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TAXES AND JOB MOBILITY IN SWEDEN

by

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Taxes and Job Mobility in Sweden*

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ABSTRACT.

In a model where expected net-of-tax income growth rates connected with moving and staying determine job changes, a decrease in marginal tax rates has ambiguous effects on job mobility. An empirical application suggests that the tax system is an integral part of individuals' considerations to change employers. The results show that reductions in marginal taxes stimulate job mobility but only at a very low rate. If the marginal tax rate is lowered by 1 percent the probability of moving increases by only .1 percent. Under high tax progression, changes in expected gross incomes of moving and staying do not affect job mobility while they do in periods of low tax progression. A panel of 1 103 individuals is used and their job changes during a period of high tax progression, 1980 through 1990, are studied.

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1. Introduction

A condition for a well functioning labour market is that workers have incentives to move to more suitable jobs. That this job matching process works well is in the interest of both workers and firms and is important 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 crucial. However, unless the worker is interested in raising the gross wage as, for instance, a signal of social status, we should expect the net-of-tax wage increase to be the crucial determinant of job mobility.

It has often been claimed that high tax rates are detrimental to mobility in the labour market. In the popular debate in Sweden preceding the major tax reform of 1990-91, voices were raised that such a reform was necessary to raise labour mobility. The argument was intuitive: If a wage premium connected with changing employers is taxed at a high rate then also the incentives for job mobility are hampered.

However, this simple reasoning is based on a model involving only a comparison of the present wage level with the wage offered by another employer. A formal analysis that involves not only the immediate wage hike but also the income prospects of the job change casts doubts on the effects of taxation on the propensity to change employers. The reason for this is that a tax decrease raises the present discounted value not only of moving but also of staying. While income increases connected with moving raises the propensity to change employers, the income increases connected with staying lowers the propensity. Therefore, we cannot *a priori* determine the net effects of these income increases on the decision to change employers.

We shall clarify the conditions for job mobility to occur and test empirically how changes in marginal taxes affect job mobility. We specify a model that captures the effects of the tax system on the expected net-of-tax income gains from moving and staying and we estimate the effects of these income gains on the probability to change employers.

In previous job mobility studies the role of taxes has not been given much attention. For mobility in the Swedish labour market in the period 1968-1974, Holmlund (1984) discusses the effects of increases in gross incomes but provides only an illustration of the

possible 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 percent increase in gross incomes) was assumed. Under such strict and hardly realistic assumptions, the analysis suggested that the effects of changes in tax progression on job mobility are small.

The approach in this paper builds on that of Holmlund (1984) but we aim at being considerably more ambitious in terms of the tax system. In particular, for each individual in the panel we calculate the marginal and average taxes as well as the degree of tax progression. Moreover, for an individual who moved (stayed) during the period we also predict both the gross income and the marginal and average taxes had he stayed (moved). This allows us to use, for each individual, the expected net-of-tax income growth rates of moving and of staying (actual and predicted rates) as determinants of job mobility.

After the period studied by Holmlund marginal tax rates rose a great deal so that the importance of taxes on job mobility can be expected to have increased. We study here the period 1980 through 1990 when tax progression reached unprecedented levels and the effects of marginal taxes on peoples' net incomes and their behavior were much debated. 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 1990-91 tax reform.

Holmlund (1984) found that changes in gross incomes connected with moving and staying were important determinants of job mobility in 1967-74. For our high tax period, 1980-90, we find that gross income changes have lost their role as determinants of job changes. Instead, changes in expected disposable income growth are what matters: a higher expected net-of-tax income growth rate of moving raises the probability of moving while a higher growth rate connected with staying lowers it. While workers seem to have internalized the tax system into the job change decision, the net effects of tax changes are nevertheless very small. Lowering the marginal tax rate for each individual by 1 percent raises the probability of changing jobs by a modest .1 percent. The result that job mobility is only little affected by changes in marginal taxes seems to be a fairly robust and quite

different estimates than the ones obtained are required for this conclusion not to hold.

In the following section we present a basic model of taxes, income prospects and job changes. Then, in section 3, we discuss the empirical application of the model and in section 4 we present and evaluate our results. We conclude the paper with some final remarks.

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 assumed known with certainty and the worker has perfect foresight on income growth and about the taxes 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,

$$(1) \quad Y_{nm} - Y_{ns} - C > 0.$$

In period, t , the net income is related to the gross income by $\ln Y_{ni,t} = \psi_{i,t} \ln Y_{i,t}$ 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_i .¹

The initial net-of-tax income level is Y_{n0} . The present value of the net-of-tax incomes can be written as

$$(2) \quad Y_{ni} = \int_0^T Y_{n0} e^{(g_i - \rho_i)t} dt = Y_{n0} (e^{(g_i - \rho_i)T} - 1) / (g_i - \rho_i),$$

for $i=m,s$, where g_i is the real expected net-of-tax growth rate of income and ρ_i is the total

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

rate of discount. It is assumed that the worker behaves as if his working life ends at T . The individual has a constant death risk δ and may be fired with the probability μ , assumed dependent on tenure. The total rate of discount ρ_i , can then be written, for $i=m,s$, as

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

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 expected growth rate of moving as

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

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

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

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. We may think of I as a latent variable defining the decision index:

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

where $c = C/Y_{ns}$. The last term in (6), $\ln((\exp(g_m - \rho_m)T - 1)/(\exp(g_s - \rho_s)T - 1))$, arises because of the finite working life horizon and approaches zero as T increases (for $\rho > g$). A Taylor expansion around the means yields

$$(7) \quad I = a_0 + a_1(g_m - \rho_m) + a_2(g_s - \rho_s) + a_3 c + \ln \frac{e^{(g_m - \rho_m)T} - 1}{e^{(g_s - \rho_s)T} - 1},$$

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 $a_3 = -1$ for small c . Clearly, the propensity to move depends on progressivity since the variables g_m and g_s include the degree of progression as seen in (4) and (5). Therefore, the marginal tax rate and the average tax rate both affect the decision to move.

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

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

As seen, 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 income levels. We cannot *a priori* determine the sign of the derivative (8) and a general 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

Secondly, the parameters a_1 and a_2 measure the effects of the expected (discounted) growth of moving and staying, respectively, on the decision to change jobs. Obviously, the (absolute) value of a_2 might exceed the value of a_1 and, if this is the case, changes in marginal taxes are likely to hamper job mobility.

Our strategy in the following is to estimate the effects of marginal tax changes on the degree of progression, to calculate the relevant income levels and to obtain estimates of a_1 and a_2 . With this information we can assess the impact of changes in marginal taxes on the propensity to change employers.

²The 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. It is assumed, hence, that the individuals, in 1980 and based on the levels of expected disposable incomes in 1990, form expectations about their future income growth rates (of moving and staying). To obtain the necessary growth equations we estimate wage equations for 1990:

$$(9) \quad \ln W_{m90} = \beta_{m90} X_{m90} + \eta_m \lambda_m + \epsilon_{m90}$$

and

$$(10) \quad \ln W_{s90} = \beta_{s90} X_{s90} + \eta_s \lambda_s + \epsilon_{s90}$$

where in each function, X represents vectors containing the standard Mincer (Mincer (1974)) explanatory variables. However, the wage W_m can only be observed for movers and W_s for stayers. If the error terms of the conditional expectations for net income growth rates have nonzero means, which can be suspected, 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).³ These are obtained by estimating the reduced form probit of the standardized cumulative normal density function.⁴

With unbiased estimates of the parameters of the wage equations and with data on hours worked per year, we may predict expected disposable income growth rates for each individual in the data set, i.e. irrespective of if the individual moved or stayed. In other

³See Heckman (1979). For similar studies dealing with sample selection bias, see Robinson and Tomes (1982) and Lee (1978).

⁴This implies plugging in all the relevant variables into (7) and estimating this on reduced form.

words, we may predict a growth rate of moving for those who stayed and predict a growth rate of staying for those who moved. We may then easily calculate the average and marginal taxes connected with the predicted alternative incomes and the full set of net-of-tax growth rates is then obtained and used in the final estimation of the job change probabilities.

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 movers' 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 earnings functions for movers and stayers are estimated using the variables schooling, experience and experience squared. The vectors X_i for $i=m,s$ are then

$$(11) \quad X_i = (\text{education}, \text{experience}, \text{experience}^2).$$

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

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

where $i=m,s$, and Q is a vector of explanatory variables and n is the error term. As in Holmlund (1984), the Q_i -vectors for $i=m,s$ are specified as

$$(13) \quad Q_m = (\text{age})$$

and

$$(14) \quad Q_s = (\text{age}, \text{tenure}, \text{tenure}^2),$$

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

We also need to determine the costs of transferring from one job to another. From the derivations above, the costs 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.

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

Z is specified as:

$$(16) \quad Z = (\text{age}, \text{tenure}, \text{tenure}^2, \text{marital status}).$$

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. Finally, the last term in (7), i.e. $\ln((\exp(g_m - \rho_m)T - 1) / ((\exp(g_s - \rho_s)T - 1)))$, is, as in Holmlund (1984), assumed to be a function of age and written as $\zeta \text{AGE} + \kappa$.

Before estimating the specified model it is instructive to present the sample means for job stayers and job movers. We have applied a computer program that calculates the marginal tax, average tax and the degree of progression (ψ) of the tax system which each individual face in 1980 and 1990.⁷

⁵A 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).

⁷In calculating taxes for 1980, capital incomes were added to work incomes. In 1990, however, the tax reform was partially in operation and the rules had changed. Then, only work incomes determine the marginal and average taxes.

The job mobility variable is based on the question in the 1991 survey on the number of years with the present employer. Therefore, moves from one job to another are recorded only for the last time during 1980 to 1990, and consequently, previous moves are not included.⁸

The final data set includes individuals who worked more than 600 hours in 1980 and 1990 and excludes retired people. We also exclude people who in both the 1981 and the 1991 survey report moving to the present employer in 1980; these individuals cannot be classified either as a mover or a stayer. This leaves us with a total of 1 103 individuals.

The number of movers during the period is 362 and stayers are 741, implying that 32.8 percent of the individuals changed employers during the period. Table 1 shows the means for job movers, job stayers and all workers in the final data set.

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 percent as compared to 53.7 percent). 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

⁸The same limitation is present in the study by Holmlund (1984).

movers the degree of progression decreased from .717 to .750 and for job stayers the degree of progression decreased from .694 to .742. In both periods stayers were exposed to a higher degree of progression.

Table 1. Characteristics of Sample. Means.			
	Job Movers	Job Stayers	All Workers
Age	35.5	39.21	38.0
Marital status, 1 = unmarried	1.55	1.70	1.66
Tenure	6.1	11.0	9.4
Initial wage 1980	35.67	37.23	36.72
Final wage 1990	46.27	43.97	44.72
Work hours 1980	1914	1870	1884
Work hours 1990	1928	1901	1910
Initial marginal tax	51.4 percent	53.7 percent	53.0 percent
Final marginal tax	53.8 percent	53.8 percent	53.8 percent
Initial average tax	33.4 percent	34.6 percent	34.2 percent
Final average tax	38.9 percent	38.3 percent	38.5 percent
Degree of tax progression 1980.	.717	.694	.702
Degree of tax progression 1990.	.750	.742	.745
Years of experience 1980	15.67	18.61	17.31
Years of education 1980	12.25	12.08	12.13

The tendency toward equalization in terms of marginal taxes, average taxes and (consequently) degree of progression during the 1980-1990 period can be explained by

three factors. First, it is a result of the tax reform that influenced the tax parameters in 1990. Secondly, it is an effect of the equalization of work hours across movers and stayers, which narrows income differentials and therefore marginal tax rates across the two groups. Thirdly, movers, who initially have lower wages, increase their gross wages more than stayers do.

4. Estimation Results.

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

As the level of education increases, wages of movers as well as of stayers go up. The experience variables produce estimates that are significant and, as expected, positive but the non-linearities are not present. We also note that there is no evidence of sample selection in data.

With the result in Table 2 we can obtain predictions of the expected disposable income growth of moving also for the stayers and the expected disposable 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 expected net-of-tax incomes in 1990 and the corresponding expected growth rates of net-of-tax incomes. We present these in Table 3. Stayers obtain a more favorable growth rate by staying (4.93 percent) than by moving (1.93 percent) and movers obtain a more favorable growth rate by moving (3.98 percent) than by staying (1.93 percent).

For each individual we now have an income growth rate of moving and an income growth rate of staying, irrespective of if the individual 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

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	2.4188*** (15.936)	2.7304*** (19.243)
Education	.08978*** (13.742)	.06368*** (14.157)
Experience	.01912** (2.075)	.01456** (1.905)
(Experience) ²	-.2742E-4 (-.169)	-.4514E-4 (-.367)
λ_m	-.03043 (-.588)	
λ_s		-.01223 (-.230)
Log-likelih.	-69.977	-98.057
R ² (adjust)	.35	.23
Obs.	362	741

Table 3. Growth rates of expected disposable incomes. The two diagonal entries are the actual off-diagonal entries are the predicted ones. 1980-1990. Percent per year.

	Growth rate of moving	Growth rate of staying
Movers	3.98	1.93
Stayers	1.93	4.93

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 expected income growth of moving is .232 while the effect on the same decision of expected income growth of staying is -.200. We also note that the probability of a job change falls in tenure at a decreasing rate. If

Table 4. The Estimated Decision Equation on Structural Form. Probit. Based on changes in net-of-tax incomes. t-ratios in parentheses.	
Constant	1.2615*** (5.416)
Expected Net-of-tax Income Growth Rate of Moving	.2323*** (6.144)
Expected Net-of-tax Income Growth Rate of Staying	-.2002*** (-5.002)
Tenure	-.1260*** (-7.426)
Tenure ²	.2682E-2*** (4.315)
Initial Marital Status	-.1993** (-2.143)
Age	-.01662*** (-2.668)
OBSERVATIONS	1 103
Log-likelihood	-598.23

married, the individual has a lower propensity to change employers. Finally, the job mobility rates decreases in age.

The estimates in Table 4 do not, however, give us the effects on the *probability* of a job move following a 1 percent increase in the independent variable. They show instead 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 5.⁹

Table 5. Effects on the probability of job mobility following a 1 percent increase in the determinants of job mobility. Effects on ΔF and $\Delta F/F$. Evaluated at the means.		
	ΔF	$\Delta F/F$
Expected Net-of-tax income growth of moving. Increase by one percentage point.	.0258	.0785
Expected Net-of-tax income growth of staying. Increase by one percentage point.	-.0337	-.1027
Tenure. Increase by one year.	-.0526	-.1604
Change in marital status.	-.0851	-.2592
Age. Increase by one year.	-.0071	-.0216

⁹The formula

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

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.

If the expected disposable income growth of moving increases by 1 percentage point, the probability of moving increases by .0258 and if the expected disposable income growth of staying increases by 1 percentage point the probability of moving drops by .0337. Tenure and age can be interpreted in the corresponding manner but with respect to changes in years.

The estimates presented in Table 4 support the basic model and suggest that individuals internalize the tax system into the job mobility decision. To shed further light on the issue to what extent taxes matter to the decision to change employers, we may estimate the same model as in Table 4 but using instead the growth rates of gross incomes. These results are presented in Table 6, below.

Comparing Table 4 and Table 6, it appears that it is vital to include the tax system. The growth rates in gross incomes do not affect the probability of changing employers while the expected net-of-tax growth rates yield highly significant estimates. The estimates of the remaining variables are virtually unchanged.

It is useful to compare the results in Table 6 to those presented in Holmlund (1984) for the period 1968-74 when the marginal taxes were considerably lower. He estimated largely the same model as in Table 6 but the earnings functions were estimated in rate of change form. It was found, in contrast to the results in Table 6, that both growth rates of gross incomes yielded significant estimates of the expected signs. A possible interpretation may be that, during the seventies, as the marginal tax rates facing the individuals increased drastically, people became increasingly conscious about the effects of taxes on their disposable income. It is likely that growth rates of disposable incomes also in 1967-74 had performed better as determinants than growth rates of gross incomes do. Nevertheless, it is the case that the high tax rates during the 1980-90 period create such differences between gross and net incomes that the growth rates of gross incomes do not work as proxies for the growth of disposable income. Changes in gross incomes had lost their role as determinants

of job mobility.¹⁰

Table 6. The Estimated Decision Equation on Structural Form. Probit.	
Based on changes in gross incomes. t-ratios in parentheses.	
Constant	1.2951*** (5.510)
Expected Gross Income Growth of Moving	-.2624 (-1.769)
Expected Gross Income Growth of Staying	.01549 (.094)
Tenure	-.1283*** (-7.750)
Tenure ²	.2784E-2*** (4.684)
Initial Marital Status	-.1768** (-1.924)
Age	-.01669*** (-2.710)
OBSERVATIONS	1 103
Log-likelihood	-616.91

Having established the theoretical links between marginal taxes and the probability of job mobility and having obtained estimates of the relevant parameters we may go on and

¹⁰Unfortunately, there are no estimates of the effects of the net-of-tax growth rates on job mobility for the 1968-74 period. It may be that for this period net-of-tax growth rates perform even better than gross income growth rates do.

specify in more detail the effects of changes in marginal taxes on job mobility. 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 generally are different at other levels.

We may calculate how mobility is affected by changes in marginal taxes since these are the policy parameters of interest. It is assumed that marginal taxes were slightly higher in 1990 and that the estimated elasticities continue to hold. We raise the marginal tax rate by 1 percent in 1990 for all individuals above the actual level. For instance, a person with a 50 percent marginal tax would have faced a 50.5 percent marginal tax and a person with an initial 70 percent marginal tax would have faced a 70.7 percent marginal tax.

In calculating the effects of changes in marginal taxes, we assume that the underlying tax function is locally linear i.e. $T = mt \cdot Y - h$, 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 $(at - mt)/(1 - at)^2$. As is clear from 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 1.36 percent (from .72404 to .71420) and stayers' tax progression rises by 1.33 percent (from .74040 to .73055). Moreover, movers' log income level is 12.062 and stayers' is 11.978. The changes in tax progression, in turn, affect the net-of-tax income rates of moving and of staying which are $\delta \psi_{m90} / \delta ms_{90} \ln Y_{nm90}$ and $\delta \psi_{s90} / \delta ms_{90} \ln Y_{ns90}$, respectively. Plugging in these values we find that, as the marginal tax increases by 1 percent, the growth rate of moving decreases by $(-.0136 \cdot 12.062 = -.164)$ and the growth rate of staying by $(-.0133 \cdot 11.978 = -.159)$. 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 our estimates of a_1 and a_2 , i.e. .232 and -.200, respectively. Plugging all information into equation (8) we obtain a negative value implying that the marginal tax increase lowers the probability of moving. Consequently, a marginal tax increase tends to hamper job mobility.

How large is this effect? We may evaluate the effects by using the cumulative normal density function. We then find that, as we decrease the marginal taxes by 1 percent

for each individual, the probability of changing employers only increases by .103 percent.¹¹ Expressed at the mean values, if marginal taxes decrease from 53.80 to 53.26, the probability of a job change increases from 32.82 to 32.92.

It should be clear that even very small changes in the estimated parameters a_1 and a_2 can give us a reversed result, namely that job mobility increases in marginal taxes. Anyhow, the quantitative effects are small and the conclusion is that we cannot expect reductions in marginal taxes to effectively raise job mobility. As shown above, the crucial factor is that the individual reacts strongly to an increase in the growth rate of staying which counteracts the growth rate of moving.

Our regression estimates are, like most others, surrounded by uncertainty. One may ask to what extent our tax results depend on the estimates of a_1 and a_2 . Assume that the estimate of a_1 is .40 instead of .23 which we obtained, and that the estimate of a_2 remains at -.20. This implies a very large difference between the absolute values of the two estimates. Under these extreme assumptions, a one percent decrease in marginal taxes raises the probability of job mobility from 34.78 to 35.34 i.e. by .5 percent. While the effects then are considerably larger, it shows that it takes large, and quite unrealistic, differences in reactions to the two growth rates for taxes to have any major impact on job mobility.

5. Some Final Remarks

There are no *a priori* reasons to believe that changes in marginal taxes will have strong effects on job mobility. Changes in marginal taxes affect net incomes of both movers and of non-movers implying counteracting effects on the decision to change employers. Moreover, workers may react quantitatively different on increases in the income growth

¹¹We have $\Delta I = -.006248 * \Delta mt$ from the calculations in the text. Our change in marginal taxes is $\Delta mt / mt = .01$ where $mt = 53.814$. We then get $\Delta I = -.003362$ which, using the cumulative normal distribution, yields a change in the probability of moving amounting to .00103.

rate of moving than to a decrease in the income growth rate of staying. This is another source of counteractive effects.

Our empirical results show that while individuals internalize the tax system into the decision to change employers, the net effects are numerically small. Moreover, the absolute values of our estimates need to differ substantially for marginal tax changes to have strong impact on job mobility. Changes in marginal tax rates affect the discounted incomes of moving approximately as much as the discounted incomes of staying. The latter increase effectively hampers mobility and we do not obtain any strong effects on job mobility rates.

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APPENDIX

Table A.1. The Estimated Decision Equation on Reduced Form. Probit.	
Constant	.8478** (2.478)
Education 1980	.04151** (2.074)
Experience 1980	.001263 (.060)
Experience ² /1000	.05690 (.113)
Marital status 1980	-.2097 (-2.268)
Tenure 1980	-.1221*** (-7.142)
Tenure ²	.002608*** (4.223)
Age	-.02048** (-2.271)
OBSERVATIONS	1 103
Log-likelihood	-617.20