimates of the returns to employment, since the experience of unemployment, particularly the length of the unemployment spell, may affect productivity as well as the reservation wage.

In order to determine how the probability of moving from non-employment into work is affected both by an increase of predicted out-of-work income and a rise of expected gains from working, Gregg et al. (1999) compare the distribution of hourly wages for employed workers with the distribution of hourly re-entry wages (wages reported by individuals moving from non-employment into employment). The research of Gregg et al. is based on two UK data sets: the Quarterly Labour Force Survey (QLFS) and the Family Resources Survey (FRS). A tax and benefit microsimulation model (TAXBEN from the Institute for Fiscal Studies (IFS)) is implemented on the data in order to evaluate the post-tax and benefit income in and out-of-work. The QLFS is a five-quarter 'rolling' panel. The quarters one to five used for the analysis concern Summer 1994 to Spring 1995 (10,453 observations). The authors restrict their attention to a sample of individuals

aged between 18 and 59 (excluding the students, the severely disabled, and the individuals who moved into self-employment). who were not in work in the Summer of 1994. Moreover, they consider only the labour market status at the beginning and the end of the panel⁹. The starting wages refer to the wages obtained by the individuals out-of-work in the first quarter and in-work in the fifth quarter. The information concerning the general hourly wages comes from the FRS cross-sectional data set. Gregg et al. show that the shape of the wage distribution of employed workers differs from the shape of the re-entry wage distribution; the first is close to a normal distribution whereas the second is more concentrated on lower wage levels. The re-entry wage distribution has a lower mean than the overall wage distribution. The median re-entry wage is around 69 per cent of the median for the overall wage distribution. A large part of the divergence between the two distributions can be attributed both to differences in individual characteristics (e.g. concerning job tenure) and to differences in job attributes in the two populations. Further, Gregg et al. are interested in the level of wages that individuals who are out-of-work would be able to earn if they move into work. They compare the results from different wage estimations based in particular on the overall wage distribution, the overall wage assumption adjusted for self-selection, and the re-entry wage distribution without selectivity correction. They find that the expected wages for the individuals currently out-of-work are lower if the re-entry wage distribution is used. They emphasize also that the differences due to gender and to education are weaker for the re-entry wages than for the overall wage distribution.

The study by Kyyrä (1999) reports also that the distribution of post-unemployment wages is leftward-skewed and more compressed than the overall wages distribution. The empirical analysis of Kyyrä is based on two samples. The first one is obtained by pooling individuals flowing out of the unemployment register in 1988, 1990, 1992 and 1994 (14,438 observations). The second one is drawn from the working age population and is restricted to wage earners (4,628 observations). These two data sets are merged with administrative registers. The author compares the results obtained from two estimations of a wage equation; one based on the overall wage distribution and the second using wages reported by the individuals who exit the unemployment register for employment (post-unemployment wages). Kyyrä finds that the wage differentials between educational level and between men and women are smaller in the post-unemployment wage estimation than in

⁹By construction the individuals are observed to have at most one change of labour market status.

the overall wage estimation.

Several empirical studies have examined the earnings losses associated with a period of unemployment. The general findings from these studies suggest that the cost resulting from job loss is not limited to a loss of earnings in the period of unemployment: the unemployed get re-employed at lower wages than the ones they enjoyed in their previous job. Moreover, despite various methodologies and data sets, consistent evidence has been found concerning the persistence of reductions in wages following displacement (see Fallick, 1996 for a survey of the recent empirical literature on displaced workers; see also Kletzer, 1998).

Jacobson et al. (1993) provide evidence for the existence of earnings losses due to the experience of unemployment. The study of Jacobson et al. is based on a panel of high-tenured displaced and non-displaced workers in Pennsylvania. This panel was built by merging administrative records of workers' earnings histories with informations about their firms. The authors develop a fixed-effects model to control for unobserved heterogeneity that may be correlated with displacement probabilities. They find that during the early to the mid-eighties, high-tenured workers (six or more years of job tenure by the beginning of 1980) suffer from large income losses when they separate from firms. They point further that the losses of income seem to be persistent : five years after the separation from their firms these workers incur a loss of 25 per cent of their quarterly previous earnings. These losses are observed for men and women, for young and old workers and vary with respect to the sectors, the size of the firms and the regional labour markets.

The study by Ruhm (1991) based on the waves 1969 to 1982 of the Panel Study of Income Dynamics (PSID) compares the weekly earnings of displaced workers to those of non-displaced workers (control group). The attention is restricted to heads of household. He finds that the earnings losses suffered by displaced workers are substantial and persistent: the weekly wages of displaced workers are 16 per cent lower than those of nondisplaced workers in the year following displacement and still 14 per cent lower four years after displacement.

Stevens (1997) also finds persistence of wage losses associated with periods of unemployment. The data set used is drawn from the waves 1969 to 1988 of the PSID. The sample consists of 1.606 household heads workers, 441 of whom experience at least one displacement at some point in the sample period. The methodology used is similar to the one developed by Jacobson et al. (1993)¹⁰. She concludes that the wages associated with

¹⁰Displacement is defined as "leaving due to a plant or business closing or due to being

displacement are reduced by more than 12 per cent for the year of the job loss and that the average wage rate tends to remain 9 per cent below the expected level without displacement six or more years after re-employment. She underlines that repeated job losses contribute to the persistence of a displacement effect (see also Schoeni and Dardia, 1996) for workers who do not suffer from additional displacements the average wage rate is reduced by only 4 per cent six or more years after job loss. Furthermore, she shows that earnings losses are found to be larger for high-tenured workers (more than 3 years of predisplacement job tenure). The magnitude and the persistence of the wage cost of displacement depends on the educational level; those with 12 or fewer years of education (no more than a high school degree) lose less than the more educated workers and the losses are also less persistent.

OECD (2002) investigates wage losses caused by unemployment. The authors suggest, on the grounds of the European Community Household Panel (ECHP) and the Panel Study of Income Dynamics (PSID), that the average wage of those who lose their job is, on average, only two-thirds of the average wage in all countries. Further, the cost of job loss in terms of wages is higher for older workers even if the effect of age is small. For Belgium, this study reports that after a spell of unemployment, the wages are reduced by 8 per cent relative to previous wages. This result may be affected by the small size of the sample used for Belgian investigations.

Theory suggests several reasons to explain why a period of unemployment may be followed by wage losses. The first one concerns job tenure: jobs associated with post-unemployment wages are by definition short-tenure at the time at which one observes them (no seniority effect). Lower post-unemployment wages may also result from a loss of firm-specific (or sector-specific) human capital which is not transferable to a new job. A reduction in the post-unemployment wages may also be caused by a lower quality of the job match between the worker and the firm. Further, a decrease in the reservation wage over time can lead to acceptance of a job with a lower wage. The decline of the reservation wage can be justified for instance by a (expected) decrease in the level of unemployment benefits, see e.g. van den Berg (1990).

The research described below is concerned with the measure of financial incentives faced by the unemployed (see also OECD, 2002).

The recent study by Pedersen and Smith (2001) analyses the importance of economic dis-incentives faced by unemployed and low paid workers in Denmark, using a panel survey merged with administrative registers for laid off or fired" (Stevens, 1997).

the years 1993 and 1996. For this purpose, they compute an individual net income ratio between collecting unemployment benefits and working in a full-time job. This ratio includes some social transfers like housing benefits and child care subsidies but also some fixed costs linked to job holding (commuting costs and child care costs). For the individuals who are unemployed at the week of the interview no information is available about the wages and the fixed costs of work. Concerning the wages, the unemployed's own expectations about the wage they would obtain in a future job are used to compute the income ratio. Pedersen and Smith do not develop a predicted wage rate based on an estimated wage equation. The use of the unemployed's own expectations avoids the correction of wages for sample selection bias in a panel framework. The predicted amount of fixed costs of work are obtained from an estimation made on the employed individuals. For the individuals in employment at the date of the survey, the amounts of unemployment benefits and others social transfers are calculated by using the information included in the administrative registers. The analysis of the replacement rates shows that 9.1 per cent and 10.9 per cent of the unemployed were in an unemployment trap (net income ratio greater than or equal to 1) in 1993 and in 1996, respectively. Unemployed women are more exposed to financial dis-incentives than unemployed men; 12.2 per cent and 14.6 per cent of the women were trapped in unemployment in 1993 and 1996, respectively. This proportion is lower for men; 4.9 per cent in 1993 and 6.7 per cent in 1996. As mentioned before, the net income rates were also computed for the people in work at the week of the interview. The results for the workers suggest that for 7 per cent and 9.5 per cent of them in 1993 and 1996 ,respectively, the disposable income in work is lower than the one that would be obtained through collecting unemployment benefits. As for the unemployed, the proportion of women facing an unemployment trap but who are still working is larger than that of men. The panel structure of the data allows the author to look at the transitions that occur between 1993 and 1996 in and out of the unemployment trap state. Pedersen and Smith underline, without distinction between unemployed and employed workers, that 19 per cent of the men and 20 per cent of the woman who were trapped in unemployment in 1993 had not escaped the trap in 1996.

Gregg et al. (1999) are interested in the entry or the re-entry into work after a period of unemployment or inactivity in United Kingdom. They compute a replacement rate defined as “the ratio of income net of taxes and benefits when out of work to net income in work” (Gregg et al., 1999) by

using various assumptions concerning the wages¹¹. The use of entry wages leads to a predicted replacement rate for a full-time job (37 hours a week) of 70 per cent against 60 per cent on the grounds of the average wage for employed workers. The replacement rate decreases with the number of hours worked. Gregg et al. find that gender and family type account for substantial differences in the financial returns associated with moving into work. Further, the net replacement rate is higher for married individuals with a non-working partner comparing with married individuals with a working partner.

The research of Kyyrä (1999) deals with the importance of financial incentives faced by the unemployed in Finland. The financial incentives are studied in a cross-sectional framework (in fact, the sample used is of the panel form but is processed by “cross-sectional methodologies”). As mentioned above, the sample used in this analysis is based on the unemployed who left the unemployment register in 1988, 1990, 1992 and 1994 and is merged with the administrative register. The unemployment spells ended either in a new job, in a manpower program, or in a withdrawal from the labour force. Detailed income statistics are available for the sampled individuals and also for their spouses. The income information includes transfer payments to households. The wages obtained by individuals who leave unemployment for employment are used to predict wages. The estimation of post-unemployment wages is achieved by applying a maximum likelihood method. The estimated post-unemployment wages are then used to calculate the expected change in the disposable income of the household that would result from the transition to employment of the unemployed member. Two income ratios are computed; an observed income ratio and an estimated income ratio. The first is only obtained for the subsample of those who leave the unemployment register for employment and is based on the observed post-unemployment wage. The observed income ratio is defined as the disposable income of the household during employment divided by the household’s disposable income during unemployment. The estimated income ratio is computed for all the households in the sample since the estimation of the post-unemployment wage is available for each individual. The definition of the estimated income ratio is the following: the household’s disposable income resulting from fictional employment divided by the disposable income of the household obtained during unemployment. Kyyrä find that 31 per cent of those who move from unemployment into employment record an increase of their household’s disposable income less than or

¹¹The replacement rates are calculated for 12, 20 and 37 hours of work.

equal to 25 per cent. Moreover, 4 per cent of those who leave unemployment for employment accept a job leading to a decrease in their household's disposable income. Concerning the estimated income ratio, 8 per cent of the sample are facing a ratio less than 1 and 43 per cent are estimated to be unable to increase their household's disposable income more than 25 per cent. A large part of the households exposed to a financial trap (observed and estimated) are couples.

From the studies mentioned above three important results should be emphasized. First, some transitions from unemployment to employment are associated with a decrease or a small increase of the disposable income. Moreover, the literature (e.g. Pedersen and Smith, 2001; Callan et al., 1994; OECD, 1996) informs us that a non-zero fraction of those in work are facing a replacement rate around or above 100 per cent. Second, unemployed workers get re-employed at lower wages than the ones they enjoyed in their previous job. Third, the wage losses suffered by workers that have experienced a period of unemployment are persistent; the average wage rate tends to remain below the expected average wage rate without job loss(es) for several years after the unemployment spell(s).

In this paper, in order to calculate replacement ratios for all the individuals observed in the sample we will compute expected wages by estimating a wage equation for those individuals who move into employment during the observation period, that is post-unemployment wages. The methodology applied will be summarized in the next section.

4 Methodology

The availability of panel data instead of a single cross-section allows us to follow individuals and their behaviour over time. In addition, if not controlled for, sample selection bias may be expected to affect the results of the estimation. Therefore the appropriate estimator is the one that exploits the panel structure of the data and corrects for sample selection bias.

In general, two main approaches have been followed in the development of panel data sample selection model estimators: two-step estimators following the idea of Heckman (1979) and maximum likelihood estimators. Jensen et al. (2001) survey different panel selection estimators and they suggest using a random effects estimator, when the equation of interest is mainly the wage equation¹². We have adopted this approach in our study.

¹²See the estimators suggested by Wooldridge(1995), Kyriazidou (1997), Vella and Ver-

Specifically, we estimate a parametric panel data random effects model. We briefly describe the model below.

The model we consider can be formulated as follows:

$$\begin{aligned}
y_{it}^* &= x'_{it}\beta + \alpha_i + \varepsilon_{it} \\
d_{it}^* &= z'_{it}\gamma + \eta_i + v_{it} \\
d_{it} &= 1 \text{ if } d_{it}^* > 0, 0 \text{ otherwise} \\
y_{it} &= y_{it}^* \cdot d_{it},
\end{aligned} \tag{1}$$

where i ($i = 1, \dots, N$) denotes the individual and t ($t = 1, \dots, T$) denotes the time period; d_{it} is an indicator for having an observed wage, y_{it} denotes the log of the wage, x_{it} and z_{it} are vectors of explanatory variables, possibly with common elements. The equation of interest is the first one and the selection process is the second one in 1. Here, β and γ are the unknown parameter vectors that we have to estimate. The α_i and η_i are unobservable time-invariant individual-specific components which are possibly correlated with each other and with the explanatory variables, and ε_{it} and u_{it} are unobserved disturbances (possibly correlated with each other). The variable y_{it}^* is observed only if the indicator variable $d_{it} = 1$. This means that sample selectivity can be accounted for.

In this estimation procedure the selection process and the equation of interest are estimated simultaneously. For this purpose it is necessary to specify the joint distribution of the error components treated as random effects in the selection equation and the equation of interest. Specifically, we assume that the error terms follow a bivariate normal distribution

$$(\varepsilon_{it}, v_{it}) \sim N(0, \Sigma), \text{ where } \Sigma = \begin{bmatrix} \sigma_\varepsilon^2 & \rho\sigma_\varepsilon \\ \rho\sigma_\varepsilon & 1 \end{bmatrix}$$

The bivariate random effects are assumed to follow a discrete distribution with 2×2 points of support and we assume independence between idiosyncratic errors and random effects.

Let $\alpha = \{\alpha_1, \alpha_2\}$, $\eta = \{\eta_1, \eta_2\}$ and $p = \{p_{11}, p_{12}, p_{21}, p_{22}\}$, where $p_{kj} = \Pr[\eta_k, \alpha_j]$, and let $\theta = [\beta, \gamma, \sigma_\varepsilon, \rho, p, \alpha, \eta]$ denote the parameter vector. For a single individual we derived the contribution to the likelihood function as

beek (1999), Rochina-Barrachina (1999). See also Dustman and Rochina-Barrachina (2000), Lee (2001), Hausman and Wise (1979), Ridder (1990), Verbeek and Nijman (1996).

follows:

$$\begin{aligned}
L_i(\theta) &= \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} \left[\prod_{t=1}^{T_i} f(\varepsilon_{it}, v_{it} | x_{it}, z_{it}, \eta_i, \alpha_i) \right] dG(\eta_i, \alpha_i) \\
&= \sum_{j=1}^2 \sum_{k=1}^2 p_{kj} \prod_{t=1}^{T_i} f(\varepsilon_{it}, v_{it} | x_{it}, z_{it}, \eta_k, \alpha_j)
\end{aligned}$$

where $G(\cdot)$ is the joint CDF of the random effects and

$$\begin{aligned}
&f(\varepsilon_{it}, v_{it} | x_{it}, z_{it}, \eta_i, \alpha_i) \tag{2} \\
&= \Phi_v(-z_{it}\gamma - \eta_i)^{1-d_{it}} \cdot \\
&\quad [(1 - F_{v|\varepsilon}(-z_{it}\gamma - \eta_i | y_{it} - x_{it}\beta - \alpha_i)) \cdot f_\varepsilon(y_{it} - x_{it}\beta - \alpha_i)]^{d_{it}} \tag{3}
\end{aligned}$$

where $f(\cdot)$ and $F(\cdot)$ are respectively the density and distribution functions for the variables referred by subscripts and $\Phi(\cdot)$ is a standard normal distribution function.

This model is estimated separately for men and women. This allows us to distinguish the expected wages according to gender and to account for phenomena that affect males and females labour market participation differently.

In order to be able to compute the replacement ratio for each individual in the sample we compute the expected log wages as in Rosholm et al.(2001). Conditional on participation in a given year and on the entire path of participation indicators, the expected log wage for an individual is

$$\begin{aligned}
&E[y_{it} | d_{i1}, \dots, d_{iT_i}, x_{it}, z_{i1}, \dots, z_{iT_i}] \tag{4} \\
&= x_{it}\beta + E(\alpha_i | d_{i1}, \dots, d_{iT_i}, z_{i1}, \dots, z_{iT_i}) + E(\varepsilon_{it} | d_{it}, z_{it})
\end{aligned}$$

The expected values of the error components of the wage equation are

$$E(\alpha_i | d_{i1}, \dots, d_{iT_i}, z_{i1}, \dots, z_{iT_i}) = \sum_{j=1}^2 \alpha_j q_{ji}^\alpha \tag{5}$$

$$\begin{aligned}
E(\varepsilon_{it} | d_{it} = 1, z_{it}) &= \rho\sigma_\varepsilon \sum_{k=1}^2 q_{kit}^\eta \frac{\phi(z_{it}\gamma + \eta_k)}{\Phi(z_{it}\gamma + \eta_k)} \\
E(\varepsilon_{it} | d_{it} = 0, z_{it}) &= -\rho\sigma_\varepsilon \sum_{k=1}^2 q_{kit}^\eta \frac{\phi(z_{it}\gamma + \eta_k)}{1 - \Phi(z_{it}\gamma + \eta_k)} \tag{6}
\end{aligned}$$

The term q_{ji}^α denotes the parameters of the individual specific probabilities of α_i . Its expression is

$$q_{ji}^\alpha = \frac{\sum_{k=1}^2 p_{kj} \prod_{t=1}^{T_i} \left[\Phi(z_{it}\gamma + \eta_k)^{d_{it}} [1 - \Phi(z_{it}\gamma + \eta_k)] \right]^{1-d_{it}}}{\sum_{l=1}^2 \left[(p_{l1} + p_{l2}) \prod_{t=1}^{T_i} \left[\Phi(z_{it}\gamma + \eta_l)^{d_{it}} [1 - \Phi(z_{it}\gamma + \eta_l)] \right]^{1-d_{it}} \right]}$$

and q_{kit}^η denotes the parameters of the individual and time specific probability of η_i (see Rosholm et al., 2001)

$$q_{kit}^\eta = \frac{\sum_{j=1}^2 p_{kj} \Phi(z_{it}\gamma + \eta_k)}{\sum_{j=1}^2 [(p_{1j} \Phi(z_{it}\gamma + \eta_1) + p_{2j} \Phi(z_{it}\gamma + \eta_2))^{1-d_{it}}]}$$

5 Data

5.1 The sample

The empirical analysis is based on the Panel Study of Belgian Households (PSBH). This panel was first carried out in the spring of 1992 (wave 1) and contains a variety of information. We have decided to consider the waves 3 to 7 (spring 1994 to spring 1998) because both the questions concerning the income and the definition of employment have been modified relative to the first two waves. The waves 3 to 7 consist of 9.398 individuals aged 16 or over. At the time of the survey, people report their labour market state at the time of the interview but also for each of the preceding twelve months.

At the same time people are interviewed about their annual income for the previous year net of taxes and social contributions. For each of the five waves, we use the number of months in which the individual is unemployed or employed to compute the monthly in-work and out-of-work income. Because the information we use is retrospective, the analysis covers the years 1993 to 1997. As mentioned before, the income information is reported on an annual basis. Monthly wages are computed by dividing annual salaries by the number of months worked¹³. The same methodology is applied for unemployment benefits.

Among the 9.398 individuals interviewed during the waves 3 to 7, 1.338 have known at least one unemployment spell during the observation period. We observe 1.948 unemployment spells, however we will focus only

¹³Computing monthly wages from the annual income information does not allow to separate the wages associated with different jobs in the case where the worker has been employed in more than one job for the same year.

on those that are “subsidized”. For this reason we will only consider 1.661 unemployment spells, experienced by 1.142 individuals. Half of the unemployment spells end with a transition towards employment (paid work and self-employment); 12 per cent of the unemployment spells end with a transition towards the “non-participation” state (retirement, housekeepers and students); 35 per cent of the unemployment spells are right-censored and 3 per cent of the unemployment spells end in a so-called “other activity”. Regarding the spells of unemployment which are right-censored, 67 per cent concern individuals who remain unemployed at the end of the observation period and 33 per cent are due to panel attrition. Our sample is made of both unemployed individuals (men and women) having moved towards employment (working at least 15 hours per week) and unemployed persons who remain unemployed throughout the period. Individuals who move from unemployment into self-employment are excluded from the analysis. The reason for discarding those individuals resides mainly in the fact that in Belgium there is a large number of people reporting false self-employment status (paying for this social security contributions) but receiving a monthly salary by their employer. In addition, it is difficult to distinguish the wages from the profits. After eliminating these observations, our sample consists of 1.341 spells of compensated unemployment, experienced by 959 individuals. We will use separate samples for men (601 spells) and women (740 spells). The sample is unbalanced; individuals are observed from one to seven times. Some observations are characterized by missing values for unemployment benefits (280 observations). This forces us to estimate the amount of unemployment benefits associated with those spells. As mentioned in Section 2, the level of the unemployment benefits to which the unemployed is entitled depends on four elements : the age, the unemployment duration, the type of family and the previous wage. The estimation that we use is based on the first three elements. The information concerning the wage earned in the last job prior to employment is not available. Therefore, when the information about the unemployment benefits is missing, we decide to compute the maximum and the minimum unemployment benefit.

5.2 The dependent variables

The dependent variables are an employment indicator and the monthly net wage.

The employment indicator takes a value of 1 if the individual moves from compensated unemployment to paid work during the observation period. To be considered as employed in the PSBH, people have to work at

least 15 hours per week. The information available in the survey concerning hours of work are about hours as specified in the job-contract and hours actually worked. We have chosen the last definition since labour income covers also extra-hours worked (see below). Using this piece of information we have distinguished between full-time and part-time workers. Part-time arises when the number of hours worked per week is less than thirty. Full-time is defined accordingly. The distinction between full-time and part-time work is not possible for all the sampled members because of the structure of the survey; the information on the hours worked are given at the time of the interrogation (spring) but if the transition from unemployment to employment occurs between the two interrogations and the individual is unemployed at the date of the first and second interview we have no information about the hours. In addition, a proportion of those in work at the data of the interview do not report the hours worked. In fact, for 74 per cent of our sample, we know if the unemployed left unemployment for full-time or part-time work. The distinction between part-time and full-time seems to be particularly important for women. Indeed the available information on hours worked suggests that for them 31.5 per cent of the transitions from unemployment into employment are made in the form of part-time jobs. Furthermore, women work on average 34 hours per week. Conversely, for men the majority of transitions from unemployment into employment is made of full-time jobs: only 7 per cent of the transitions from unemployment into employment are made of part-time jobs. The average number of hours worked per week is for men equal to 41.4.

The monthly net wage includes tips, commissions, bonus and holiday earnings. The wage is deflated by the consumer price index (base 1997). For 25 per cent of the unemployment spells which ended into work, the information concerning the wages is missing.

5.3 The explanatory variables

The set of explanatory variables used in this study is described below. Some variables are continuous and others are dummies.

The measure of experience we construct concerns potential work experience; current age minus age when the individual left school. We use a second order polynomial for experience. In addition, a dummy variable indicates if unemployed have already been in work in the past. The variable 'responsibility in work' takes the value 1 if the unemployed has never supervised other workers in the past.

Education is introduced in our specification by a set of indicators for

the highest level of formal education obtained. Five educational levels are considered; primary school or without education, lower secondary school (3 years after primary school), upper secondary school (6 years after primary school), high school (2 to 4 years after the secondary school) and university.

We have distinguished between the healthy and the unhealthy unemployed. The individuals are in 'bad health' either if they describe themselves as having a health problem, as suffering from a chronic illness or from a handicap, as being an invalid, and if they have spent more than 14 nights in hospital for the previous year (except for childbirth).

In addition to the information about physical health, we build a measure of mental distress in the following way (see Sweeney, 1998). We compute a score for each individual by attributing one point each time he answers 'always' or 'nearly always' to the next questions: to which extent have you experienced each of the 17 negative feelings during the three months prior to the interview. The feelings are: feeling tired, having physical symptoms, feeling bad, being irritable, needing to feel reassured, having strange thoughts, being pessimistic, crying easily, thinking about death, thinking about suicide, unable to concentrate, having unpleasant thoughts, feeling guilty, unable to sit quietly, having insomnia, losing weight or appetite, feeling depressed. The distribution of scores for all the individuals included in the waves 3 to 7 shows on average that 47 per cent score zero, 18 per cent score one and 11 per cent record two. In addition, about 15 per cent of all the individuals score at least 4 points. Individuals who record more than four points are classified as suffering from high mental distress.

We include an indicator for being long term unemployed (if the individual has been unemployed for more than twelve months at the start of the year).

A measure of social involvement (see Sweeney, 1998) has been built in order to differentiate people socially active from the others. Individuals are ranked as socially active if they are member of an association as a sporting, a cultural or a humanitarian association or if they have a very active circle of friends.

A dummy takes the value of one if the unemployed or his household is receiving a financial support from the state e.g. a social housing with low rent or food-stamps.

We decided also to introduce in our specification three variables relating to pecuniary difficulties. First, a dummy indicates if the unemployed, or another member of his household, is in debt (excepting for a mortgage loan). A second dummy takes the value of one if the unemployed is in financial difficulties (concerning e.g. rent, heating). The third dummy is equal to one if the unemployed is unsatisfied about his financial situation. The last

variable is subjective, the two first are more objective.

Some variables are related to the family structure. We have information about the number and the age of the children in the household. A dummy indicates the presence in the family of children under three years. The families with a child aged less than three have to pay child care costs. We know also the civil status of individuals: married, non married, divorced, separated or widowed. In addition, unemployed are classified into the following three categories of household: singles, couples and single parents¹⁴. In addition, a variable indicate is the unemployed is a head of household. Finally, two variables tells us if the unemployed is a head of household and if he is entitled to additional child benefits.

The variable concerning the nationality is restricted to Belgian or non Belgian. A richer variable was first introduced but was not significant.

Other variables were introduced in the specification but removed again after a first analysis because of lack of significance. These variables were relating to individual's involvement in housework, participation in leisure activities and voluntary work

5.4 Some descriptive statistics

Tables 2 and 3 in Appendix A present descriptive statistics of the sample and distinguish the characteristics between the spells which ended by a transition to employment (spells 'E' for employment) and the right-censored spells (spells 'U' for unemployment).

All the variables are used in the selection equation, but the wage equation only uses experience and its square, educational indicators, the indicator for long term unemployment, an indicator for working in the public or private sector, an indicator for the type of contract (temporary or not), an indicator for nationality, and for responsibilities (supervision of other people).

6 Estimation results

The estimation results are presented in Appendix B, in table B1. The model is estimated separately for men and women. In discussing the results, we keep in mind that one of the main purposes of this study is to investigate whether unemployment traps exist and they significantly affect the behaviour of individuals on the labour market. The results derived from the

¹⁴The information about the type of family could be misleading for the unemployed who live with their parents because they are classified as member of a couple.

estimation of the wage equation corrected for sample selectivity in a panel data framework can lead to some additional hints.

Looking at the estimation results we see that, from a general point of view, significant differences in the behaviour of males and females appear. Moreover sample selectivity seems to affect more women than men.

Considering the results of the selection equation for this sub-sample, we notice that the most significant parameter is the one associated to the unemployment status: when having experienced long-term unemployment, women are likely to participate less on the labour market. Furthermore, married women participate more, conversely those that are not head of the household have difficulties in moving into employment. Surprisingly, none of the variables linked to the presence of children seem to affect their participation decisions.

Different factors seem to affect men's participation decision. First, older men participate more: this effect is likely to be linked to the experience acquired on the labour market. Similarly to women, those having experienced long term unemployment have higher difficulties in re-integrating the labour market. For this sub-sample we observe that health matters, since having had a health problem affects significantly their participation decisions. The same effect is associated with the fact of not being the head of the household. Finally, higher education levels are associated to the best outcomes on the labour market.

Let us turn now to the wage equation. For women, long-term unemployment seem to play a negative role by lowering their salary. Conversely, having exerted some tasks of supervision in previous job experiences affects positively their wage. This result can be justified by thinking that supervision tasks are associated frequently to more important jobs.

For men, the significant coefficient associated to the number of years of experience underlines the importance of this variable in the analysis and is likely to confirm the interpretation of the age variable in the selection equation. Again, the experience of long unemployment spells negatively affects their salary.

Unluckily none of the variables being linked in some way to non-financial incentives (like participation in social activity) turns out to be significant.

Using the expressions in (4) we have built different kind of replacement ratios for the individuals in the sample. We focus mainly on three of them. The first one is

$$ratio \equiv y = \frac{\text{Non-related work incomes} + \text{Observed wages}}{\text{Individual's disposable income when unemployed}} \quad (7)$$

This ratio can be computed only for people that are observed to move into jobs during the observation periods.

The second one is obtained by summing non related work incomes and predicted wage on the basis of 4 as follows

$$ratio1 \equiv y_1 = \frac{\text{Non-related work incomes} + \text{Expected wages}}{\text{Individual's disposable income when unemployed}} \quad (8)$$

The third one is a mixture between the previous two. Indeed we impute estimated (expected) incomes only to those individuals that have not made the transition towards employment during the observation period. For the others, we impute the observed income. It writes as follows

$$ratio2 \equiv y_2 = \frac{\text{Non-related work incomes} + \text{Expected wages if non worker} + \text{Observed wages if worker}}{\text{Individual's disposable income when unemployed}} \quad (9)$$

We remind that when unemployment benefits were missing we have imputed the maximum benefits allowed.

The presence of unemployment traps in this framework is revealed by a ratio smaller than 1. When the ratio equals 1 individuals are likely to be indifferent between working and not working. Whereas when the ratio is higher than 1 they should have higher benefits in working. We report in Appendix C some graphs describing the distribution of the ratio for the different samples. Furthermore we present there the evolution of the different ratios computed during time (see fig. 1, 2 and 2a).

The graph where we plot the first ratio (y), reported in Appendix C, suggests that more than 10% of the transitions of men into employment are associated with a decrease or a small increase of the disposable income; more than 20% of women experience the same situation.

There are several ways to explain why it may be meaningful in some cases to accept a job associated with negative short-term financial returns. Such behaviors could be justified for instance by the fact that the unemployed give a very large importance to the intertemporal perspectives: they are likely to expect higher wages in the future (promising career prospects) or lower the negative effect of long unemployment periods. Some individuals may even be willing to accept a job that is associated with long-term income losses if they enjoy working or if they simply feel shamed to be unemployed'. This explanation concerns the non monetary factors related to job holding.

The phenomenon of unemployment traps seems to be particularly important for women. In figures 7 to 11, we have plotted the distribution of

the replacement ratios (computed according to expression 8 and 9) for the whole sub-sample and for the sub-group of women that do not move into employment during the observation period, respectively. We remark in tables 4 and 5 (Appendix A) that around 40% of the latter sub-group would have an important financial loss if decided to move into employment.

7 Conclusion

(to be completed....)

In this paper we investigated whether unemployment traps exist and are significant for Belgian individuals. In order to assess them we have used panel data sample selection models. Specifically we estimated a parametric random effects models composed by a wage equation and a selection equation estimated simultaneously by maximum likelihoods techniques. The replacement ratios have been computed for every individual in the sample by using the predicted wages obtained from the estimation of the wage equation corrected for sample selectivity. This issue seem to be particularly important for women, while for men the coefficients associated with both the points of support and the correlation and variance coefficients do not allow an easy interpretation.

The empirical analyses has exploited the data extracted from the waves 1993-1997 of the Panel Study of Belgian Household and has been led separately on (unbalanced) samples of men and women. The estimation results suggest significant differences in the behaviour of these two groups. A common striking factor affecting both the level of the wage and participation decisions is represented by the experience of long periods of unemployment in the past: long-term unemployed people seem to have higher difficulties in re-integrating the labour market and to obtain low salary when they succeed in doing it.

Moreover the computation of replacement ratios for all individuals highlight the importance of unemployment traps in the transition of women towards employment. Indeed it seems that their expected wage is to a great extent lower to what they earn while being unemployed. This finding is very important for policy concerns. Increasing the participation of women to the labour market through the design of some incentives schemes (like those linked to child care) could indeed contribute to lowering the overall unemployment rate and by there alleviate labour market problems.

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8 Appendix A: Tables

Table 1:

<i>Annual earnings in euros</i>	<i>Marginal income tax rate in percent</i>
0 – 6,271.7	25.0
6,271.7 – 8,304.4	30.0
8,304.4 – 11,849.3	40.0
11,849.3 – 27,268.3	45.0
27,268.3 – 40,902.4	50.0
40,902.4 – 59,990.2	52.5
≥ 59,990.2	55.0

Table 2: Descriptive statistics - Men

<i>Number of observations</i>	Spells 'E'		Spells 'U'		Spells 'E'+ 'U'	
	363		238		601	
<i>Continuous variables</i>	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Age	31.7	8.8	39.1	12.9	34.6	11.2
Experience	16.	12.5	21.3	13.9	16.0	12.5
Children	0.5	0.9	0.7	1.2	0.6	1.0
<i>Dummies</i>	Frequency		Frequency		Frequency	
<i>Educational dummies</i>						
Primary school or no education	9.4		25.6		15.8	
Lower secondary school	27.8		32.4		29.6	
Upper secondary school	36.6		25.2		32.1	
High school	16.3		10.1		13.8	
University	9.9		6.7		8.7	
<i>Household dummies</i>						
Children under 3 years	10.7		8.8		10.0	
Not head of household	48.5		76.0		59.4	
Married	40.2		48.5		43.5	
Not married	52.3		37.6		46.5	
Divorced, separated or widowed	7.5		13.9		10.0	
Single	9.1		15.1		11.5	
Couple	82.1		81.9		82.0	
Single -parent	8.8		3.0		6.5	
Additional child benefits	2.7		5.0		3.7	
<i>Regional membership dummies</i>						
Brussels	11.8		12.2		12.0	
Wallonia	55.1		54.6		54.9	
Flanders	33.1		33.2		33.1	
<i>Job attributes dummies</i>						
Part -time	5.5					
No responsibility	83.7		94.1		87.9	
Previous work	92.8		91.6		92.3	
<i>Time dummies</i>						
1993	20.7		11.3		17.0	
1994	22.6		7.6		16.6	
1995	18.2		10.9		15.3	
1996	20.9		10.1		16.6	
1997	17.6		60.1		34.5	
<i>Others dummies</i>						
Bad health	9.1		27.3		16.3	
High mental distress	10.2		15.1		12.1	
Financial support from the state	11.6		17.2		13.8	
Long -term unemployment	29.8		78.1		48.9	
In debt	38.0		31.1		35.3	
Pecuniary difficulties	35.0		41.2		37.4	
Worse financial situation	29.7		41.2		34.3	
Householder	62.5		54.2		59.2	
Belgian	88.7		84.4		87.0	

Table 3: Descriptive statistics - Women

	Spells 'E'		Spells 'U'		Spells 'E'+ 'U'	
<i>Number of observations</i>	398		342		740	
<i>Continuous variables</i>	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Age	30.1	7.7	36.5	10.7	33.1	9.7
Experience	10.6	8.5	18.2	11.9	14.4	11.0
Children	0.8	0.9	0.8	1.0	0.8	1.0
Dummies	Frequence		Frequence		Frequence	
<i>Educational dummies</i>						
Primary school or no education	5.3		17.5		10.9	
Lower secondary school	18.3		31.6		24.5	
Upper secondary school	38.7		37.4		38.1	
High school	29.7		11.7		21.4	
University	8.0		1.8		5.1	
<i>Household dummies</i>						
Children under 3 years	18.8		16.7		17.8	
Not head of household	84.2		93.3		88.4	
Married	47.5		47.2		47.4	
Non married	42.7		24.4		34.2	
Divorced, separated or widowed	9.8		28.4		18.4	
Single	8.3		7.6		8.0	
Couple	75.6		70.2		73.1	
Single -parent	16.1		22.2		18.9	
Additional child benefits	4.0		18.1		10.5	
<i>Regional membership dummies</i>						
Brussels	11.1		10.8		11.0	
Wallonia	47.7		48.8		48.2	
Flanders	41.2		40.4		40.8	
<i>Job attributes dummies</i>						
Part-time	22.86					
No responsibility	93.5		96.2		94.7	
Previous work	91.5		85.7		88.8	
<i>Time dummies</i>						
1993	21.6		8.2		15.4	
1994	20.3		5.6		13.5	
1995	19.1		8.2		14.1	
1996	18.6		6.4		13.0	
1997	20.4		71.6		44.0	
<i>Others dummies</i>						
Bad health	8.0		13.2		11.4	
High mental distress	20.4		25.2		22.6	
Financial support from state	9.1		20.2		14.2	
Long-term unemployment	32.7		86.0		57.3	
In debt	30.7		33.3		31.9	
Pecuniary difficulties	24.1		41.5		32.2	
Worse financial situation	21.1		36.3		28.1	
Householder	53.3		51.5		52.4	
Belgian	94.2		91.2		92.8	

Table 4: Replacement ratios (based on y_1) for women unemployed over the whole survey period

y1	Freq.	Percent	Cum.
.3	1	0.29	0.29
.45	5	1.46	1.75
.6	18	5.26	7.02
.75	60	17.54	24.56
.9	28	8.19	32.75
1.05	29	8.48	41.23
1.2	42	12.28	53.51
1.35	19	5.56	59.06
1.5	13	3.80	62.87
1.65	16	4.68	67.54
1.8	13	3.80	71.35
1.95	23	6.73	78.07
2.1	27	7.89	85.96
2.25	13	3.80	89.77
2.4	9	2.63	92.40
2.55	2	0.58	92.98
2.7	4	1.17	94.15
2.85	4	1.17	95.32
3	4	1.17	96.49
3.15	6	1.75	98.25
3.3	3	0.88	99.12
3.45	2	0.58	99.71
3.75	1	0.29	100.00
Total	342	100.00	

Table 5: Replacement ratios (based on y_2) for women unemployed over the whole survey period

y2	Freq.	Percent	Cum.
.3	1	0.29	0.29
.45	5	1.46	1.75
.6	18	5.26	7.02
.75	60	17.54	24.56
.9	28	8.19	32.75
1.05	29	8.48	41.23
1.2	42	12.28	53.51
1.35	19	5.56	59.06
1.5	13	3.80	62.87
1.65	16	4.68	67.54
1.8	13	3.80	71.35
1.95	23	6.73	78.07
2.1	27	7.89	85.96
2.25	13	3.80	89.77
2.4	9	2.63	92.40
2.55	2	0.58	92.98
2.7	4	1.17	94.15
2.85	4	1.17	95.32
3	4	1.17	96.49
3.15	6	1.75	98.25
3.3	3	0.88	99.12
3.45	2	0.58	99.71
3.75	1	0.29	100.00
Total	342	100.00	

9 Appendix B: Estimation Results

Table B1:

<i>Variables</i>	<i>MEN</i>		<i>WOMEN</i>	
<u>Selection equation</u>				
η_1	1.2497	(1.2628)	-0.6893	(1.5534)
η_1	-0.2679	(1.1486)	1.0561	(1.5569)
Age	0.1182*	(0.0598)	0.0869	(0.9283)
Age ²	-0.002094*	(0.008)	-0.002079	(0.00136)
Social activity	0.1692	(0.1463)	-0.1634	(0.1595)
House allowances	-0.1567	(0.2242)	-0.369	(0.2288)
Long Term unemp	-1.1595*	(0.1545)	-1.6075*	(0.203)
Having loans	0.159	(0.1499)	-0.026	(0.1588)
Financial Difficulties	0.1389	(0.1611)	-0.0604	(0.1968)
Mental distress	-0.1925	(0.21)	0.243	(0.1621)
Kids less than 3 years	-0.2762	(0.2474)	-0.2233	(0.2001)
Bad health	-0.5654*	(0.1978)	-0.3266	(0.3271)
Financial satisfaction	-0.2076	(0.1577)	-0.2919	(0.1782)
Not head of the household	-0.6697*	(0.185)	-0.9844*	(0.248)
Householder	0.2101	(0.1314)	0.0662	(0.1713)
Number of children	-1.7125	(1.0025)	0.0021	(0.9918)
Belgian nationality	-0.0566	(0.2288)	0.505	(0.3058)
Lower secondary school	-0.1388	(0.2602)	0.3889	(0.2942)
Upper secondary school	0.3141	(0.2646)	0.5007	(0.277)
High school	0.6324*	(0.2692)	0.4636	(0.3466)
University	0.5489	(0.2934)	0.8034	(0.5206)
Married	-0.2027	(0.1607)	0.4376*	(0.19)
Lone parenthood	-0.061	(0.1372)	-0.0108	(0.2416)
Additional child benefits	-0.2306	(0.3838)	-0.5183	(0.2967)
Living in Flanders	0.2282	(0.1805)	0.0118	(0.1689)

<u>Wage equation</u>				
α_1	9.7438*	(0.1251)	10.1338*	(0.1426)
α_2	10.5152*	(0.098)	10.698*	(0.1425)
Experience (# years)	0.2669*	(0.0582)	0.0375	(0.0791)
Squared experience	-0.4469*	(0.1628)	-0.1374	(0.2369)
Long term unemployed	0.0342	(0.0517)	-0.3131*	(0.045)
Part-time worker			-0.0337	(0.0874)
Responsibility	0.0094	(0.0558)	-0.0975*	(0.0464)
Previous work experience	0.0758	(0.0739)	-0.0797	(0.1083)

ρ	-1		0.8864*	(0.1073)
σ^2_ε	0.1106	(0.0005)	0.0759	(0.003)
P11	0.0429	(0.0232)	0.1042*	(0.0761)
P12	0.0368	(0.0197)	0.1702*	(0.0807)
P21	0.071**	(0.0359)	0.2754*	(0.0521)
P22	0.8492*	(0.0382)	0.4503*	(0.0726)
Number of cases	601		740	
Log-likelihood	-321.8926		-412.0017	

10 Appendix C: Figures

Fig. 1: Temporal evolution of "ratio"

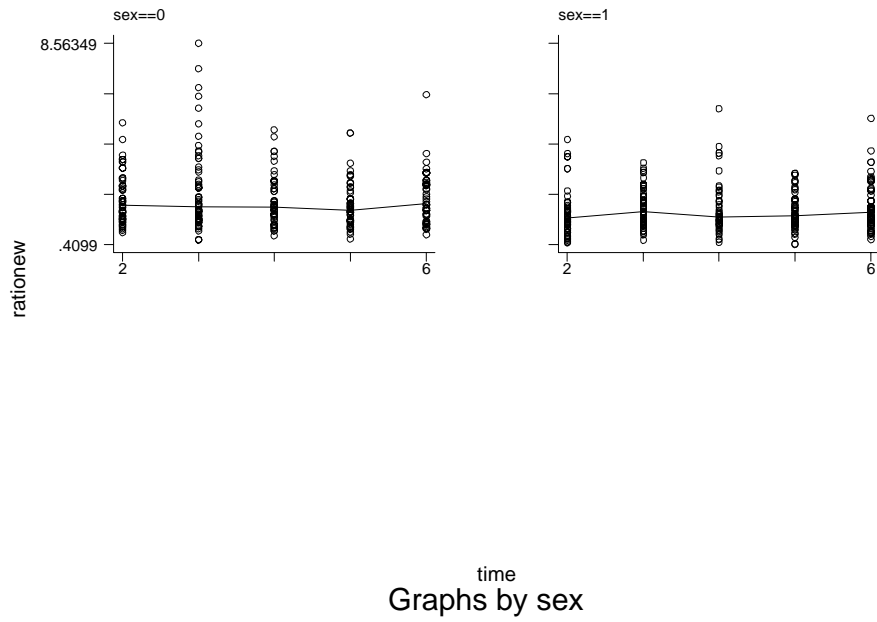
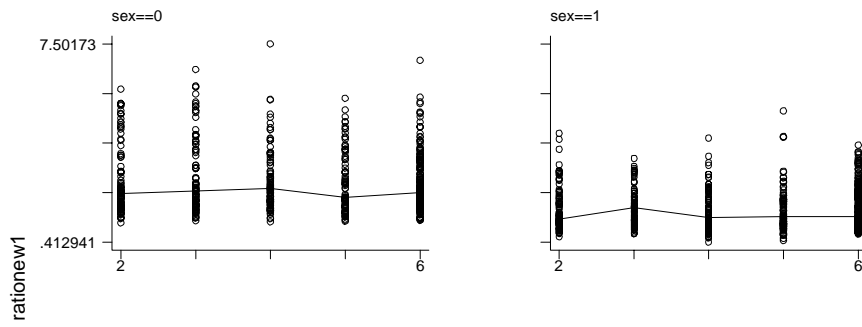
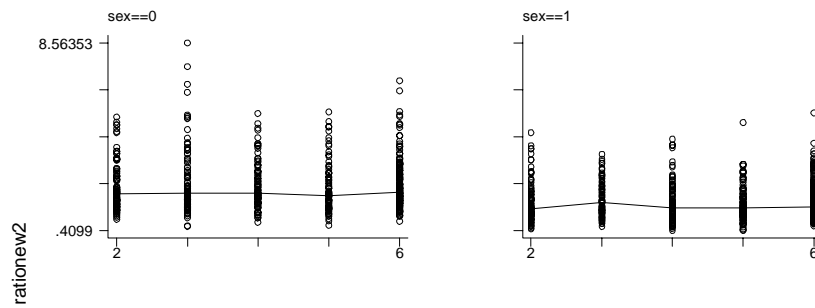


Fig.2: temporal evolution of "ratio1"



time
Graphs by sex

Fig. 2a : temporal evolution of "ratio2"



time
Graphs by sex

Fig 3: Replacement ratios for men using "ratio"

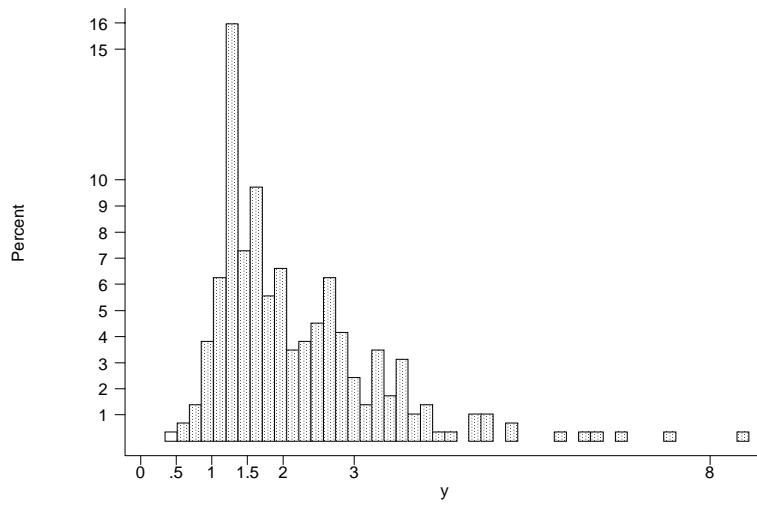


Fig. 4: Distribution of replacement ratios (ratio1) for men

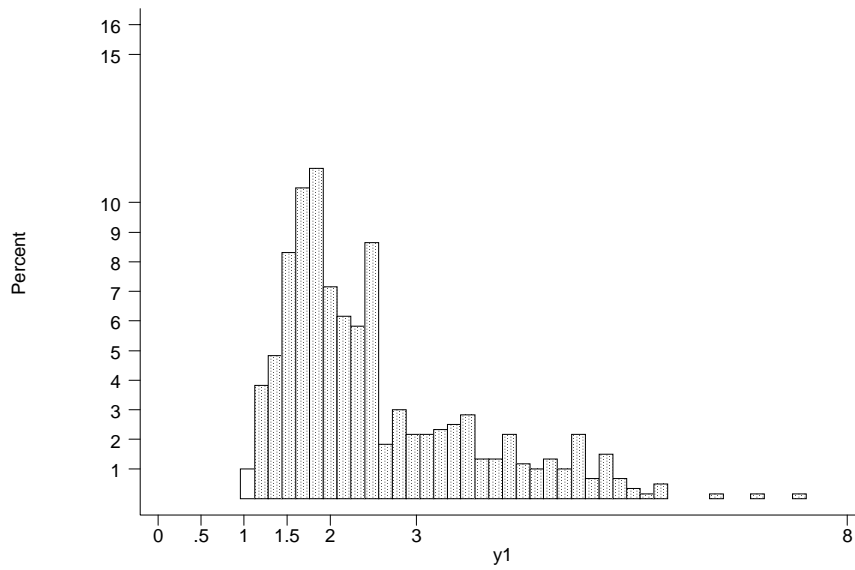


Fig 4a: Replacement ratios for men using "ratio1" and only for those not moving into employment

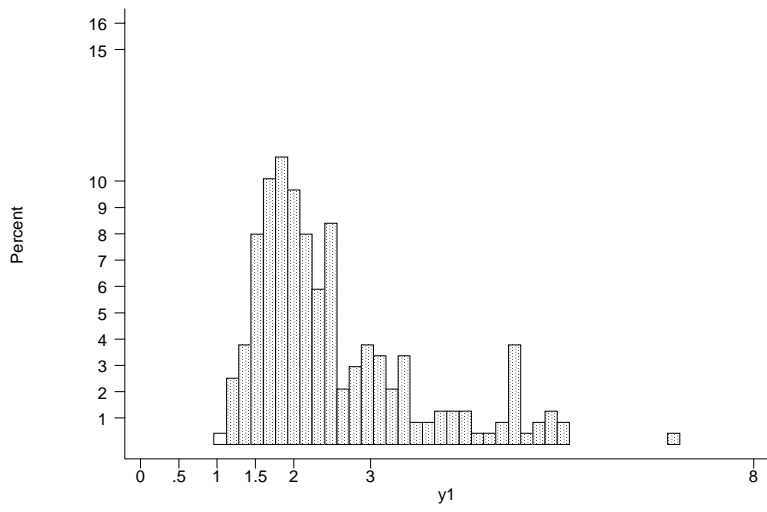


Fig. 5: Replacement ratios for men using "ratio2"

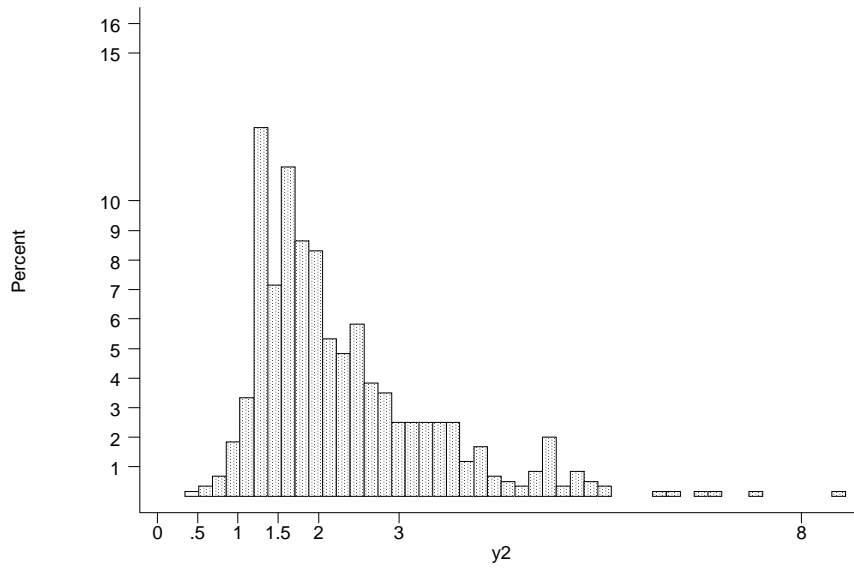


Fig. 6: Replacement ratios for men using "ratio2" for those staying unemployed over the whole survey

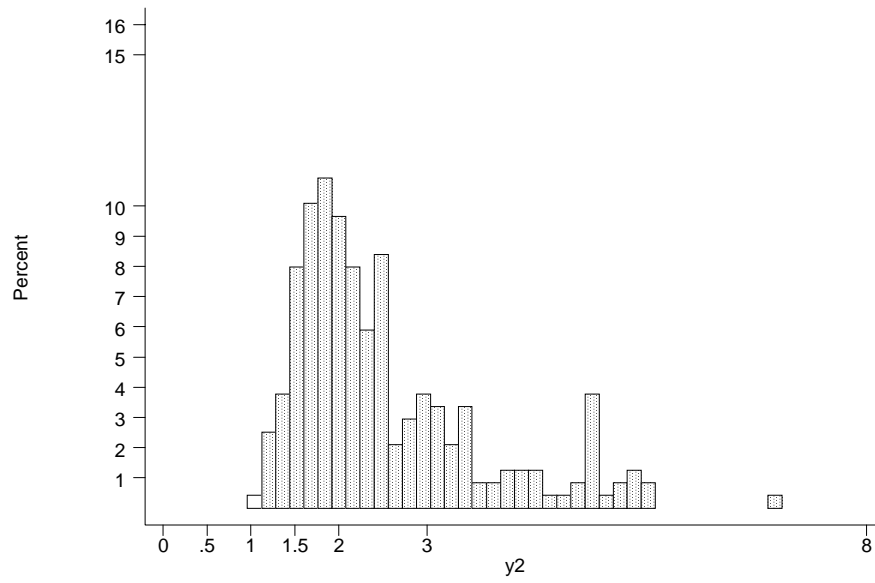


Fig 7: Replacement ratios for women using "ratio" (y)

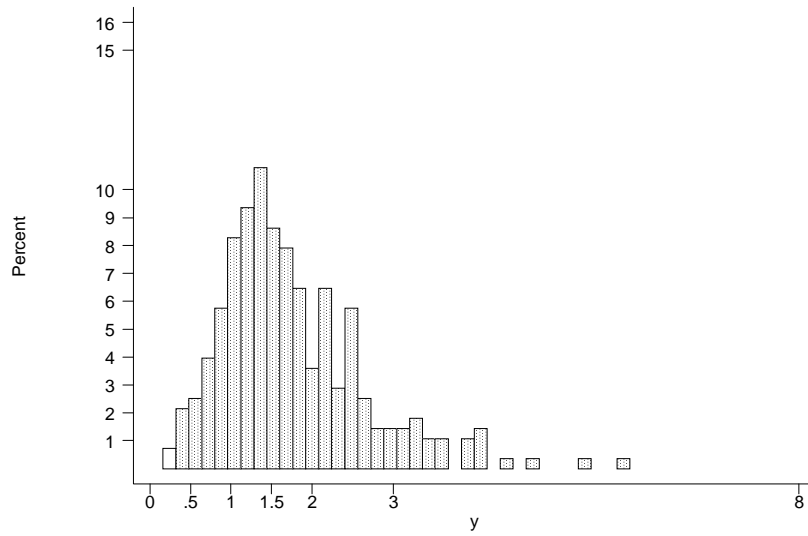


Fig. 8: Replacement ratios for women using "ratio1"

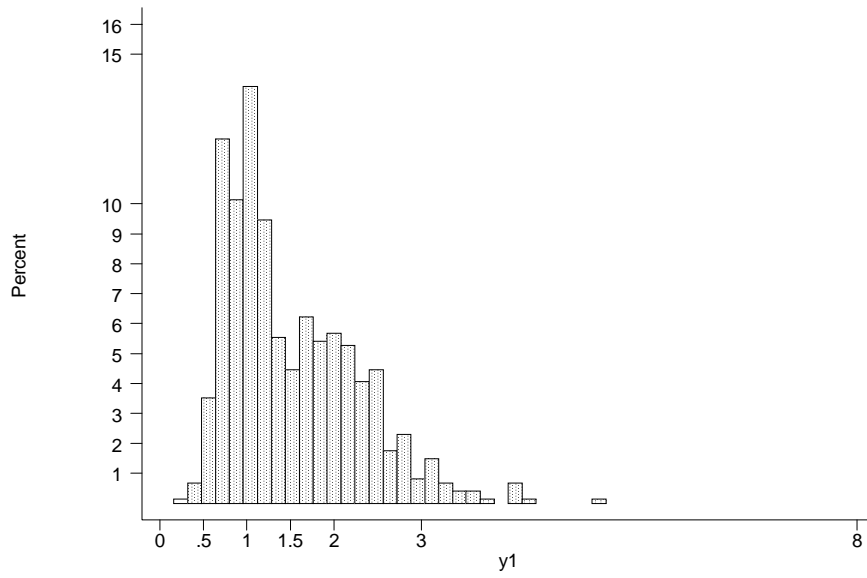


Fig. 9: Replacement ratios for women using "ratio1" if trans=0

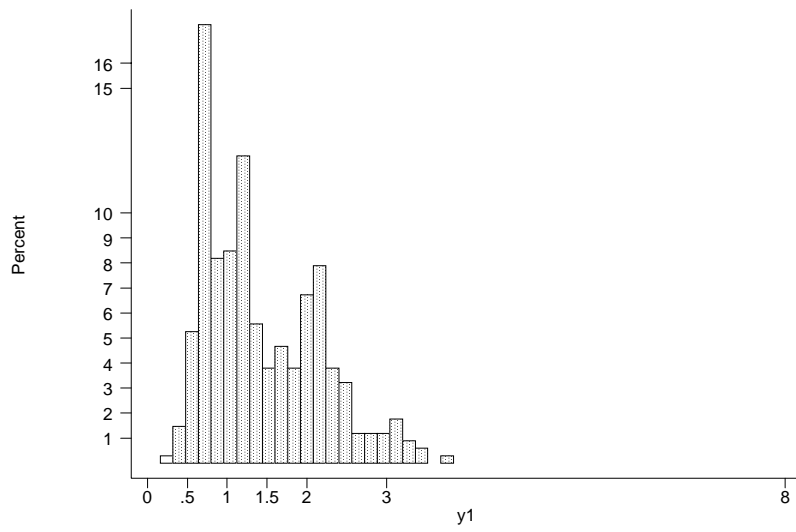


Fig. 10: Replacement ratios for women using "ratio2"

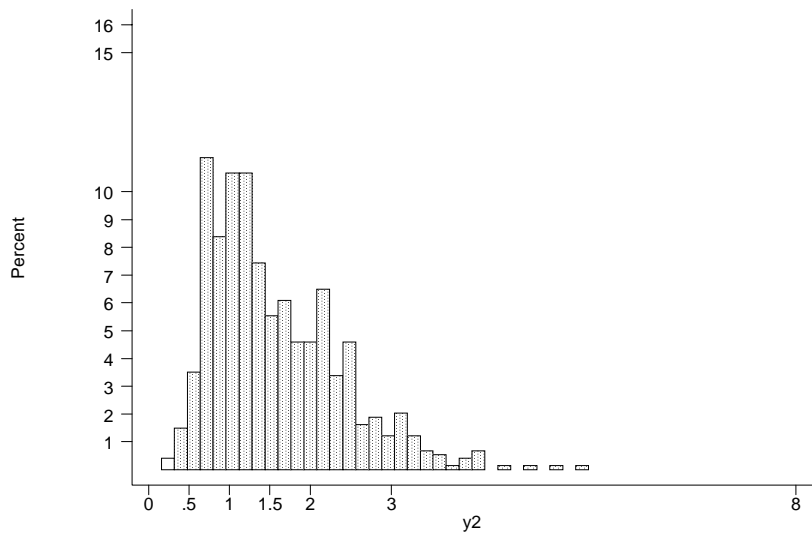


Fig. 11 Replacement rates for women using ratio2 when unemployed

