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Taxes and Job Mobility in the Swedish Labor Market

Per Lundborg

NATIONAL INSTITUTE OF ECONOMIC RESEARCH
ECONOMIC COUNCIL, STOCKHOLM SWEDEN

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Taxes and Job Mobility in the Swedish Labor Market*

by

Per Lundborg

The Industrial Institute for Economic and Social Research

Box 5501, S-114 85 STOCKHOLM, Sweden

ABSTRACT.

Based on income growth rates connected with moving and with staying, I determine a decision index and argue that a marginal tax decrease may increase or decrease job mobility. An empirical application shows that the effects of marginal tax reductions on net-of-tax incomes connected with moving and with staying and the effects of these income changes on the probability of moving are such that job mobility actually falls. The results suggest that one could expect the tax reform to have only a minor impact on job mobility rates. A sample of 1 134 individuals from the Level of Living Survey is used and their job changes during 1980 through 1990 are studied.

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1. Introduction

A condition for a well functioning labor market is that workers have incentives to move to other and more suitable jobs. That this job matching process works well is in the interest of both workers and firms and is of great importance to the economic performance of a society. In the process of matching vacancies with workers having the desired properties, the wage the employer offers is undoubtedly of a crucial importance. Unless the worker is interested in raising the gross wage as, for instance, a signal of social status, the net-of-tax wage increase is what matters to the decision to change employers.

To assume that increases in the disposable income is a major determinant of job mobility is hardly very strong. If the net-of-tax income matters, the tax system might have a strong influence on job mobility rates and it has often been claimed that high marginal tax rates are detrimental in this respect. The argument is intuitive: If a wage premium connected with changing employers is taxed at a high marginal rate then also the incentives for job mobility are hampered.

However, a more formal analysis of the job change decision casts some doubts on the effects of taxation on the propensity to change employers. One reason for this is that a tax change affects the discounted present value not only of moving but also of staying and we cannot *a priori* determine the net effects of these income changes on the decision to change employers.

The objective of the present paper is to clarify the conditions for job mobility to occur and test empirically how marginal taxes affect job mobility. For this purpose we need a model that can capture the effects of the tax system on the expected net-of-tax income gains from moving and from staying and moreover can capture the effects of these income gains on the decision to change employers. We start out by defining the net-of-tax income growth rates of moving from the present employer and of staying. These growth rates then enter a decision function in which the crucial tax parameters affect the mobility decision via wage growth variables.

It should be pointed out, that it is hardly possible to make a credible evaluation of

the effects on on job mobility of the Swedish tax reform. First, data do not yet exist. The 1991 Level of Living survey contains mainly data for the year 1990 and there is basically no information on job changes after the tax reform. Time series are too short for the period after the reform to be of use in an evaluation.

Secondly, one cannot claim that there exist theories that can be used to evaluate such major changes in the marginal tax rates which the reform implies. Economic theory is rooted in marginalistc analysis and the results from a traditional tehoretical and empirical analysis do not necessarily carry over to large changes.

This leaves us with the possibility to analyze only the effects of small changes in marginal tax rates during a period preceding the tax reform. Of course, estimates obtained from data of the 1980:s need not be the same as those one would have obtained for the 1990:s and may be different if large tax changes are made. Nevertheless, the analysis will give us some indications of the likely effects of a tax reform.

In previous job mobility studies the role of taxes have not been given much attention. For mobility in the Swedish labor market in the period 1968-1974, Holmlund (1984) provides an illustration of the effects of tax progression on the mobility decision. As no data on the individuals´ marginal taxes were available a common tax elasticity (defining the effects of net-of-tax incomes of a 1 % increase in gross incomes) was assumed. Under such strict assumptions, the analysis suggested that the effects of changes in tax progression on job mobility are small.

The approach in this paper is similar to that of Holmlund (1984) but we aim at being considerably more ambitious in terms of the tax system. This is crucial since in Sweden marginal tax rates and the degree of progression during many years differed considerably.

The time period studied here is 1980 through 1990, a period of great changes in tax rates. The data set is the Level of Living Survey and the wage earners included in the final set experienced a strong increase in the marginal tax rates during the years preceding the tax reform.

We find that individuals react quite differently to the growth rates of moving and

growth rates of staying. Our empirical results show that an increase in the growth rate of staying has a strong negative effect on job mobility while an increase in the growth rate of moving has only a small positive effect on job mobility. Hence, our results suggests that marginal tax reductions *lower* job mobility.

This conclusion holds, however, only for small changes in the marginal tax rates. We cannot conclude that the same result would hold for the very large changes in marginal tax rates that the Swedish tax reform implied. Still, it is fair to say that we should have only very small expectations concerning the possibility to raise job mobility by means of the tax reform.

2. A Model of Job Migration

The worker is assumed to compare two revenue flows, one connected with changing employers and the other with staying. At each point in time, the actual wage is known with certainty and the worker forms expectations about income growth and about the taxes that are to be paid. Let Y_{nm} be the net-of-tax discounted income if moving, Y_{ns} the net-of-tax discounted income from staying and let C be the cost of moving. We have deleted the index representing the individual. The basic behavioral assumption is that the worker will decide to move if, at unchanged work hours,

$$Y_{nm}-Y_{ns}-C>0. \tag{1}$$

The net income is related to the gross income by $\ln Y_{ni}= \psi_i \ln Y_i$ for i=m,s. ψ_i can be shown to equal (1-mt)/(1-at), where mt is the marginal tax and at is the average tax, and measures the effects on net-of-tax incomes of a one percent increase in gross income. More progression implies a lower ψ.[1]

The initial net-of-tax income level is Y_{n0}. The present value of the net-of-tax

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[1]For a thorough analysis of the properties of this measure of the degree of progression, see Jakobsson (1976).

incomes can be written as

$$Y_{ni}=\int_0^{\infty} Y_{n0}e^{(g_i t-\rho_i t)}dt=Y_{n0}/(\rho_i-g_i), \quad (2)$$

where g_i is the real net-of-tax growth rate of income and ρ_i is the total rate of discount. It is assumed that the worker behaves as if his work life was infinite but the individual has a constant death risk δ and may be fired with the probability μ. The total rate of discount ρ_i, can then be written, for i=m,s, as

$$\rho_i=r+\delta+\mu_i, \quad (3)$$

where r, the traditional rate of discount, and δ is identical at the two employers.

The expected net-of-tax growth rate of incomes of movers at time t is $g_m=\psi_{m,t+1}\ln Y_{m,t+1}-\psi_{m,t}\ln Y_{m,t}$. Defining W as the hourly wage rate and H as the number of hours worked per year, we obtain the growth rate of moving as

$$g_m=\psi_{m,t+1}\ln(W_{m,t+1}H_{m,t+1})-\psi_{m,t}\ln(W_{m,t}H_{m,t}). \quad (4)$$

In the corresponding way we get the growth rate of staying as

$$g_s=\psi_{s,t+1}\ln(W_{s,t+1}H_{s,t+1})-\psi_{s,t}\ln(W_{s,t}H_{s,t}). \quad (5)$$

Using these net growth rates, and in line with (1), we specify next a decision index which guides the individual worker in his decision in the initial period whether to change employers or not:

$$I=\ln(Y_{nm}/Y_{ns}(1+c))=-\ln(\rho_m-g_m)+\ln(\rho_s-g_s)-\ln(1+c)>0, \quad (6)$$

where $c=C/Y_{ns}$. A Taylor expansion around the means yields

(7) $$I=a_0+a_1(g_m-\rho_m)+a_2(g_s-\rho_s)+a_3c,$$

where $a_1=(\rho_m^a-g_m^{a^*})^{-1}$ is positive $a_2=-(\rho_s^a-g_s^{a^*})^{-1}$ is negative and in which the top index, a, indicates an average, and $a_3=-1$. Clearly, the propensity to move depends on progressivity since the g-variables include the degree of progression as seen in (4) and (5).

We assume that the marginal tax rates are the policy parameters. Consider an expected increase in the marginal taxes in year t+1, mt_{t+1}, and that the individual takes the average degrees of progression as given. We find that the effect on the decision to change employers is

(8) $$\delta I/\delta mt_{t+1}=a_1(\delta\psi_{m,t+1}/\delta mt_{t+1})\ln Y_{m,t+1}+a_2(\delta\psi_{s,t+1}/\delta mt_{t+1})\ln Y_{s,t+1}.$$

Hence, the effect on job mobility depends on the parameters a_1 and a_2, on the effect of marginal taxes on movers´ and stayers´ degree of progression and on incomes of the two groups in t+1. We cannot *a priori* determine the sign of the derivative (8) and a marginal tax increase may increase or decrease the probability to change employers. First, via the degree of progression, the change in marginal taxes affects the net incomes connected with moving but also the net incomes connected with staying.[2] Remember that such a calculus must account for the incomes of moving for those who stayed and the incomes of staying for those who moved. It is not self evident that moving is connected with higher income growth than is staying.

Secondly, the parameters a_1 and a_2 measure the effects of the (discounted) growth of moving and staying, respectively, on the decision to change jobs. Obviously, the absolute value of a_2 may well exceed the absolute value of a_1 and if this is the case a marginal tax reform would tend to hamper job mobility.

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[2]The corresponding indeterminacy was pointed out by Holmlund (1984) in which the degree of progression is parametric and was changed exogenously.

3. Explanatory Variables, Data, and Estimation.

Our data base is the Level of Living Surveys of 1981 and 1991 giving us the relevant variables for the years 1980 and 1990, which is the period we study. To obtain the necessary growth equations we estimate wage equations for 1990:

$$\ln W_{m90} = \beta_{m90} X_{m90} + \eta_m \lambda_m + \epsilon_{m90} \tag{9}$$

and

$$\ln W_{s90} = \beta_{s90} X_{s90} + \eta_s \lambda_s + \epsilon_{s90}, \tag{10}$$

where in each function, X represents vectors containing the standard Mincer (Mincer (1974)) explanatory variables. However, the wages W_m can only be observed for movers and W_s for stayers and therefore the income growth equations cannot both be estimated using all the individuals in the sample. If the error terms of the conditional expectations for net income growth rates have non-zero means, the observed mean income increases may deviate from the means of the income increases of the population. As data thus may suffer from selection bias we estimate the wage growth equations by including estimates of Heckman´s λ in equations (9) and (10). These are obtained by estimating the reduced form probit of the standardized cumulative normal density function.[3]

With the estimated wage equations and data on hours worked per year, we may predict net-of-tax income growth rates for each individual in the data set, i.e. irrespective of if the individual actually moved or stayed. In other words, we obtain a growth rate also of movers had they stayed and of stayers had they moved. The full set of net-of-tax growth

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[3]This implies plugging in all the relevant variables into (7) and estimating this on reduced form.

rates are then obtained and used in the final estimation of the decision function.[4] Moreover, with the predicted incomes we may also calculate the degrees of tax progressivity for movers, had they stayed, and for stayers, had they moved.

We focus in on the wages connected with moving and do not present any theory on the determination of work hours, which, like wages, are crucial to the determination of the individual´s actual tax payments and degree of progression. In determining mover´s incomes of staying and stayers´ incomes of moving we assume the same number of work hours as he actually had in 1990. We then implicitly make the reasonable assumption that it is the changes in wages that matter to the decision to change employers, not any change in the number of work hours.

The Mincer earnings functions equations for movers and stayers are estimated using the variables schooling, experience and experience squared. To the basic function we add a set of variables representing the personal characteristics. The vectors X_i for i=m,s are then

(11) $$X_i=(education\ ,experience\ ,experience\ ^2,marital\ status\ ,gender\ ).$$

The decision index (7) involves, besides the income growth rates associated with moving and staying, also the non-observable rates of discount, ρ_m and ρ_s. We assume that these rates of discount are written as functions

(12) $$\rho_i=Q_i\gamma_i+n_i,$$

where i=m,s, and Q is a vector of explanatory variables and n is the error term. The Q_i-vectors for i=m,s are specified as

(13) $$Q_m=(age\ )$$

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[4]The method chosen is similar to that in other studies that correct for selection bias along the lines suggested by Heckman (1979). Studies that previously have applied Heckman´s approach involve Robinson and Tomes (1982), Lee (1978) and, for Sweden, Holmlund (1984).

and

$$(14) \qquad Q_s=(age, tenure, tenure^2),$$

where tenure is measured as the number of years at the present employer. Short tenure implies a higher layoff risk and age is included since young workers value returns in the long term differently than old workers do.[5]

We also assume that the costs of transferring from one job to another are proportional to the prospective income at the current employer, C/Y_{ns}.[6] This ratio is then assumed related to a vector Z of personal and other characteristics, i.e.

$$(15) \qquad c=C/Y_{ns}=Z\theta+u.$$

Z is specified as:

$$(16) \qquad Z=(age, tenure, tenure^2, marital\ status).$$

Costs of moving are assumed to increase in age and with the number of years at the present employer and to be higher for the married.

Before turning to estimating the specified model it is instructive to present the sample means for job stayers and job movers. We study the period 1980 to 1990 using the panels of the Level of Living Surveys for these two years. We have specified a computer program that, for each individual and for each year, calculates the individual´s marginal tax, average tax and the degree of progression of the tax system which each individual faces in 1980 and 1990.

The job mobility variable is based on the question in the 1991 survey on the number

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[5]A potential problem we have is that job moves may not be voluntary. However, the period we focus on, i.e. the 1980:s, was characterized by full employment and growth of vacancies. The number of involuntary separations of workers and firms, can therefore be assumed to be very low.

[6] See Robinson and Tomes (1982) for this common assumption.

of years with the present employer. Hence, moving from one job to another is recorded only for the last time during 1980 to 1990, and consequently, previous moves are not included.

The final data set includes individuals who worked more than 600 hours in 1980 and 1990 and excludes retired people. This leaves us with a total of 1 134 individuals. The number of movers during the period is 362 and stayers are 772, i.e. 31.9% of the individuals moved (at least) once during the period. Table 1 shows the means for job movers, job stayers and all workers in the final data set.

Table 1. Characteristics of Sample. Means.

	Job Movers	Job Stayers	All Workers
Age	35.5	39.1	37.9
Initial marital status.2=married 1=unmarried	1.55	1.70	1.66
Tenure	6.1	9.6	9.2
Initial wage, 1980	35.67	37.12	36.65
Final wage, 1990	46.27	43.92	44.67
Work hours 1980	1914	1870	1884
Work hours 1990	1928	1902	1910
Initial marginal tax	51.4 %	53.6%	52.9%
Final marginal tax	53.8%	53.8%	53.8%
Initial average tax	33.4%	34.6%	34.2%
Final average tax	38.9%	38.3%	38.5%
Degree of tax progression,1980.	.717	.695	.702
Degree of tax progression, 1990.	.750	.742	.745
Experience in 1980, years	15.67	19.46	18.25
Education level in 1980	4.93	4.52	4.65

We see from Table 1 that, compared to job stayers, the job movers :

1) are younger,

2) more often are single,

3) have less tenure,

4) have a lower initial but higher final wage,

6) have a lower initial marginal tax while final marginal taxes are identical across the two groups,

7) are exposed to a lower progressivity,

8) have less work experience,

9) have more education.

Most of these characteristics are in line with our expectations like those of age, marital status, tenure, work experience. It is also in line with previous studies that job movers increase their gross wage more.

Job movers experienced lower initial marginal taxes than stayers (51.4% as compared to 53.6%). By 1990, the two groups have approximately the same marginal taxes. The average initial tax is lower for movers but in 1990 the movers face a higher average income tax.

Consequently, also the degree of progression has changed during the period. (Remember that a higher value implies a lower degree of progression.) To the job movers the degree of progression decreased from .717 to .750 and for job stayers the degree of progression decreased from .695 to .742. In both periods stayers were exposed to a higher degree of progression.

Hence, we see a tendency towards equalization in terms of marginal taxes, average taxes and (consequently) degree of progression during the 1980-1990 period. There are three candidates to explain this equalization. First, it is a result of the *tax reform* which influenced the tax parameters in 1990. Secondly, it is an effect of the *equalization of work hours* across movers and stayers, which tends to equalize incomes and hence marginal tax rates across the two groups. Thirdly, movers, who initially have lower wages, *increase their gross wages* more than stayers do.

To evaluate the impact of taxes on job mobility, we first estimate the probit job mobility equation on reduced form. These estimates are then used to obtain estimates of the selectivity variables λ_m and λ_s which then are added to the earnings equations. The estimates of the earnings functions are presented in Table 2, below.

Table 2. Estimates of the Earnings Functions for Movers and Stayers in 1990. Dependent variable lnW. T-ratios in parentheses. Ordinary Least Squares.

	Movers	Stayers
Constant	3.17945***	3.45178***
	(18.442)	(22.467)
Education	.1043***	.07308***
	(12.070)	(13.332)
Experience	.005064	-.003907
	(.535)	(.530)
$(\text{Experience})^2$	.0001132	.00006120
	(.739)	(.544)
Married	.04363	.03249
	(1.350)	(1.469)
Gender	-.2042***	-.1799***
	(-6.260)	(-8.885)
λ_m	.08106	
	(1.370)	
λ_s		.03183
		(.564)
Log-likelihood	-51.170	-67.568
R^2(adjusted)	.40	.29
Observations	362	772

As the level of education rises the wage of movers as well as of stayers grow faster as expected from the human capital model. The experience variables produce estimate that are not significant. For both movers and stayers gender matters to the wage. Finally, we note that there are no evidence of sample selection in data.

With the result in Table 2 we are in a position to obtain predictions of the income

growth of moving also for the stayers and the income growth of staying for those who actually moved. We assume that work hours are unchanged, i.e. equal to the actual ones in 1990. With the estimated wages for 1990 and the tax tables of this year, we may calculate the net-of-tax incomes in 1990 and the corresponding growth rates of net-of-tax incomes. We present these in Table 3. Stayers obtain a sligthly more favorable growth rate by moving (5.39%) than by staying (4.85%) and movers obtain a more favorable growth rate by moving (3.98%) than by staying (.28%).

Table 3. Growth Rates of Net-of-Tax Incomes. Actual and Predicted.
The two diagonal elements are the actual growth rates and the two off-diagonal rates are the predicted ones. 1980-1990. Per cent per year.

	Growth Rate of Moving	Growth Rate of Staying
Movers	3.98	.28
Stayers	5.39	4.85

For each individual we now have an income growth rate of moving and an income growth rate of staying, irrespective of if the individual actually is a mover or a stayer. We can then estimate the decision equation on the structural form using the obtained net-of-tax growth rates of the individuals as determinants. The definitions of the growth rates of moving and staying are those in (4) and (5). The regression results are presented in Table 4.

Clearly, workers react to the tax adjusted income growth rates of moving and staying. We see that the estimate with respect to the income growth of moving is .076 while the effect on the same decision of income growth of staying is -.144. We also note that the probability of a job change falls in tenure at a decreasing rate and that, if married, the individual has a lower propensity to change employers. Finally, individuals tend to

Table 4. The Estimated Decision Equation on Structural Form. Probit.

Constant	1.0104*** (4.403)
Net-of-tax Income Growth of Moving	.07624** (2.024)
Net-of-tax Income Growth of Staying	-.1445*** (-3.857)
Tenure	-.1027*** (-5.970)
$Tenure^2$	.1981E-2*** (3.321)
Initial Marital Status	-.2041** (-2.256)
Age	-.01211** (-1.990)
OBSERVATIONS	1 134
Log-likelihood	-637.07

lower the job mobility rates with increasing age.

The estimates in Table 4 do not, however, give us the effects on the increase in the *probability* of a job move following a one percent increase in the independent variable. Rather, they show the effects on the inverse of the cumulative distribution function, $F^{-1}(P)$. The effects on the probability of increases in the independent variables are provided in

Table 5.[7]

Table 5. Effects on the probability of job mobility following a one percent increase in the determinants of job mobility. Effects on ΔF and ΔF/F. Evaluated at the means.

	ΔF	ΔF/F
Net-of-tax income growth of moving. Increase by one percentage point.	.0161	.0503
Net-of-tax income growth of staying. Increase by one percentage point.	-.0210	-.0655
Tenure. Increase by one year.	-.0430	-.1347
Change in marital status.	-.0873	-.2728
Age. Increase by one year.	-.0052	-.0162

If the net-of-tax income growth of moving increases by 1 percentage point, the probability of moving increases by .0161 and if the net-of-tax income growth of staying increases by 1 percentage point the probability of moving drops by .021. Tenure and age can be interpreted in the corresponding manner but with respect to changes in years.

[7]The formula

$$\delta p/\delta X_{ij} = 1/\sqrt{2\Pi}\exp(-X'\beta/2)^2\beta,$$

where X is the independent variable to be evaluated and β the relevant parameter, gives the effect on the probability of job mobility. See Fomby, Hill and Johnson (1984), p. 348.

4. Marginal Tax Changes and Job Mobility.

We now have both the theoretical links between marginal taxes and the probability of job mobility as well as estimates of the relevant parameters. We have obtained estimates of the impact of the net of tax growth rates of moving and of staying on the decision to change employers. The effects of changes in marginal taxes on the probability of a move may be traced numerically. We do this evaluation at the means remembering that the results potentially could be much different at other levels. These calculations are meant to illuminate the effects of only one element, though a crucial one, in the tax reform, namely the change in the marginal taxes. Other tax changes connected with the tax reform are outside the scope of the study.

We shall calculate what had happened had the tax reform been somewhat less radical in the sense that marginal taxes had been slightly higher in 1990. Assume that the marginal taxes are the policy parameters and that the estimated elasticities continue to hold. We then raise the marginal tax rate by 1% in 1990 for all individuals above the actual level. For instance, a person with a 50% marginal tax then would have faced a 50.5% marginal tax and a person with an initial 70% marginal tax would have faced a 70.7% marginal tax.

In calculating the effects of changes in marginal taxes, we assume that the underlying tax function is locally linear i.e. T=mt*Y-h, where T are taxes and h is a constant. We then obtain the effects of a marginal tax increase on the degree of progressivity as $(at-mt)/(1-at)^2$ and, as noted in equation (8), the degree of progression connected with moving is affected differently than the degree of progression connected with staying. Movers´ tax progression rises by 1.31% (from .75213 to .74228) and stayers´ tax progression rises by 1.34% (from .73484 to .72499). Moreover, movers´ log income level is 11.94 and stayers´ is 12.00. The changes in tax progression, in turn, affect the net-of-tax income rates of moving and of staying which are $\delta\psi_{m90}/\delta ms_{90}\ lnY_{nm90}$ and $\delta\psi_{s90}/\delta ms_{90}\ lnY_{ns90}$, respectively. Plugging in these values we find that, as the marginal tax increases by 1 per cent, the growth rate of moving decreases by (-.0131*11.94=-.156) and the growth rate of staying by (-.0134*12.00=-.161).

We also need to consider that the reactions of the individual to the changes in growth rates of moving and of staying matter, as represented by a_1 and a_2. Our estimates imply that the individual reacts more strongly to an increase in the growth rate of staying than to the growth rate of moving. Table 4 indicated that the estimate of a_1 equals .076 and the estimate of a_2 equals -.145, which, in absolute terms, is considerably larger. Multiplying -.156 by .076 we get -.01186 and withdrawing -.161*-.145=.02334 we obtain a positive net value (-.01186+.02334=.011484) which implies that the marginal tax increase raises the probability of moving. Consequently, a marginal tax increase tends to stimulate job mobility.

Though we stated in (8) that this result cannot be theoretically dismissed one may still be surprised to obtain this empirical result. As shown above, the crucial factor is that the individual reacts more strongly to an increase in the growth rate of staying than to an increase in the growth rate of moving.

5. Concluding Remarks

We first established that there are no *a priori* reasons to believe that a marginal tax reform stimulates job mobility. A tax reform that involves reduced marginal taxes affects net incomes of movers as well as of non-movers which implies counteracting effects on the decision to change employers. Moreover, workers may react quantitatively different on increases in the income growth rate of moving than to a decrease in the income growth rate of staying. This is another source of counteractive effects.

Our empirical results imply that workers react much stronger on the increase in the growth rate of staying than to the growth rate of moving and the effect is that job mobility falls as a consequence of the marginal tax decrease.

What conclusions, if any, can we draw from these estimates on the effects of the tax reform? First, estimates like the ones presented are certainly surrounded by uncertainty. Moreover, it is also highly uncertain if the elasticities obtained are relevant to the case when major changes in tax rates are made. Finally, the estimated elasticities are based on

data from the 1980:s and need not be stable over time.

Nevertheless, it is hard to see that it is possible to obtain a major increase in job mobility rates by means of a tax reform. The model we apply assumes rational behavior of workers and is a fundamental model in labor mobility studies. A crucial factor here is, as shown in equation (8), that the effects of a marginal tax change on job mobility are ambiguous. The effects of changes in marginal tax rates on the discounted incomes of moving are approximately as large as the effects on the discounted incomes of staying and the latter increase effectively hampers mobility. Unless the estimates we obtained are very much off the mark, the tentative conclusion must be that we should expect only minor effects (in either direction) on the job mobility rate of a radical tax reform.

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