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Abstract

This paper analyzes a labor market program which enables workers to leave employment temporarily with a compensation financed by the taxpayers. The main aim of the program was to increase the chances of the unemployed finding a job. However, the empirical analysis reveals a clear negative relationship between the unemployment rate and transition rates from employment into the paid leave scheme. Program participation is low, precisely in those labor market states, where the scheme has a potential to perform as a remedy by increasing the transition rate from unemployment to employment. Several possible explanations are discussed.

1 Introduction

The European unemployment problem has increased interest in a variety of labor market programs which have the potential to improve the performance of the labor market. Consider a labor market scheme which enables workers to leave employment temporarily for child caring or education, and during which the participants are paid compensation by the government. At face value, such a scheme could, in a period of high unemployment, increase the chances of the unemployed finding a job, while the voluntary participation in the program would either enhance welfare in the case of child care or increase productivity in the case of education. The following offers both a theoretical and an empirical analysis of such a scheme, which was enacted by the Danish government in 1994.

The program was intended to be temporary and alleviate the unemployment problem at a severe cyclical trough where the number of unemployed workers reached a hitherto unseen level. However, the program became immediately a considerable success, in the sense that an unexpectedly large number of workers chose to participate, and in the sense that the program has gained so much support in the general public, that it has been impossible to abandon it.

For economists outside the Scandinavian laboratory of welfare programs, an analysis of this program is interesting in its own right to the extent that it provides new insight in the functioning of the labor market. Moreover, such an analysis could be of interest in thinking about the implementation of other labor market programs.

The analysis in the present paper could have direct relevance for similar schemes, as leave programs of various types have been implemented in different countries. In the US, the Family and Medical Leave Act opens up the opportunity for leave in connection with childrearing after birth and care of family members with serious health conditions (Public Law 103-3 of 1993). An eligible employee is entitled to a total of 12 workweeks of leave during any 12-month period. In Europe, minimum provisions for parental leave in connection with childrearing are contained in an EU directive (Council directive 96/34/EC of 1996 on framework agreement). Male and female workers in Europe have the right to parental leave for at least three months until a given age up to 8 years (to be defined by Member States). Both the American and the European scheme require that the employer restore the employee in the position of employment. Neither of these schemes contain provisions for financial compensation during leave.

A further step in the development of such leave programs is the introduction of publicly

financed compensation during the leave. Publicly financed parental leave after the expiry of maternity leave exists in several European countries. Besides the Scandinavian countries, Austria, Belgium, France, Italy, and Germany have a variety of such schemes.[1] Some of these schemes have several traits in common with the ones analyzed in the present paper. More generally, the present contribution might have relevance for analyses of different schemes involving public support to non-market activities for employed workers.[2]

The main aim of the analysis is to investigate the determinants of the decision to participate in the program. As the topic for investigation is a scheme which has been in force for some time, it is not necessary to confine the analysis to theoretical considerations; data exists for the behavior of workers. In the empirical section, the consequences of labor market tightness for program participation are investigated. Data on program participation and unemployment rates in different unemployment insurance funds are used for this purpose. There is substantial variation in both program participation and unemployment rates in the unemployment insurance funds attached to the Danish trade unions. The evidence from the analysis is that program participation is low when the unemployment rate is high, while a tight labor market seems to attract more participants into the paid leave scheme. I.e., program participation is low precisely in those labor market states where the scheme has the potential to perform as a remedy by increasing the transition rate from unemployment to employment.

The paper then considers the possible reasons for this empirical phenomenon. First a search theory explanation is offered, where the re-employment probability after program participation plays a central role. A temporary absence from the workplace could be considered less risky when the threat of replacement by another worker is small. The aim is to construct the simplest possible theoretical model in the search framework, such that it becomes possible to analyze the determinants of program participation.

The search explanation assumes homogeneous workers. This assumption is then relaxed, and various assumptions about how worker heterogeneity can help explain the observed participation pattern are discussed. One possibility is that workers chose the paid leave scheme as a substitute for unemployment in tight labor markets.

The next section takes a closer look at the paid leave programs and at the data used in the empirical analysis. In section (3) the results of the empirical analysis of program

[1] European Industrial Relations Review, November 1995.

[2] A recent example is the Norwegian 'cash support' scheme ('kontantstøtte'), according to which Norwegian parents who do not send their children to kindergartens are paid about 6000 US dollars a year. This scheme went into force in August 1998.

participation are presented. The remaining sections of the paper contain attempts to explain the observed empirical pattern. In section (4) a search explanation is offered under the assumption that workers are homogeneous. This assumption is relaxed in section (5) where different variants of heterogeneity of workers are considered. Section (6) concludes.

2 The schemes and the data

Several types of paid leave schemes were enacted in 1994 in order to reduce the unemployment rate. In order to enable the reader to assess the empirical results, it is necessary to take a closer look at the different schemes and at the data collected to evaluate the impact of the schemes.

The present empirical analysis concentrates on the relationship between participation in the scheme and the unemployment rate. As participation in the schemes involves a payment of compensation to the participants, participants are registered by the Danish labor exchange authorities, which administer the schemes. Statistics are produced with participation broken up into different categories. For the present analysis, the statistics on participation according to affiliation with the different unemployment insurance funds are of special interest. Membership in an unemployment insurance fund is a prerequisite for participation in several of the schemes.

The unemployment insurance funds, which administer unemployment benefits in Denmark, are affiliated with the different trade unions in the heavily unionized Danish labor market.[3] The trade unions and the 34 unemployment insurance funds have broad coverage within the Danish labor market.[4] Unions in Denmark were formed according to skill as opposed to industrial affiliation, and some of the observations actually contain workers with a very narrowly defined skillbase. There is, for example, a union for nurses and a union for unskilled female workers. However, in recent years there has been a surge of mergers of unions, partly along the lines of industrial affiliation. This implies that there is some question regarding the extent to which the members of some of the larger unions belong to the same labor market, and to what extent the unemployment rate for those

[3]The unemployment insurance funds are, in principle, private organizations under public surveillance, but have very close connections with the trade unions. The fee for membership of unemployment insurance funds is fixed by the state and the marginal expenditures on the paid leave program is financed by the state out of general revenue.

[4]About 80 percent of Danish workers are members of trade unions.

unemployment insurance funds is a reliable indicator of the labor market opportunities for all workers in those unions.

The paid leave schemes comprise three main groups, one for child care, one for education and one for 'sabbatical' leave, where the child care scheme can be broken up into two sub-schemes. The child care schemes in Table 1 supplement the ordinary parental leave scheme after the birth of a child.[5] The provisions regulating participation in the schemes differ in several important aspects; an overview of the main dimensions of the schemes can be obtained from Table 1.

[Table 1. *Dimensions of paid leave schemes* about here]

Participation can be restricted to previously employed workers, as opposed to the case where both employed and unemployed workers can enter the scheme. With respect to leave for the purpose of taking care of children, employed workers with a child below 1 year old have a right to half a year paid leave, and a right to 13 weeks of paid leave if the child is between 1 and 8 years old (henceforth: the 'parental right' scheme). Paid leave for employed workers beyond these durations has to be with the consent of the employer in the form of a written agreement between the employer and the employee (henceforth: the 'parental negotiated' scheme). The case of parental leave where there has to be an agreement with the employer is described in the second column of Table 1. This scheme is oriented towards both employed and unemployed. The maximum duration of paid leave for child care is one year, while the minimum duration of the paid leave period for child care is 13 weeks.[6]

In the leave scheme for educational purposes, participants who enter the scheme from employment must obtain the consent of their employer. This is also the case for the sabbatical leave scheme, where only employed workers are eligible. For the sabbatical leave scheme the employer has to declare that the job of the worker on sabbatical leave has been filled with a new worker who had previously been among the long-term unemployed.

[5] The ordinary leave provisions after births grant an allowance corresponding to the maximum unemployment benefit for half a year for the father and mother combined. This is mainly a maternal leave scheme combined with some options for the father. Parents can participate in the paid leave schemes described in Table 1 irrespective of the length of leave in the earlier leave scheme. The provisions of this earlier leave scheme and the participation pattern of this scheme is *not* discussed in the following. The data for parental leave analyzed in the present paper is data for participation in excess of the basic leave provision on half a year after the birth of a child.

[6] A condition for paid leave for child care is that a child of age 0-2 does not attend the expensive and heavily subsidized day nurseries and kindergartens. A child of age 3-8 can at most attend half time subsidized day care.

The compensation to the workers on paid leave was initially 80 percent of the maximum unemployment benefit, except for the educational leave scheme which had a compensation ratio of 100 percent.[7] In order to reduce the large inflow into the schemes, the compensation was reduced to 70 percent starting in 1995 and further reduced to 60 percent in 1997. The exception is the educational leave scheme which continues to have a compensation of 100 percent of the maximum unemployment benefit level. The justification for this exception is that this particular scheme furthers human capital accumulation and productivity.[8]

The analysis in the present paper is confined to the decision of employed workers to participate in the paid leave schemes. This subject is the most relevant, given that the goal of the program was to increase the chances of unemployed workers finding a job. Furthermore, employed and unemployed workers are in different choice situations which entails that an analysis of the participation of unemployed workers would demand a separate analysis.

The inflow rate for employed female members of the unemployment insurance funds into all of the paid leave schemes combined was one percent per quarter, calculated as an unweighted average in the first year of the existence of the schemes (see Table A1 in the appendix). The most popular scheme among females was the parental right scheme; 0.46 percent of employed females went on leave on this scheme each quarter during 1994. The average transition rate for male workers was less than half of the rate for female workers, and the educational leave scheme was the most attractive for males. There was considerable dispersion in inflow rates across the different unemployment insurance funds, which is clear from the figures in Table A1 on the minimum, median and maximum values of the transition rates.

There is also a substantial variation in unemployment rates across unemployment insurance funds in 1994, for example, the lowest unemployment rate was 0.3 percent while the highest was 34.1 percent.[9] Unemployment rates among insured workers are higher than the unemployment rates, where labor force participation enters as a denominator, because workers with a higher risk of unemployment have a higher propensity to enter an unemployment insurance fund.

[7] The maximum unemployment benefit level in 1999 is about 140,000 Danish kroner a year, which amounts to approximately 20,000 US dollars.

[8] The compensation ratios in Table 1 enter in the subsequent analysis as explanatory variables. A more precise measure for the attractiveness of the paid leave schemes would have been a compensation ratio, where the wage or income level of the workers in the different unions or unemployment insurance funds entered as the denominator. However, there are no official statistics on wage or income levels in the different unions or unemployment insurance funds.

[9] The 34 unemployment insurance funds cover all workers with unemployment insurance.

In the following, we examine the connection between the variation in the transition rates to the paid leave scheme and the unemployment rate in the different unemployment insurance funds. Besides the substantial cross-sectional variation, it is seen from Table A1 that the decrease in unemployment rates over the sample period also generates a longitudinal variation, although the variation in unemployment rates in this dimension is of a smaller magnitude than the cross-sectional variation.[10]

It is likely that for some employed workers, transition to the program is considered an alternative to leaving the labor force or becoming unemployed. Hence, the regulations of relevance for transitions from employment might be relevant in evaluating the impact of the paid leave scheme. A worker who voluntarily quits a job is not eligible for unemployment benefits for a 5 week period; eligibility is conditional on a declaration from the employer that the worker has been layed-off. The general impression is, that it is not overwhelming difficult for workers to persuade employers to declare that a separation is due to a lay-off when a match dissolves. Participants in the parental leave scheme with a right to participate are protected against dismissal. The rest of the schemes demand the consent of the employer, in the sense that the employer and the employee have to reach an agreement about the conditions of the return of the employee. Such an agreement does not neccessary include a promise from the employer that the employee has the right to return to work. However, it is questionable how much a right to return to a work-site is worth in the subsequent career, as formal rules about employment protection on the Danish labor market are virtually absent.[11]

Despite the lack of employment protection and despite the comparatively low compensation level by Danish standards, the paid leave schemes continue to have a considerable attractiveness for workers. In 1997, the number of full time equivalent workers (from both employment and unemployment) who participated in the paid leave schemes constituted 1.6 percent of the work-force. It is worth noting that the unemployment rate according to the ILO definition came down to a level of 5.6 percent in the last quarter of 1997. The 1.6 percent of the work-force on paid leave were, on average, paid about 80 percent of the maximum unemployment benefit in compensation.

[10] The variation in unemployment rates across regions is also considerably less than the variation across unions, as Denmark is a small, homogeneous and densely populated country. An analysis of the relationship between paid leave participation and unemployment across regions does not give as clear results as those presented in the present analysis.

[11] According to average ranking of different indices in OECD (1994), p. 74, Denmark has the least strict protection laws of the OECD countries in Europe. For a closer discussion of employment protection in Denmark, see, for example, Albæk, Audenrode, and Browning (1999).

3 Paid leave participation and labor market tightness

We now investigate whether workers are more inclined to participate in a paid leave scheme when the labor market is tight. The data for the empirical analysis are the quarterly observations on inflow rates to the paid leave scheme in different unemployment insurance funds or unions.

In order to convey an impression of the covariation between inflow into the paid leave schemes and the state of the labor market, a plot of the female inflow rates and unemployment is contained in Figure 1. The inflow is the total inflow rate, i.e., the sum of the inflow rates of the four schemes. The inflow rates for the quarters are added up to yearly rates, and an average is taken over the four years in the sample period. The unemployment rate is the average of the quarterly rates in the different unemployment insurance funds in the sample period.

[Figure 1. *Female transition rates* about here].

There are no observations present in the North-east corner, and only smaller circles come close to the South-east corner. The magnitudes of the circles signify the size of the unemployment insurance funds as measured by the number of employed females. Many of the observations are not far from the average unemployment rate of 12 percent, but a sufficient number of the larger unemployment insurance funds are so far from the average unemployment rate, that the figure documents a clear negative cross-sectional relationship between paid leave participation and the unemployment rate.

Furthermore, Figure 1 indicates that the magnitude of variation in participation is substantial. In the unions with the highest propensity to participate, close to one out of 10 workers enter one of the schemes per year (under the assumption that each worker enters only one of the schemes per year). These unions have very small unemployment rates, while members of the unions with high unemployment rates have much smaller transition rates. For all the unions with unemployment rates above 10 percent, between one out of 50 to one out of 25 of the workers enter one of the schemes per year.

The position of the circles indicates that a non-linear relationship will give the best approximation to the conditional expectation function. The line in the Figure consists of the predicted values from a regression of the inflow rates on the logarithm of the unemployment rates, where the number of employed females in the insurance funds have been used

as weights. This regression performs well according to a standard statistical evaluation.[12]

The unemployment rate, which enters in Figure 2 and in the subsequent analysis, is the combined unemployment rate for male and female workers in the different unemployment insurance funds. The line of reasoning is that the unemployment rates in the different funds indicate the labor market opportunities of the members irrespective of the gender of the member. The application of gender-specific unemployment rates causes problems in unweighted regressions, as some of the unemployment insurance funds contain very few male or female workers. However, transitions are analyzed separately for male and females workers, as their propensity to participate is different. This is clear from the sample statistics in Table A1 in the appendix.[13]

The statistical model for participation in the four paid leave schemes is different variants of

$$q_{it} = \beta \ln u_{it} + \gamma \ln c_t + \alpha_i + \varepsilon_{it}, \tag{1}$$

where q_{it} is the transition rate in insurance fund i in quarter t, u_{it} is the unemployment rate in the unemployment insurance fund, c_t is the compensation ratio in the paid leave schemes displayed in Table 1, α_i is an intercept term, and ε_{it} is the error term.

However, higher transition rates from employment to the program state might increase transitions from unemployment to employment and thus could diminish the unemployment rate (this was actually the intention of the program: so another possible interpretation of the relationship in Figure 1 is, that the program has been successful in reducing unemployment). As the left-hand side variable of (1) might affect a right-hand side variable, a simultaneity bias could be present. An expression for the bias of the ordinary least square estimator of the coefficient on the unemployment rate is calculated in Appendix A. The bias is negative when β is zero. Thus, if no correction for the simultaneity bias is made, one risks drawing the erroneous conclusion that high unemployment leads to low program participation, when there in fact is no connection present.

In order to correct for the simultaneity bias, instrumented versions of (1) are reported where lagged unemployment rates are used as instruments. Lagged unemployment is a valid instrument if there is sufficient persistence in unemployment, and if lagged unemployment

[12] The coefficient to the log unemployment rate takes the value -1.436 with a standard error of 0.300, the Root Mean Squared Error is 1.426 and the R-squared is 0.424.

[13] The negative correlation between paid leave inflow rates and unemployment was first noted in Hansen and Knudsen (1996).

is uncorrelated with the error term in (1) (for a formal statement see Appendix A). The equations reported in what follows are instrumented with the unemployment rate lagged up to four quarters.[14]

Table 2 reports regression results of estimating equation (1) for female workers. The regressions are weighted using the number of employed females in the different unemployment insurance funds.[15]

[Table 2. *Inflow, females* about here].

According to the pooled sample estimates of the quarterly transition rates in Table 2, panel A (i.e. a common intercept $\alpha = \alpha_i$), there is a strong negative relationship between unemployment and the inflow to the parental leave scheme where workers do not have to get a permit from the employer to participate. In this case, the estimated coefficient on the unemployment rate is highly significantly different from zero. In order to assess the magnitude of the impact of unemployment on participation into this scheme implied by the point estimate of -0.173, note that a reduction of the unemployment rate by 50 per cent would result in an increase in the quarterly transition rate of 0.12 per cent (the point estimate multiplied by $\ln 2 \approx 0.7$). This is perhaps not a particularly alarming magnitude when the unemployment rate is reduced from a high level, but it translates into substantial increases in program participation when full employment is approached in a particular segment of the labor market.

In contrast to the first parental leave scheme, workers who wish to enter the scheme displayed in the second column of Table 2 have to get a permit from their employers. The coefficient on the unemployment rate is negative and significantly different from zero, but the magnitude is much smaller than for the first child care scheme. One interpretation of this result is that the employers are inclined to deny the permit to participate in the negotiated child care scheme, if it is difficult to get a substitute for the worker who wishes to go on paid leave. As substitutes are difficult to find in a tight labor market, the presence

[14] There is no major differences between the instrumented versions of the equations reported in the text and the ordinary least squares versions. The auxiliary regression of the unemployment rate on the unemployment rate lagged up to four quarters gives an R-square value of 0.98. The persistence in unemployment is so strong that a picture very similar to the one in Figure 1 emerges when the average transition rates are plotted against the unemployment rates for 1993, the year before the introduction of the paid leave schemes. The statistics of association are also very similar.

[15] The quarterly transition rates do not exhibit any noticeable seasonal pattern according to the significance level of quarterly dummies when these are included in the regressions. Quarterly dummies have consequently been omitted in the results presented.

of employer consent weakens the relationship between paid leave scheme participation and unemployment.

Workers who wish to enter the sabbatical leave scheme displayed in Table 2, column 3 also have to get a permit from their employers. In this case, the employer consent seems to have broken the relationship between program participation and labor market tightness, in the sense that the estimated coefficient for unemployment is not significantly different from zero.

The compensation levels for both of the child care schemes and the sabbatical leave were reduced in two steps (see the details in Table 1). Consequently, the compensation rate enters in these equations, and the results are positive coefficients. The coefficient of the sabbatical leave scheme is significantly different from zero, while the coefficient of the parental negotiated leave scheme is on the borderline of significance. To assess the magnitude, consider the sabbatical leave scheme where the point estimate is 0.5. With this coefficient, the predicted effect of the reduction in compensation level from 80 percent to 60 percent of the maximum unemployment benefit level is a reduction in the quarterly inflow rate of 0.14 percentage points. This was actually the degree of female participation in the sabbatical leave scheme during the first year, when the compensation level was 80 percent, while the inflow rate was close to zero during the last three quarters of 1997, where the compensation level dropped to 60 percent, see Appendix, Table A1. According to the point estimates in Table 2, the reduction of the compensation level had a somewhat smaller impact on inflow to the parental leave scheme, which had to be negotiated with the employer, and a substantially larger impact on the parental leave scheme, where the worker had a right to participate.

It could be worthwhile to pay attention to the fit of the parental right scheme, which, according to the values of the R-squared statistics, is twice as good as the fit of the negotiated child leave scheme and the sabbatical leave scheme. Exactly the same explanatory variables are used in these three equations and one of the phenomenons that could generate a better fit of the parental right scheme, might be a larger responsiveness to the tightness of the labor market, as opposed to the other two schemes, where employer consent in required in order to enter the schemes.

In the equation for the educational leave scheme in Table 2, column 4, only the unemployment rate enters as an explanatory variable, as the compensation level was 100 percent of maximum unemployment benefit level throughout the sample period. Again an inverse relationship between the inflow rate and the unemployment rate comes forth with a

coefficient highly significant from zero. The coefficient has about the same size as the one for the parental right scheme. As entrance in the educational paid leave scheme requires the consent of the employer, this result could be taken as evidence against the story that employer consent weakens the relationship between labor market tightness and paid leave participation.

However, while it is difficult to imagine any direct effect on worker productivity as a consequences of participating in the first three schemes, the educational leave program has the potential to enhance human capital and worker productivity in the work place. This does not necessarily generate a systematic participation pattern across labor market states, but to the extent that the purpose of the education during the paid leave is relevant for the work place, it is conceivable that employers are more willing to give their consent in a tight labor market with rapid restructuring in the work place, such that the upgrading of the skills of the work force is financed by the tax-payers through the educational leave scheme.

An alternative to the parametric evidence for association between paid leave participation in the different schemes and unemployment rates is to calculate nonparametric statistics like Spearman´s rho and Kendall´s tau. The evidence presented in Table 2 rests essentially on a measure of the strength of the linear association between transition rates and the log of the unemployment rates. In contrast, the nonparametric statistics only measure the association of the ranking between program participation and unemployment, but a disadvantage in this context is that they are sensitive to random variation in program participation in the smaller unions (in contrast to the statistics from the weigthed regressions).

The average inflow rates for all schemes combined shown in Figure 1 is associated with the unemployment rates on a significance level of 3 percent according to the Spearmen and Kendall measures. The association between the transition to the parental right scheme and unemployment is so strong, that the hypothesis of no association is rejected on the 0.3 significance level. But for the rest of the schemes the nonparametric statistics show no significant relation between transition rates and unemployment. This could be taken as further evidence for the hypothesis that employer consent reduces the relationship between program participation and labor market tightness.

While the equations in the pooled sample estimation in Table 2, panel A, reflect both the cross-sectional and the time-series variation in the data, the cross-sectional variation is removed from the equations reported in Table 2, panel B, and the parameters reflect only

the time-series variation in the data over the 4 years of estimation (i.e., an intercept term α_i is estimated for each trade union). The results are obtained by including dummies for each of the unemployment insurance funds, which should capture any differences, that are constant or fixed during the estimation period, in the propensity to participate in the paid leave schemes between employed members of the unemployment insurance funds.

The results for the two parental leave schemes and the sabbatical leave scheme seem, at face value, to be somewhat at variance with the hypothesis of an inverse relationship between program participation and the unemployment rate. The coefficient of the unemployment rate in the two parental schemes and the sabbatical scheme are positive but not significantly different from zero. With respect to the compensation level, none of the coefficients are significantly different from zero. The compensation enters with a reasonably high coefficient in the parental right scheme, but with smaller values in the parental negotiated scheme and the sabbatical leave scheme. According to the size of the point estimate for the compensation level for these two schemes, the reduction in the compensation level had only a minor role in explaining in the substantial decrease in the propensity to participate in these two schemes. However, it should be noted that the unemployment rate decreased from an average of 12.0 per cent in 1994 to 7.5 per cent in the last three quarters in 1997, see Appendix, Table A1, and during this period both the compensation level and the inflow rates to the schemes also decreased. It is therefore questionable, if it possible to disentangle the time-series variation in the inflow rates into reasonably precisely separate effects from the variation in the unemployment rate and the variation in the compensation level.[16]

In the educational leave scheme, unemployment shows a large negative coefficient in the time-series dimension. As the level of compensation in this scheme was unaltered during the period of estimation, the problem of co-movement between unemployment and compensation rate is not present in this case.[17]

After the discussion of the female participation in the paid leave schemes, described in Table 2, we turn to the equivalent results for the male participation in the paid leave

[16] A standard procedure which aims at evaluating the extent to which correlation between the explanatory variables affects the precision of the estimates is an auxiliary regression, in this case a weighted regression of the log of the unemployment rate on the log of the replacement rate and union dummies. The result is an R-squared of 0.975, which indicates a high degree of correlation between the explanatory variables.

[17] In this case a GLS estimate of the parameters might be of interest as an alternative to the OLS estimate in Panel A. As there are considerable differences between the within and the between estimates for the other schemes, a random effects procedure makes less sense in these cases, and the results are consequently not reported.

schemes, which are displayed in Table 3. Male participation in the schemes was lower than the female participation, especially in the parental leave schemes but also in the educational leave scheme, see Appendix, Table A1.

[Table 3. *Inflow, males,* about here].

The lower participation rates show up in smaller constant terms in Table 3 compared to those for females in Table 2. The pooled sample estimation in Table 3, panel A, gives the same qualitative results as those for females, an inverse relationship between transition rates and the unemployment rate, which is significantly different from zero for the parental right scheme and the educational leave scheme. Furthermore, there is now a significant reduction in the inflow for two of the schemes as a result of the lowering of the compensation rate. However, it is not only the constant terms that are smaller for males, all the other coefficients in the pooled sample estimation are numerically smaller than for females, indicating a smaller response in inflow rates for males when the labor market state or the compensation level changes.

The results for the fixed effects estimation for male workers in Table 3, panel B, essentially mirrors the fixed effects results for females in Table 2, panel B. The unemployment rates now show a positive sign, that is insignificantly different from zero, for the three schemes that have experienced a reduction in the compensation level, while the coefficient for the compensation level drops to a very low level in two of the three cases. For the educational scheme, which had the same compensation level throughout the sampling period, unemployment comes out with a negative coefficient that is significantly different from zero.

In the foregoing analysis, the sign of the coefficient for unemployment becomes positive, when fixed effects are introduced in the equations for the three paid leave schemes, where the compensation level was diminished during the sample period. This was the case both with respect to the results for females in Table 2 and the results for male workers in Table 3. It was mentioned that problems with the separate identification of the effects from unemployment and compensation level in the time-series dimension were to be expected because of the substantial correlation between these two variables during the sample period.

Another phenomena that could cause problems in the time-series dimension is substitution between the schemes. Some of the participants have the option to enter several of the schemes, and the decline in the compensation level for the other schemes might have

caused a shift towards the educational leave scheme.[18] Eligibility to the programs vary, which means that individuals that consider participating in one of the programs might or might not have the choice to enter one of the other programs. With the type of data analyzed in the present paper, it is difficult to see how it should be possible to quantify the degree of substitution between the different programs without imposing strong and arbitrary assumptions on the data.[19]

Besides the consequences of the covariation in the time series dimension of the unemployment rate and the compensation level, movements in the time series dimension of variables not included in the analysis might cause differences between the estimates in the cross-section and the time-series dimension. For example, during the estimation period there has been a considerable growth in the supply of day care institutions: in January 1993 33.7 percent of children aged 0-13 attended public subsidized day care institutions while this had risen to 41.6 percent by January 1998. One would expect this to reduce the inflow over time into the parental leave schemes to the extent that some parents participate in these schemes because they cannot get a place in a day care institution. This phenomenon would affect the measured influence of tightness on participation in the parental leave schemes in the time series dimension, but is not expected to affect the estimate in the educational leave scheme.

However, about half of parental leave takes place concomitant to maternal leave, i.e., before the first birthday of the child, and the figures for this age group seem at variance with the hypothesis that parents should be constrained in the choice because of lack of day care places. The share of children of age zero attending public supported day care dropped from 19.7 percent to 18.0 percent from January 1993 to January 1994, the first month of the existence of the paid leave schemes, and further down to 14.3 percent in January 1995. For 1996 the figure was 13.3 percent, but then it increased from 13.7 to 16.8 percent from January 1997 to January 1998, when the compensation level was reduced from 70 to 60

[18] To date, participants in the educational leave scheme have not be required to enter a full-time educational program. It is possible to enter a very wide variety of different educations, although the rules have been changed somewhat with the intention of limiting the participants to entering educational programs with a labor market relevance.

[19] With the present specification of the equations, substitution towards the educational leave scheme will result in a positive error term in this equation and a negative error term in the other equations. This line of thought could lead to the consideration of an estimation strategy using the seemingly unrelated regression equations methodology. The result of such an exercise is that there are some efficiency gains from the application of the SURE method, but in general the coefficients do not change much. If micro-data had been present, it is conceivable that it would have been possible to take a closer look at the choice to enter one scheme instead of another.

percent of the maximum unemployment benefit level. These figures seem to indicate that the parental leave scheme actually reduced the demand for public subsidized day care for children of age zero and that parents were not constrained in their choice by the supply of day care places.[20]

This section has documented a clear negative relationship between the unemployment rate and program participation in the cross-sectional dimension, while the evidence from the time-series dimension is more mixed. However, the differential development over time in the attractiveness of the different schemes does not distort the relationship in the cross-sectional dimension: when transition rates for all schemes combined are plotted against the unemployment rate, pictures similar to the one in Figure 1 emerge for all quarters in the sample period. The evidence presented from this empirical analysis on narrowly defined segments of the labor market with a rather extreme variation in unemployment rates is, that paid leave schemes are especially attractive to groups with low unemployment rates.

4 A search explanation

In this section an explanation for the observed empirical phenomenon is offered in the context of search theory. After introducing some notation an intuitive argument is presented followed by a more precise analysis. The formal part will be limited to the most simple one that is necessary in order to analyze the phenomenon under investigation. The analysis is conducted under the assumption of homogeneous workers, but this assumption is relaxed in the next section.

The program entails that a third state is opened up on the labor market in addition to employment and unemployment. The three states are labeled N (employment), U (unemployment), and P (paid leave, program). The uppercase letters of the states N, U, and P will, in the following, denote both the names of the states and the value of occupying the states. An overview of the transitions between the three states can be obtained from figure 2.

[20] Finally, it could be questioned to what extent unemployment is the right variable to capture labor market tightness. Another option for potential participants is to look at the transition probability from the paid leave scheme to employment, relative to the transition probability from unemployment to employment. However, an obstacle for both the potential participants and the researcher is, that there are no official statistics on transition rates among different labor market states of the Danish labor market.

Figure 2 about here

Transitions from employment to unemployment take place as a consequence of the exogenous job destruction rate or worker displacement rate δ, while the search for jobs determines the transition rate s from unemployment to employment. During employment workers are paid the wage level w and enjoy the instantaneous utility level $v^n(w)$, while unemployed workers receive the benefit level b, which gives rise to the instantaneous utility level $v^u(b)$.

In the new program state, the participants get the compensation level c which is associated with the instantaneous utility level $v^p(c)$. It is assumed that the employed workers decide whether they want to participate in the program or not, which entails that the quit rate q for the program is endogenous in the analysis. There are no frictions associated with the transition from employment to the program, if the worker is eligible, he or she can enter the program instantaneously. The participants in the program disappear at rate ρ determined by the length of the program.

It is furthermore assumed that a fraction θ of the participants enter employment after participating in the program while the rest enter unemployment. For simplicity, the fraction θ is treated as a parameter, but the re-employment probability after program participation could be assumed to depend on the state of the labor market. Furthermore, the parameter θ depends on the provisions regulating the right to return to the former job after program participation.

The equilibrium before the introduction of the program was characterized by a continuous flow out of employment into unemployment and a return back to employment from the unemployment state, and the condition for constant stocks in the two states was equality between the inflow and outflow from the states. The program opens up a new state on the labor market, and a new equilibrium entails equality between the flow into the program and the flow out of the program as participation is discontinued.

The first worker who considers entering the program after the introduction of the paid leave scheme will actually enter the program if the value of the program state is higher than the value of the employment state, i.e., the first worker will enter the program if $N < P$. If this is the case for the first worker, it will also be the case for the second worker, as it is assumed that workers are identical, actually all employed workers will enter the program state, unless something adjusts in the economy. The exodus from employment will stop when there is no advantage for the marginal employed worker to migrate to the program

state, and this is the case when the value occupying the two states are equal, i.e.,

$$N = P. \tag{2}$$

As the fulfillment of this condition implies that the workers have no incentive to depart from work and participate in the program, the condition is labeled the 'no-more-leave'-condition. Note that this is not a 'no-leave' condition, as the equilibrium is characterized by a continuous flow of workers between the employment state and the program state.

It is possible to get an intuitive idea of the consequences of the paid leave scheme within this framework without resorting to formal analysis. If the migration to the scheme is to halt, the endogenous variables of the system have to adjust in order to ensure that the above condition is fulfilled. One natural candidate is the wage rate. The instantaneous value of the program state is exogenous, but an increase in the wage rate will increase the value of the employment state. Increases in the wage rate, which raise the value of the employment state relative to the value of the program state, could ensure that the no-more-leave-condition becomes fulfilled. One prediction from this intuitive approach is consequently that the program implies a tendency to increase the wage rate for the employed workers.

Next look at the consequence of a rise in the re-employment rate θ. When a worker considers traveling from the employment state to the program state, he or she looks at the consequences at the end of the program period. The higher the value of the re-employment probability, the more likely it is that the worker will end up in the employment state (the good state), compared to the unemployment state (the bad state). It therefore seems intuitive that a higher re-employment probability will entail a higher propensity to participate in the program.

For the sake of simplicity, the re-employment probability is treated as a parameter, but is it likely that it will vary across labor markets with different tightness. In a tight labor market it will be difficult for the employer to find a substitute for a worker who enters the paid leave scheme, and upon return to an overloaded workplace it is likely that the program participant will be greeted with a welcome. On the other hand, in a slack labor market, substitutes for the program participant are readily available, another worker will fill the job during program participation, and at the end of the paid leave period, the employer could be in a choice situation between the new worker and the program participant. This could be the case despite formal provisions granting the worker a right to return to the

workplace after program participation - in the decision to end a match between a worker and an employer, a formal legal provision is not the only determining factor.

Given that the re-employment probability is higher in a tight labor market, increased tightness leads to increased program participation. When the unemployment rate is taken as an indicator for tightness, high unemployment rates implies low participation rates and low unemployment rates imply high participation rates. This is the second prediction which is obtained from an intuitive analysis of the consequences of the paid leave scheme. A negative relationship between unemployment and program participation was precisely the result that was obtained in the cross-sectional dimension in the previous empirical investigation.

A closer and more formal analysis is necessary in order to investigate to what extent the intuition holds. The aim in the following is to carry out the most simple formal analysis, which can trace the consequences of the paid leave scheme in the present framework.

Denoting the stocks of the three states in lowercase letters, n for employment, u for unemployment, and p for the program, the steady state conditions for constant stocks can be obtained (outflow = inflow). The conditions are (3) for constant employment, (4) for constant unemployment, and (5) for constant program participation

$$(\delta + q)n = su + \theta\rho p \tag{3}$$

$$su = \delta n + (1 - \theta)\,\rho p \tag{4}$$

$$\rho p = qn. \tag{5}$$

Using these expressions for constant stocks on the labor market, and normalizing the labor force to one (i.e., $n + u + p = 1$), employment can be written in terms of transition rates

$$n = \frac{s}{s + \delta + (1 - \theta)\,q + sq/\rho}. \tag{6}$$

The value of the states N, U, and P are obtained from the steady state arbitrage equations, which are (7) for employment, (8) for unemployment, and (9) for program participation

$$iN = v^n + \delta\,(U - N) + q\,(P - N) \tag{7}$$

$$iU = v^u + s\,(N - U) \tag{8}$$

$$iP = v^p + \theta\rho\,(N - P) + (1 - \theta)\,\rho\,(U - P)\,, \tag{9}$$

where i denotes the interest rate.

When the solutions for N and P are inserted in the no-more-leave condition (2), the result can be written as

$$(v^n - v^p) - \frac{\delta - (1 - \theta)\,\rho}{i + \delta + s}\,(v^n - v^u) = 0, \tag{10}$$

i.e., the condition has been rewritten in terms of instantaneous utilities and transition rates. The formulation of (10) entails that the left hand side is proportional to the difference of the value of the employment state and the program state $N - P$ (the values of the states have the same denominator).

As the instantaneous value of employment is larger than the instantaneous value of unemployment ($v^n > v^u$), the sign of the last term in (10) is determined by the sign of $\delta - (1 - \theta)\,\rho$. The destruction rate δ is the probability of entering unemployment from employment. The rate of participants leaving the program, ρ, times the share that leaves for unemployment, $1 - \theta$, is the probability of entering unemployment from the program. Hence the sign of the last term in (10) depends on whether the probability of entering unemployment from employment is larger or smaller than the probability of entering unemployment from the program.

If the paid leave scheme protects the participants from the consequences of unemployment (i.e., $\delta > (1 - \theta)\,\rho$), workers will demand a premium ($v^n - v^p > 0$) to stay in employment. This premium is established by adjustments of the endogenous variables in (10), the wage rate w and the search rate s. Given the search rate, the exodus from employment to the program will stop when the wage rate has been driven up sufficiently to establish the desired premium that makes the marginal worker indifferent between entering the program or continuing the risky work.

On the other hand, if the paid leave scheme does not entail a protection from the risk of unemployment, the program can only attract participants if the instantaneous utility of the program is larger that the instantaneous utility of work, evaluated at the wage rate before the introduction of the scheme. Given a smaller compensation level of the program relative to the wage rate, this hinges upon the non-monetary aspects of program participation incorporated in the function v^p ().

We have now obtained a model with two equations, the steady state employment equation (6) and the no-more-leave equation (10), containing the four endogenous variables q,

s, n and w. In order to obtain a full model it is necessary to specify how employment and wages are determined. The most obvious way to do this is to specify a demand equation for labor and a wage setting schedule between the employment level and the wage level.[21]

The foregoing discussion indicates that wage formation is an important topic in this context. However, the specification of a supply schedule is a rather elaborate exercise in the present context. For the sake of simplicity the results are not presented here.[22] Instead it is assumed that the system consisting of equations (6), (10) and some equations describing employment and wage determination has settled to equilibrium after the introduction of the program. From the equilibrium values of the endogenous variables, the partial effects on the search rate s and the quit rate q from a change in the re-employment probability θ are investigated.

This entails that we hold the wage level and the employment level fixed in the following. This choice is made purely for expositional purposes, and what is loost in the analysis by this shortcut is outlined below.

We have, consequently, a two equation model in the variables q and s. The linearized form of the steady state employment relation (6) can be written as

$$dq = g_\theta d\theta + g_s ds, \quad g_\theta > 0, \quad g_s > 0.^{23} \tag{11}$$

When the expression for s from the linearized version of the no-more-leave condition (10) is inserted in this expression, the solution for the effect of changes in the re-employment probability on the transition rate from employment to the program is obtained.

The solution is

$$\frac{\partial q}{\partial \theta} = g_\theta + g_s \frac{\rho\left(v^n - v^u\right)}{v^n - v^p}. \tag{12}$$

[21] For a discussion of alternative wage setting assumptions such that wage and unemployment formation can be analyzed in an aggregate supply and demand framework, see, for example, Phelps (1994) and Blanchard and Katz (1997). As the data in the empirical analysis is data on segments of the Danish labor market delimited by union affiliation, a natural choice would be a bargaining model. It is a common practice among Scandinavian economists to assume a union wage formation model, as these countries are heavily unionized. For an application in the analysis of active labor market policy, see the theoretical contributions by Holmlund and Lindén (1993) and Calmfors and Lang (1995).

[22] It is also possible to supplement the model with a description of the frictions, which prevent unemployed workers finding jobs instantaneously. Again for the sake of simplicity the interaction between job vacancies and unemployment is also omitted in the present context. Some versions of the models in the papers on active labor market programs contain analysis of job matching a la Pissarides (1990).

[23] The expressions have the values $g_\theta = q/\left(1 - \theta + s/\rho\right)$ and $g_s = u/n\left(1 - \theta + s/\rho\right)$.

The first term is a positive effect from the steady state employment condition. Increased re-employment probability implies more transitions from the program to employment and less transitions to unemployment, but as both the employment level and the transition from unemployment to employment are at a steady state level, increased re-employment probability is associated with increased transition rates to the program.

The next term stems from the no-more-leave condition. If the paid leave program protects the participants from the risk of unemployment (i.e. $v^n > v^p$), increased re-employment probability implies more transitions from unemployment to employment if the no-more-leave condition is to be fulfilled. As employment is at a steady state level, a higher transition level from unemployment to employment leads to more transitions from employment to the program.

In the case where the program protects the participants from unemployment we have obtained the unambiguous prediction, that increased re-employment probability increases program participation. Supplemented with the assumption that re-employment probability varies positively with the tightness of the labor market, these theoretical considerations have generated the negative relation between program participation and unemployment, which was described in the empirical section.

However, the reverse pattern between unemployment and program participation could prevail, if the last term in (12) is negative and numerically larger than the positive first term. A necessary condition for this case is that the risk of unemployment after program participation is higher than the unemployment risk during employment. The reason for this reaction can be found from the no-more-leave condition (2), which was converted into (10). If a variable affects the value of employment N to the same degree as it affects the value of the program P, it does not change the relative merits of occupying the two states. Consequently, only variables that have a differential impact on the values of N and P enter in the condition (10).

An increased transition rate from unemployment to employment increases the value of the employment state by v^n and increases the value of the program state by v^p. If the instantaneous utility in the program state is higher that the instantaneous utility in employment, increased transitions from unemployment to employment will decrease the value of the employment state relative to the program state. From the last term in (10) it is seen that an increase in θ decreases the value of the employment state relative to the program state. Such an increase in the re-employment probability will consequently lead to a decrease in the search rate in the case where $v^n < v^p$, i.e., when there is a higher risk

of unemployment in the program compared to employment.[24]

As emphasized, the previous analysis has been conducted under the simplifying assumption that the marginal increase in re-employment probability did not affect wage formation and employment. To the extent that the wage level is affected, the conclusions of the foregoing analysis about program participation would have to be modified. In a technical sense, the terms on the right hand side of (12) are still present in such an extended analysis, but some extra terms have to be added, where the signs of these extra terms depend on whether increased re-employment probability has a positive or negative effect on the wage level. So the present analysis is a prober subset of a more full analysis, where wage formation is taken into account.[25] For the sake of brevity this analysis is not presented in the present context, although the effect of such a leave scheme on wage formation is obviously an important aspect in a full evaluation of the program.[26]

The previous analysis has documented the possibility of explaining the observed behavior under the assumption of homogenous workers. Under certain conditions, the search model presented generated a positive association between the tightness of the labor market and program participation. The construction of a search model that is able to explain the empirical phenomenon under investigation is not a proof that this line of thought is

[24] In this connection it would have been relevant to have some kind of indication of whether the condition $\delta > (1-\theta)\rho$ is likely to be fulfilled or not. This was a sufficient condition to get a clear prediction of the connection between re-employment probability and program participation within the framework of this model. However, it is difficult to assess whether the condition is fulfilled. According to Albæk and Sørensen (1998), the annual job destruction rate in the Danish manufacturing sector is about 12 percent, i.e. about the same as in the US. But there does not seem to be any evidence about the magnitude of the probability of return to the old job after program participation.

[25] The effect of labor market programs on wage formation has recently been considered by Heckman et al. (1998). The heading is general equilibrium analysis of labor market interventions. There has been several attempts by Scandinavian economists to trace such wage effects of labor market programs at the macro level. Such an attempt only makes sense when participation in labor market programs is reasonably large. The relative magnitude of labor market programs in Scandinavia is considerably larger than in the US, such that it could be expected that these programs have an effect on the general wage level in contrast to the wage and employment level for specific groups.

[26] As casual evidence for the empirical relevance of wage formation in this context, it could be mentioned that the minimum unemployment rate of 0.3 percent in Table A1 belongs to the unemployment insurance fund run by the union for nurses. The nurses also have the maximum transition rate into the paid leave scheme, which does not require the consent of the employer. A short time after the introduction of the paid leave schemes, there was an inflow of Swedish nurses to the hospitals of Copenhagen, and in the southern part of mainland Denmark, Dutch speaking nurses substituted the Danish ones on paid leave. At the centralized bargaining round of 1995, the union for nurses demanded a 15 percent increase in wages from their public employers, while the rest of the unions settled for about 4 percent. Eventually, bargaining was suspended by the Danish parliament and a (female) judge was appointed to decide the wage level, an extraordinary event in the Danish history of labor relations.

the relevant one. With the present knowledge it is not known whether the conditions are fulfilled or not, and other mechanisms could also be at play.

5 Worker heterogeneity

Lines of thought other than search theory with homogeneous workers could also be relevant in attempts to explain the negative association between labor market tightness and program participation. Search theory seems to be the only line of thought that can explain the phenomenon under the assumption of homogeneous workers. Relaxing this assumption, the other explanations discussed in this section involve the introduction of various kinds of heterogeneity among workers with respect to the propensity to participate in the paid leave program.

First consider the situation where workers differ between unions but are identical within each union. A negative relationship between labor market tightness and paid leave participation would require a particular sorting of workers across unions. Workers with low inclination to participate in paid leave have to be situated in unions with high unemployment, while the unions with low unemployment consist of workers with a high propensity to participate in the paid leave schemes. If there is sufficient persistence in unemployment across unions, such a sorting could take place when the occupational choice of the workers are made. But this type of sorting, according to unobservable characteristics, would entail that the workers with a high inclination to escape work chose unions with the lowest unemployment rates. Stated this way, this explanation is more or less self-contradictory.

However, one would expect that persistent differences in unemployment between unions are associated with other traits that compensate for these differences, such as wage levels and working conditions. If wages perform that role, the wage level is high in the high unemployment unions while workers in the low unemployment unions have low wage levels. This implies that the attractiveness of program participation, as measured by the compensation level relative to the wage level, would be highest for unions with low unemployment and lowest for unions with high unemployment.

To the extent that there is such a relationship, it might have been captured in the empirical analysis if a more precise measure of the compensation level were available. That is, if the compensation level relative to the wage level in the individual unions entered as

an explanatory variable instead of the present variable, which measures the economy-wide attractiveness of the different schemes. However, even though a more precise variable for the compensation level would probably improve the empirical equations, it seems highly unlikely that correlation between the compensation level and unemployment across unions should be so strong, that the direct influence from unemployment on program participation would be removed altogether.[27]

Another possibility is that better working conditions compensate for high unemployment instead of high wage levels. This type of compensation could also generate a negative relationship between unemployment and program participation, as the workers in the low unemployment unions with the worst working conditions might be more inclined to enter the paid leave scheme. There does not seem to be any evidence on the relationship between working conditions and unemployment rates across unions on the Danish labor market.

Alternatively, it could be assumed that workers are heterogeneous within unions, but that the distribution of heterogeneity with respect to propensity to participate is identical across unions. In this case the tightness of the labor market has to effect the margin where workers chose to participate in the paid leave scheme. This could be the case if there are restrictions on the choice of workers between work and non-work.

If workers do not decide working hours, the paid leave scheme opens up an opportunity to reduce the number of working hours to zero on a favorable level of compensation during periods of absence from employment. Danish collective agreements between employers and unions typically contain provisions which enable employers to unilaterally assign workers to a certain amount of overtime work. If the number of working hours, including overtime, exceeds the level desired by workers, the paid leave scheme opens up a new possibility to adjust the number of working hours. As overtime is most prevalent in tight labor markets, one would expect that increased tightness leads to higher participation rates in the paid leave schemes.

Workers who wish to leave employment for a shorter or longer period could alternatively consider leaving work and collecting unemployment benefits. In this case, the worker risks being exposed to restrictions enforced by the labor market authorities, which have enacted provisions stating that workers on unemployment benefit have to accept job offers from the labor exchange offices. As job offers are more likely in a tight labor market, the worker has,

[27] Actually, one could question the assumption that wages compensate for different levels of unemployment. Regressions of the wage level on the unemployment level in different segments of the Danish labor market typically come out with negative coefficients, see Albæk et al. (1999).

in this case, a high risk of being sent back to work again. So the paid leave scheme could act as a substitute for unemployment in tight labor markets.[28] It is worth emphasizing that this explanation presupposes that the control system of unemployed workers actually functions in a tight labor market, such that reluctant workers satisfied with unemployment benefits are actually assigned work. As the Danish unemployment benefit system is comparatively generous in several dimensions, the extent to which this is the case has been under debate.

These considerations of worker heterogeneity show that several explanations for the observed association between labor market tightness and program participation are possible. With the present knowledge it is difficult to evaluate the relative merits of the different explanations.

6 Conclusion

A labor market scheme such as the paid leave scheme, opens up new possibilities for labor market participants, which has a potential impact for the choice of workers in several important dimensions. It is conceivable that the scheme has consequences for labor force participation, and it introduces an incentive for younger workers to postpone education in order to take advantage of the generous compensation level. In a broader discussion of the merits of the schemes it could be relevant to take a closer look at the characteristics of the participants and try to assess the outcome of participation with respect to productivity, labor market affiliation, etc.

The present analysis has concentrated on one particular aspect of participation, the connection between the decision to participate and labor market tightness. A main conclusion from the empirical analysis is that small unemployment rates entail high program participation, while high unemployment rates make the workers more hesitant to join the paid leave schemes. This is a pattern that is very clear in the cross-sectional dimension of paid leave participation across different unemployment insurance funds which are associated with the trade unions.

[28] Analysis of hazard rates for unemployment spells on the Danish labor market show that having children has a negative effect on the hazard rate for mothers and a positive effect for married men with children, which is also a typical pattern obtained for other countries. As one of the schemes is intended for child care, this pattern might be taken as a partial support for the relevance of paid leave participation as a substitute for unemployment.

Participation in the programs is sensitive to the compensation level associated with the schemes. The reduction of the compensation level for three of the schemes are associated with a reduction in the transition rate from employment, while the scheme with an unaltered compensation level experienced an increased participation.

The particular combination of reduced compensation level and falling unemployment level over time causes problems for the identification of the relevant parameters in the time series dimension. The evidence from the time-series dimension with respect to the relationship between program participation and labor market tightness is therefore more mixed.

A main idea behind the introduction of paid leave for employed workers was, that transitions into the programs could make room for unemployed workers as substitutes for the participants in the programs. This is a line of thought which has most relevance when the unemployment rate is high, while the validity of the argument is questionable in the case of a tight labor market. Is is disturbing for this kind of reasoning, that program participation is low when unemployment rates are high, while low unemployment rates increases the attractiveness of the scheme for employed workers, as shown in the empirical analysis in this paper.

Program participation is low, precisely in those labor market states, where the program has a potential to perform as a remedy. In contrast, participation is high in precisely those states, where the program can aggravate the performance of the labor market. In situations, where employers have difficulty in filling vacancies, the exodus from the work place makes it even more difficult to fill vacancies.

This also entails that the paid leave schemes have the potential for acting as a disturbing element in the wage formation process of the economy. The dispersion of unemployment rates across different groups on the labor market creates an asymmetry in the wage pressure across the groups. To the extent that the paid leave scheme increases the dispersion in unemployment rates, the program will, ceteris paribus, also increase the asymmetry in wage pressure across labor market groups.

For the three schemes that are comparable in the time series dimension, the relationship between unemployment and participation is particular strong in the case where the worker has a right to participate without the consent of the employer, while the relationship is somewhat weaker for the other two schemes, where participation has to be in agreement with the employer. One natural interpretation is, that the employers put restraints on the workers propensity to transfer to a paid leave scheme when replacement of the worker with

a substitute is difficult, i.e., when the unemployment rate is low. The provision of employer consent before transition into the paid leave schemes is one of the means of diminishing the potential harmful effects on the functioning of the labor market.

Several explanations have been offered for the empirical phenomenon that a tighter labor market seems to increase the attractiveness of participation in such a scheme. The main contenders offered are, that a tight labor market increases the re-employment probability after participation in the schemes, and that the schemes might act as a substitute for unemployment benefit. Whatever the reasons are for the empirical phenomenon, either a direct influence from unemployment or some other mechanisms that are associated with the tightness of the labor market, the participation pattern does not seem to be a healthy one with respect to the performance of the economy.

The overall evaluation of the paid leave program is that the program is not doing what it was intended to do. Furthermore, it is not clear that it could possibly be welfare-improving otherwise.

The particular paid leave scheme was implemented on a labor market characterized by the absence of employment protection rules. It might be that such rules make employed workers more secure in a slack labor market after the return from a temporary leave. If this is the case, it is conceivable that paid leave participation in countries with stricter employment protection laws would exhibit a less clear empirical pattern than the one presented in this paper. The underlying tendencies in program participation could, in such cases, be concealed by the effects of employment protection rules.

The present analysis offers a general conclusion for policies which open up opportunities for temporary withdrawal from the labor market. As this seems to be particularly attractive for workers, who, from a broader perspective, ought to stay on the job, it is advisable to consider provisions limiting the accessibility to such schemes in tight labor markets in order to reduce the potential adverse effects on the functioning of the labor market.

References

Albæk, Karsten and Bent Sørensen. 'Worker flows and job flows in Danish manufacturing 1980-91.' *The Economic Journal*, 1998, Vol. 108, pp. 1750-1771.

Albæk, Karsten, Rita Asplund, Erling Barth, Stig Blomskog, Björn R. Gudmundsson, Vifill Karlsson, and Erik S. Madsen. 'A wage curve in the Nordic Countries?' Paper presented at the SOLE meeting in Boston, 1999.

Albæk, Karsten, Marc van Audenrode, and Martin Browning. 'Employment protection and the consequences for displaced workers: a comparison of Belgium and Denmark.' Working Paper 99-11, Institute of Economics, University of Copenhagen, 1999.

Blanchard, Olivier and Lawrence F. Katz. 'What we know and do not know about the natural rate of unemployment.' *Journal of Economic Perspectives*, 1997, Vol. 11, pp. 51-72.

Calmfors, Lars and Harald Lang. 'Macroeconomic effects of active labour market programmes in a union wage-setting model.' *The Economic Journal*, 1995, Vol. 105, pp. 601-619.

European Industrial Relations Review. Vol. 262, November 1995.

Hansen, Susanne and Pia Knudsen. 'En teoretisk og empirisk belysning af sammenhængen mellem orlovsdeltagelse og arbejdsløshed.' Master Thesis, Institute of Economics, The University of Copenhagen, 1996.

Heckman, James, Robert J. LaLonde, and Jeffrey A. Smith. 'The economics and econometrics of active labor market programs.' Manuscript prepared for the *Handbook of Labor Economics*, Vol. III, 1998.

Holmlund, Bertil and Johan Lindén. 'Job matching, temporary public employment, and equilibrium unemployment.' *Journal of Public Economics*, 1993, Vol. 51, pp. 329-343.

OECD. *The OECD Jobs Study. Evidence and Explanations.* Part II, Paris: OECD, 1994.

Phelps, Edmund S. *Structural slumps.* Cambridge: Harvard University Press, 1994.

Pissarides, Christopher A. *Equilibrium unemployment theory.* Oxford: Blackwell, 1990.

Appendix A: The bias in the OLS procedure

When ordinary least squares is applied to equation (1) in the text the result is a bias, which is calculated as follows. A simplified version of equation (1) is considered, where the compensation level is omitted, where a common intercept is assumed, and where the subscripts for time and union are omitted. I.e., we consider the following version of the paid leave equation

$$q = \alpha + \beta \ln u + \varepsilon,$$

where q is the quit rate from employment to the program and u is the share of workers in unemployment. Denoting the employment share n and the program share p, we have

$$u = 1 - p - n,$$

the shares have to add to one.

The connection between the transition rate and the program share is given by the equation for steady state program participation

$$\rho p = qn,$$

where ρ is the exit rate from the program. The paid leave equation combined with the other two equations constitutes a simultaneous system.

In order to find the value of the OLS estimate for β we first solve for the two endogenous variables q and $\ln u$. In this procedure we make use of Taylor expansions of $\ln u$ around $u_0 = 1 - p_0 - n_0$ and of p around $p_0 = q_0 n_0/\rho$. The result is

$$q = \frac{A - (1 + q_0/\rho)\,\beta n + \epsilon u_0}{u_0 + \beta n_0/\rho}$$

and

$$\ln u = \frac{B - (1 + q_0/\rho)\, n - \epsilon n_0/\rho}{u_0 + \beta n_0/\rho},$$

where A and B are constants.

The OLS estimate of β becomes

$$b = \psi\beta - (1-\psi)\frac{\rho u_0}{n_0},$$

$\psi = \sigma_n^2/\left(\sigma_n^2 + \sigma_\epsilon^2\left(n_0/\left(\rho + q_0\right)\right)^2\right)$, where σ_n^2 and σ_ϵ^2 are the variances of n and ϵ. This implies $0 < \psi < 1$.

The bias in the OLS estimate is consequently

$$b - \beta = -(1-\psi)\left(\frac{\rho u_0}{n_0} + \beta\right).$$

A negative bias is obtained in the case where there is no connection between the tightness of the labor market and paid leave participation as $b < \beta = 0$. Generally, a negative bias is to be expected as $\frac{\rho u_0}{n_0} + \beta > 0$ is a stability condition of the model.

The last parenthesis in the expression for the bias would have been $(1+\beta)$ instead of $\left(\frac{\rho u_0}{n_0} + \beta\right)$ if the non-linearities of the problem had been absent. That is, if u had been the right hand side variable in the paid leave equation instead of $\ln u$, and if p had been the dependent variable instead of q.

The lagged unemployment rate u_{-1} is a valid instrument when the covariance $Cov\left(u_{-1}, \varepsilon\right) = 0$ and $Cov\left(u_{-1}, u\right) > 0$. This follows from the calculation $Cov\left(u_{-1}, q\right) = \beta Cov\left(u_{-1}, u\right)$ obtained from the paid leave equation.

Appendix B: Additional tables

[Table A1. *Sample mean statistics* about here].

Table 1: Dimensions of paid leave schemes in Denmark, 1994-97

Dimensions	Parental		Sabbatical	Education
	Right	Negotiated		
Eligible participants:				
Employed	Yes	Yes	Yes	Yes
Unemployed	Yes	Yes	No	Yes
Duration, maximum, years [a)]	½	½	1	1
Duration, minimum, weeks	13	13	13	0
Consent of employed required	No	Yes	Yes	Yes
Restriction to insured workers	No	No	Yes	Yes
Compensation ratio per [b)]				
1. January 1994	80	80	80	100
1. January 1995	70	70	70	100
1. April 1997	60	60	60	100

Notes: [a)] If the child is above one year old, 13 weeks of leave is allowed in the parental right scheme. When the options in the parental right scheme have been used, the negotiated scheme for children becomes relevant. Paid leave is confined to parents with children below 8 years. Each of the parents can obtain paid leave for each of their children. The parental leave provisions described in this table are additional to the ordinary leave provisions after births, where an allowance corresponding to the maximum unemployment benefit is granted for half a year for the farther and mother combined. The maximum duration for sabbatical and educational leave combined is one year within a period of five years. [b)] The compensation level is the percentage of the maximum unemployment benefit level, which is about 60 percent of the income of an average production worker.

Table 2: Inflow rates for employed females into different paid leave schemes of unemployment insurance funds, 1994:I-1997:IV, weighted instrument regressions

Explanatory variables	Parental		Sabbatical	Education
	Right	Negotiated		
Panel A, pooled sample:				
Ln(unemployment rate)	-0.173**	-0.028*	-0.003	-0.162**
	(.008)	(.006)	(.006)	(.036)
Ln(compensation rate)	0.932	0.345	0.499*	-
	(.373)	(.085)	(.095)	
Constant	1.056*	0.336*	0.262*	0.915**
	(.141)	(.042)	(.046)	(.085)
Root MSE	0.162	0.066	0.086	0.418
R-squared	0.480	0.238	0.229	0.090
Panel B, fixed effect:				
Ln(unemployment rate)	0.111	0.161	0.301	-0.681**
	(.253)	(.095)	(.121)	(.141)
Ln(compensation rate)	0.548	0.089	0.096	-
	(.320)	(.153)	(.158)	
Root MSE	0.129	0.049	0.074	0.313
R-squared	0.691	0.609	0.459	0.523

Notes: Robust standard errors in parenthesis corrected for clustering at compensation rate levels. * Significant at 5 percent level. ** Significant at 1 percent level. When the compensation level enters as an explanatory variable, significance is evaluated from the t-distribution with 2 degrees of freedom, as the number of clusters is 3. The dependent variables are the inflow of employed female workers as a percentage of employed females in the different unemployment insurance funds. The weights in the regressions are the number of employed female members in the different unemployment insurance funds. The fixed effect estimation is carried out as a least square dummy variable estimation by including dummies for the unemployment insurance funds. Instruments for the unemployment rate are unemployment rates in the different unemployment insurance funds lagged up to four quarters.

Table 3: Inflow rates for employed males into different paid leave schemes of unemployment insurance funds, 1994:I-1997: IV, weighted instrument regressions

Explanatory variables	Parental		Sabbatical	Education
	Right	Negotiated		
Panel A, pooled sample:				
Ln(unemployment rate)	-0.016**	-0.002	-0.005	-0.059*
	(.002)	(.010)	(.010)	(.024)
Ln(compensation rate)	0.130	0.044*	0.238*	-
	(.037)	(.005)	(.050)	
Constant	0.119*	0.034**	0.133	0.399**
	(.016)	(.002)	(.041)	(.049)
Root MSE	0.042	0.022	0.084	0.281
R-squared	0.080	0.029	0.063	0.007
Panel B, fixed effect:				
Ln(unemployment rate)	0.024	0.012	0.069	-0.134**
	(.009)	(.010)	(.059)	(.048)
Ln(compensation rate)	0.061	0.020	0.238	-
	(.018)	(.017)	(.105)	
Root MSE	0.027	0.017	0.071	0.230
R-squared	0.638	0.517	0.377	0.371

Notes: Robust standard errors in parenthesis corrected for clustering at compensation rate levels. * Significant at 5 percent level. ** Significant at 1 percent level. When the compensation level enters as an explanatory variable, significance is evaluated from the t-distribution with 2 degrees of freedom, as the number of clusters is 3. The dependent variables are the inflow of employed male workers as a percentage of employed males in the different unemployment insurance funds. The weights in the regressions are the number of employed male members in the different unemployment insurance funds. The fixed effect estimation is carried out as a least square dummy variable estimation by including dummies for the unemployment insurance funds. Instruments for the unemployment rate are unemployment rates in the different unemployment insurance funds lagged up to four quarters.

Table A1: Sample mean statistics for quarterly transition rates from employment into paid leave schemes and unemployment rates in Danish unemployment insurance funds, percent, unweighted, 1994-97

	Females				Males			
	Mean	Min.	Median	Max	Mean	Min.	Median	Max
1994:I-1994:IV								
Leave schemes								
Parental, Right	0.46	0.00	0.38	1.50	0.09	0.00	0.05	0.55
Parental, Neg.	0.18	0.00	0.14	1.77	0.03	0.00	0.01	0.20
Sabbatical	0.14	0.00	0.09	1.00	0.11	0.00	0.05	0.89
Education	0.23	0.00	0.13	5.00	0.17	0.00	0.08	1.63
Total	1.00	0.00	0.82	5.00	0.40	0.00	0.22	2.81
Unemployment	12.0	0.3	11.1	34.1	12.0	0.3	11.1	34.1
1995:I-1997:I								
Leave schemes								
Parental, Right	0.32	0.00	0.27	2.54	0.05	0.00	0.03	0.58
Parental, Neg.	0.16	0.00	0.13	1.44	0.02	0.00	0.01	0.33
Sabbatical	0.05	0.00	0.02	0.76	0.04	0.00	0.02	0.98
Education	0.45	0.00	0.29	5.25	0.37	0.00	0.23	4.05
Total	0.98	0.00	0.81	6.25	0.49	0.00	0.30	5.54
Unemployment	9.7	0.3	9.1	38.4	9.7	0.3	9.1	38.4
1997:II-1997:IV								
Leave schemes								
Parental, Right	0.35	0.00	0.29	1.26	0.04	0.00	0.02	0.31
Parental, Neg.	0.08	0.00	0.09	0.22	0.01	0.00	0.01	0.05
Sabbatical	0.01	0.00	0.01	0.18	0.01	0.00	0.01	0.06
Education	0.47	0.00	0.33	1.77	0.34	0.00	0.24	1.93
Total	0.92	0.00	0.79	2.66	0.40	0.00	0.26	2.18
Unemployment	7.5	0.3	6.9	20.5	7.5	0.3	6.9	20.5

Notes: The transition rates are the inflow of employed workers as a percentage of employed workers in the different unemployment insurance funds, calculated separately for female and male workers. Unemployment rates are the number of unemployed members as a percentage of members in the 34 different unemployment insurance funds. The time periods have been chosen to match the periods with different levels of compensation for participating in the schemes, see Table 1 in the text. Statistics on unemployment in the different unemployment insurance funds are collected and published by Statistics Denmark. The information on participation in the paid leave schemes has been obtained from the labor market authorities.

Figure 1. Female transition from employment into paid leave schemes of insurance funds, average annual rates, 1994-97

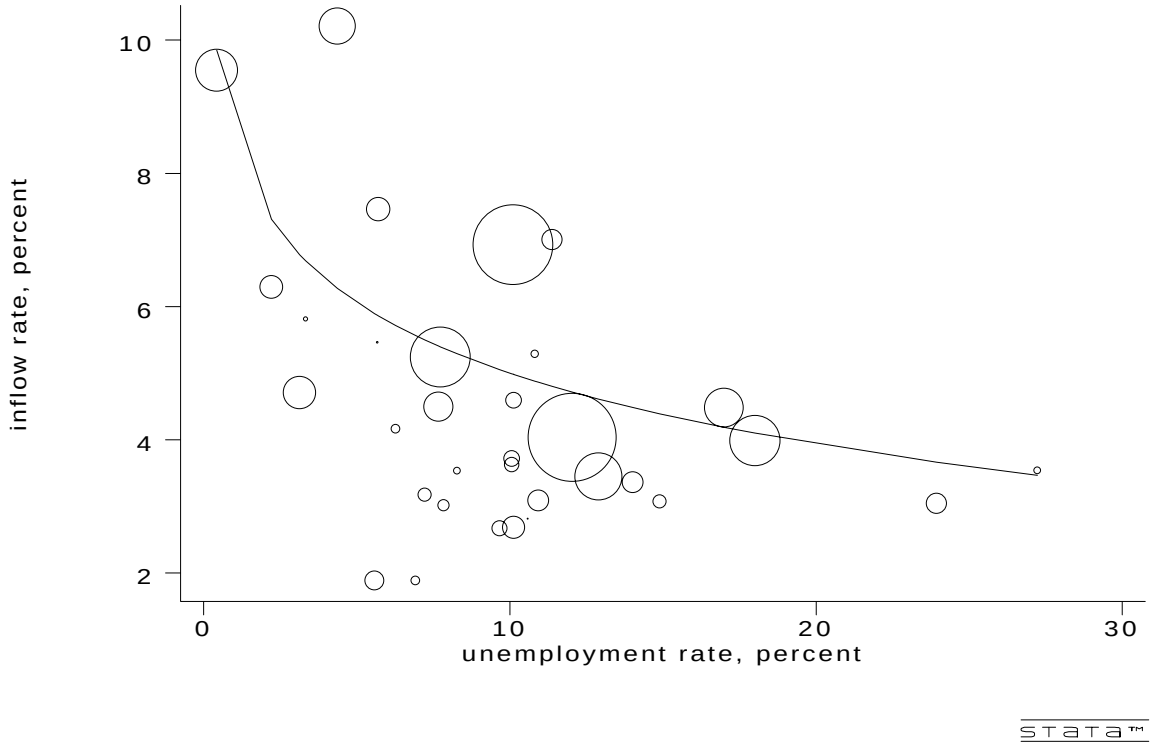

Figure 2. States and transitions for paid leave program