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CAPITAL GAINS TAXATION AND RESIDENTIAL MOBILITY IN SWEDEN

by

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ABSTRACT

Theoretical studies have shown that capital gains taxes in the housing market may create lock-in effects but so far no empirical evidence has been presented regarding the size of these effects. For a panel of Swedish house owners in 1984-1990, we show that lock-in effects only appear for households with income reductions; the size of these lock-in effects crucially depends on the magnitude of the income loss. The theoretical model and features of the Swedish tax system imply that lock-in effects depend on the degree of mismatch in the current residence and whether the households buy up or buy down.

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Owner-occupier housing markets are characterized by high transaction costs. There are not only transportation costs but also various fees and taxes to be paid when houses are bought and sold. Moreover, credit and information costs are particularly important in this market. The idea that transaction costs are important receives support in several econometric studies, showing that changes in housing consumption are slow in response to changes in desired consumption.

Capital gains taxes (CGT) are widely applied in OECD countries and represent transaction costs of special policy interest.[1] In Sweden the CGT rules have been changed several times, most recently in connection with the 1991 tax reform. Theoretical studies show that CGT may reduce residential mobility, but, to the best of our knowledge, no empirical evidence on the size of the lock-in effects has been provided.[2]

The present study is an attempt at filling this gap. We first present a theory of residential mismatching. For a large panel of Swedish households in the Level of Living Surveys 1981-1991 (Eriksson and Åberg (1987)), we then compute the expected tax payments associated with changing residence. Finally, we estimate the lock-in effects of CGT.

The computations are based on the tax rules and information on the assessed tax value *(taxeringsvärdet)* of the houses. Historically, the tax rules depend on whether the households have bought up (a more expensive house) or bought down (a less expensive one). Those buying down have been taxed more severely than those buying up. With our data we can determine, at least roughly, how much CGT the household should pay when buying up and when buying down. Since little is known about the size of these tax payments, a mere descriptive analysis of such data provides valuable information.

We argue that CGT, and for that matter any other transaction cost, will hamper

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[1] See OECD (1988a, 1988b).

[2] See Englund (1985, 1986) and Lundborg and Skedinger (1995) for theoretical studies on the effects of CGT and e.g. Edin and Englund (1991), Börsch-Supan (1990) or Börsch-Supan and Pollakowski (1990) for empirical studies on residential mobility.

residential mobility only if the house-owner is *mismatched* in the current residence. Transaction costs are thus of no concern to a household for which the basic determinants of housing consumption do not change. Our model captures this notion of mismatching and we estimate the lock-in effects of CGT for households having recently experienced changes in income or family size.

Estimating a multinomial logit model, we find that the CGT reduce the probability of buying down for households mismatched downward. The more mismatched the households are, the larger are the lock-in effects. However, CGT does not seem to affect mobility of households mismatched to buy a more expensive house.

In the next section we briefly describe the tax rules applying to the Swedish owner-occupier housing market. In Section 2, we present the theoretical basis for the estimations. Then we present our data set, including the procedure for the CGT computations. The regression results are presented and discussed in Section 4. Section 5 concludes the paper.

I. A Brief Review of the Tax Rules for Owner-Occupier Houses in Sweden since 1980.[3]

A leading principle throughout the period has been to tax capital gains upon realization and to allow deductions of various types. Two different sets of rules have been in operation since 1980. The old rules applied up to 1991 and the new ones apply as a part of the Swedish tax reform in 1991.

The CGT rules for houses effective 1981-1990 implied a nominal taxation during the first four years of ownership, and after that a taxation of real gains. Some tax deductions were allowed.[4] Postponements were allowed for all households buying up, while households buying down were allowed to postpone the tax to the extent that the taxable

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[3]More details can be found in SOU 1985:38 and SOU 1989:33.

[4]These deductions were the following: a) inflation-adjusted costs for improvements and repairs that add to the value of the house, with a minimum deduction of SEK 3 000 per year; b) SEK 3 000 per year of ownership during the period 1952-80; and c) selling costs, e.g. brokerage fees, and recording fees. The brokerage fee was around 4 per cent of the purchase value and the recording fee 1.5 per cent.

gain was large enough in relation to the price difference between the old and the new house.[5] Thus, households buying down were taxed differently than those buying up.

The taxable gains were added on top of other taxable income so that in effect the capital gains tax during this period was progressive.

After the 1991 tax reform, a person liable to tax may choose either the "principal rule" (*huvudregel*) or the "alternative rule" (*schablonregel*). Under the principal rule, nominal gains are taxed by 30 per cent and fewer deductions are allowed than in the previous system.[6] The brokerage services were imposed a 25 per cent value added tax, implying that the fee increased from approximately 4 to 5 per cent. Under the alternative rule, nominal revenues are taxed by 9 per cent. No deductions for brokerage or recording fees were allowed nor were postponements. Hence, households buying up and buying down were taxed in the same way after the reform.

Finally, yet another change occurred in 1993. The government decided to let the seller postpone all CGT for houses (and coop shares) if the seller moves to another owned unit and that the taxable gain is at least SEK 50 000.

II. Theoretical Considerations.

Whether a household is mismatched or not is obviously a basic determinant of residential mobility. Although portfolio choice considerations may well affect housing consumption, particularly the timing of the household´s purchasing decision, we assume that a condition for a move is that the household has become mismatched in the housing market. Hanushek and Quigley (1979) and Wheaton (1990) have developed theoretical models of the housing market, where it is assumed that the household faces an exogenous probability of becoming

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[5] The postponement opportunity remained if the house was inherited. Other requirements for postponement were: a) the seller must have occupied the house for at least three years during the last five year period; b) another house has been purchased within four years; and c) a taxable gain has accrued of minimum SEK 15 000.

[6] The deduction of SEK 3 000 per year of ownership during 1952-80 was no longer allowed. Repairs that added to the value of the house were deductible for the latest five years only and a minimum of SEK 5 000 per year was required.

mismatched in the current residence due to changes in e.g. household income or family size. A mismatched household would like to move, but may be prevented from doing so by transaction costs.[7]

We make a distinction between a mismatch to buy up and a mismatch to buy down. A rise in income or a larger family, for instance, increases the likelihood of being mismatched to buy up since housing consumption then is considered too small, while lower income or a smaller family increases the likelihood of being mismatched to buy down, i.e. housing consumption is too large.

This distinction of being mismatched to buy up or to buy down seems crucial in a model that involves CGT. Roll-over provisions for households that buy up, but not for households that buy down, are features of the tax system in many countries. As noted in the previous section, CGT in Sweden used to be of a considerably greater concern to those who considered to buy down.[8] Therefore, one should not necessarily expect an impact of CGT on the decision to buy up, and this important aspect is captured in our model.

We follow Hanushek and Quigley (1979), but extend their model to allow for transaction costs. It is assumed that a household with a set of characteristics, C, like family size, maximizes a utility function, U_c, that includes housing services, H, and consumption of other goods, X. We have $U_c(H,X)=V(C,H,X)$, where $V(.)$ represents the utility of a household with characteristics C. Maximization subject to the budget constraint $Y=PH + X$, where Y is income and P is the price of a unit of housing consumption relative to the prices of other goods, X, yields the demand for housing services as

(1)
$$H=H(C,\ Y,\ P).$$

Housing consumption is increasing in Y and decreasing in P. Equation (1) defines housing consumption at time t, where it is assumed that desired consumption equals actual consumption, i.e. $H^d = H$.

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[7] Wheaton (1990) introduced search costs in his model, which has been extended to allow for capital gains taxation by Lundborg and Skedinger (1995).

[8] After the 1991 tax reform all house owners faced the same rules.

To determine the matching status of the household at time $t+1$, we define the variables I^+ and I^- as

(2)

$$If \ H_{t+1}^d - H_t^a > 0 \quad then \ I^+ = 1 \ else \ I^+ = 0$$
$$If \ H_{t+1}^d - H_t^a < 0 \quad then \ I^- = 1 \ else \ I^- = 0,$$

where I^+ indicates that the household is mismatched to buy up and I^- that it is mismatched to buy down.

Only households mismatched to buy up (buy down) have a positive probability of buying up (buying down). Let M^+ be the event that a household buys up. The conditional probability of buying up, P^+, is then given by the size of the gap between desired and actual housing consumption, as in (2), and the relevant transaction costs when buying up:

(3)

$$P^+ = Prob \ (M^+ \ |I^+ = 1) = P^+ \ (H_{t+1}^d - H_t^a, \ T^+)$$
$$P^+ = Prob \ (M^+ \ |I^- = 1) = 0,$$

where T^+ is the vector of transaction costs when buying up, including CGT applicable when buying up. Now, let M^- be the event that a household buys down. We then obtain the conditional probability of buying down in the corresponding way as

(4)

$$P^- = Prob \ (M^- \ |I^- = 1) = P^- \ (H_{t+1}^d - H_t^a, \ T^-)$$
$$P^- = Prob \ (M^- \ |I^+ = 1) = 0,$$

where T^- is the vector of transaction costs, including CGT, associated with buying a less expensive house.

The transaction costs may be of different types. Besides taxes there are monetary moving costs and costs of a psychic nature. Costs that are unrelated to taxes are independent of whether the household buys up or down and these costs are therefore

included both in T^+ and T^-.

We assume that a moving household eliminates the gap between desired and actual housing consumption completely, so the demand function is again described by (1) immediately following a change of residence.

What about the probability of staying? A household that is neither mismatched to buy up nor to buy down is obviously in a matched state and will not move. This follows from (3) and (4) since if $I^+=I^-=0$, we have that $P^+=P^-=0$, and since $P^+ + P^- + P^0 =1$, we obtain $P^0=1$. However, due to the presence of transaction costs, also a mismatched household has a positive probability of staying. Therefore the (unconditional) probability of staying is

$$(5) \qquad P^0 = Prob\ (M^0) = P^0(H_{t+1}^d - H_t^a,\ T^+,\ T^-),$$

where $P^0\ (0,\ T^+,\ T^-) = 1$.

III. The Data.

We use the Level of Living Surveys, based on interviews with about 6 000 households in Sweden in 1981 and 1991. These surveys provide a great deal of information regarding factors that affect the household's propensity to move: household and individual characteristics, such as tenure type, assessed tax value of the house (*taxeringsvärde*), family size, duration in current dwelling and age of the head of household. For these variables, we have data for a given household at two points in time: 1981 and 1991. In addition, for each year during the period 1981-91, there is information regarding residential mobility, household income and the marital status of the interviewee. These data are based on the households' tax returns. Using both the survey and the tax return data enables us to create a panel of house owners with observations for the whole period 1981-91.

For each household and year we determine whether the household has bought up,

bought down or stayed in the same residence. Residential mobility is defined as a change in the place of registration for census purposes (*mantalsskrivning*).[9]

To this data set we have added capital gains tax variables for house owners, computed according to the rules described in Section I. These variables capture the tax payments should the household move up or down during the year. We therefore observe the variables also for households that do *not* move.

There are several inputs in the construction of the tax variables. They are based on the expected capital gains, i.e. the difference between the expected sales price and the purchase price (the price of the house at the time it was bought) after deductions. For the years 1981 and 1991, we have computed these prices based on the assessed tax values of the houses as reported in the 1981 and 1991 surveys.

The assessed value is 75 per cent of the market value a few years before the assessment, which gives us information about the expected sales prices for 1981 and 1991. For the period 1982-90 these prices are not observed, but are approximated with a regional house price index (published by Statistics Sweden).

Purchase prices are based on assessed tax values, a regional house price index and information regarding the year of acquisition.[10] If local house price inflation deviates from the regional house price inflation and if the dwelling has been modified in a substantial way, before or after the tax assessment, our measure of purchase and sales prices will be

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[9] Moves that are reported to the authorities during the period January - November will be registered in the following calendar year, but moves during December are not registered until the second calendar year after the change of residence. There is no information in the data set about the month in which the household has moved and we have assumed that all moves have occurred in the period January to November. In our data, the household's year of changing residence is thus the year immediately preceding the year of registration.

In principle, all moves except temporary ones and those occurring within a multi-dwelling unit should be included in this measure. However, it is quite likely that some moves are not recorded and it could also be the case that some moves are recorded which have actually not taken place. For example, there may be economic incentives for household members to illegally register themselves at an incorrect address, since this may make it easier to obtain housing allowances or tax deductions for travels to work.

[10] For acquisitions before 1981 we have used information in the 1981 survey, where respondents were asked about years of residence in the current dwelling. This variable may not necessarily correspond to the year of acquisition and may also be mismeasured due to memory lapses, especially when the respondent's most recent move occurred a long time ago. Since the regional house price series only goes back to 1957, all observations with acquisitions before that year have been assigned 1957 as the year of purchase. For acquisitions during the period 1981-91, the year of acquisition is based on the register data, which we regard as more reliable than the self-reported data in the 1991 survey.

different from actual prices.[11]

We deducted the broker's fee, when applicable. However, since we have no information regarding improvements and repairs during the period we made no deductions for such house alterations. We allowed, however, for a deduction of SEK 3 000 per year for ownership during the period 1952-80. For the year 1991, under the new tax rules, we have assumed that the household chooses the tax rule that minimizes the tax payment.

Since tax payments during the period depended on whether the household bought up or down (except in 1991), we computed the tax variables CGT^+, which is the tax payment if a more expensive house is bought, and CGT^- that represents the tax when buying a cheaper house. As noted above, CGT^- should be regarded as a maximum tax since the actual tax depends on the price of the new house. For households with a taxable gain larger than SEK 15 000, CGT^+ has been zero before 1991, whereas the size of CGT^- has varied with house price inflation and marginal tax rates. In 1991 taxes could no longer be postponed, so there is no difference between the two variables for this year.

Since we have information about residential mobility and the assessed tax values of the old house and the new house, we can differentiate between moves when the households buy up and when they buy down. This allows us to investigate whether the tax system has affected the two types of mobility in different ways.

To create a sample of respondents to compute CGT for, we have only included those house-owners who have not moved more than once during the period. The reason for this is that we observe which type of dwelling the household resides in during the years 1981 and 1991 only, and consequently we cannot compute CGT for spells of residence that both begin and end during the period 1982-90. Moreover, we only included a respondent who, for the years 1981 and 1991, was head of household, or spouse of head of household, and was living in an owner-occupied single-family house. Another requirement for being included is that a respondent, for the period 1981-1991, had no farm income or did not own a housing unit without permanently residing there (*utbomarkering*). Finally, we

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[11]It has been observed that additions is a relatively uncommon way to change housing consumption. In the Swedish sample used by Edin and Englund (1991), only 4 per cent of the households made significant additions during the year preceding the interviews.

excluded respondents who belonged to the special extended sample of immigrants in 1981 or 1991.

IV. Empirical Results.

IVa. The Econometric Specification.

With the household facing three choices, the appropriate econometric approach is a multinomial logit model. Our dependent variable takes on three values since the households may buy up, buy down or not move during the year. We estimate the probability of buying up as P^+/P^0 and the probability of buying down as P^-/P^0. Since we focus on residential mobility, rather than housing demand *per se*, we specify the logit model as non-ordered.

In line with our theoretical model, we include household income and family size among the explanatory variables. Changes in these variables indicate whether the household is mismatched to buy up or to buy down. Permanent income is denoted by Y_t^P and our income change variable is $\Delta Y_t^P = Y_t^P / Y_{t-1}^P - 1$. For households that have not moved, Y_t^P is the weighted average income during the last three years. For households that have moved, Y_t^P is basically given as the weighted average income up to three years after the move.[12] This follows from the assumption that recent movers are in equilibrium. If ΔY_t^P is positive, the household is mismatched to buy up and, if negative, it is mismatched to buy down. Mismatching is also measured by changes in family size and this variable is made up of changes in the number of children and adults, also determined with the year of moving as the base year.

As noted above, our CGT-variable measures the maximum tax and the actual tax depends on the value of the new house. The more expensive the new house, the lower is the tax to be paid. This implies that a household that is only slightly mismatched to move down is little affected by the tax and is hardly deterred from moving. The degree of

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[12] The weights are the following: For households that have not moved, or have moved during year t or year t-3 or earlier, we have $Y_t^P = .5Y_t + .3Y_{t-1} + .2Y_{t-2}$. For households that moved during t-1, $Y_t^P = Y_t$. For households that moved during t-2, $Y_t^P = .6Y_t + .4Y_{t-1}$.

mismatching thus matters for the deterrence of CGT⁻ since buying a much cheaper house would result in a large tax payment and buying a slightly cheaper house results in smaller payment. Moreover, if the household experiences a rise in income CGT⁻ is not deterrent since the household is expected to buy up. Define a variable ΔY^- (suppressing the index t) representing the degree of downward mismatch in permanent income (ΔY^p). The variable ΔY^- is the absolute value of ΔY^p. If ΔY^p is non-negative ΔY^- is set to zero. To capture the dependence of the variable CGT⁻ on the degree of downward income mismatching, we multiply CGT⁻ by ΔY^-. We also allow for non-linearities in this variable by multiplying CGT⁻ with the square of ΔY^-.

Unlike the actual CGT⁻ the household pays after having adjusted to the tax rules, the maximum amount of CGT⁻ is exogenous to the household and is the policy variable of interest.

The taxes to be paid in case of buying up, CGT⁺, are, however, not dependent on the price of the new house. Therefore, we multiply CGT⁺ with a dummy variable that takes on a unit value when income has increased and zero otherwise. Similarly, we interacted the family size variable and house prices with the CGT variables. House prices are measured as the (real) regional house price index.

It seems reasonable to express capital gains taxes as a share of capital gains since a large tax payment may be less prohibitive if the tax base itself is large. However, since capital gains may be zero or negative, despite a positive tax, we included capital gains as a separate variable in the analysis.

As noted in the theoretical section, transaction costs may also be of a psychic nature. In our model, duration in the current dwelling and age of the head of household, may be interpreted as proxies for such costs. Duration determines the strength of neighbourhood attachment that may inhibit mobility despite a mismatch. Age may affect the agony and physical strain of moving and also hamper mobility. These arguments imply that duration and age should be included as proxies for psychic transaction costs in the

vectors T^+ and T^-.[13]

Other interpretations of duration and age are possible in our framework. As a moving household eliminates the gap between desired and actual housing consumption there are no incentives to move directly after having bought a new house. However, the household may acquire information about the new residence and its neighbourhood and over time realize that it is mismatched. If so, duration should be included in the vector C as a proxy for mismatching status. We test for these alternative interpretations by including duration and age either in the T-variables or in the C vector.

Since the taxes partly depend on duration, including it as a separate variable allows us to distinguish the effects of CGT from those of other transaction costs. As noted, nominal gains were taxed during the first four years of ownership, real gains thereafter.

IV.b *Sample Characteristics*

We now turn to a description of some key variables in the data set. In Table 1 we present statistics regarding residential mobility. About one third of the households moved during the period. There is a great deal of variation in mobility during the period. The highest figure is for 1988, when 6.5 per cent of the households moved, and the lowest occurred in 1990, when only .9 per cent moved. During 1982-90, 12 per cent bought up and 18 per cent bought down (not shown).

Table 1. Moving Households. Per cent.

1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
2.5	4.3	5.2	3.3	3.1	2.2	3.0	6.5	1.3	.9	4.3

[13] Duration and age are commonly included in empirical studies on housing demand and residential mobility, but often without any explicit theoretical basis.

Table 2 shows the real CGT for households in the sample. Recall that CGT^- represents the *maximum* tax payment, so the figures for CGT^- and CGT^+ are not directly comparable.

The variation in CGT depends on house price inflation, marginal taxes and changes in the distribution between households with taxation on nominal and real gains. The average CGT^+ was very low in the period 1981-90, with values around SEK 1 000. Since the maximum payment has been limited to SEK 15 000, relatively few households have been subject to taxation. In 1991, when postponements were no longer allowed, CGT^+ increased sharply from SEK 1 400 to 23 300. Another important change was that practically all households buying up became liable to taxation. Average CGT^- has been substantial throughout the period, with considerable variation across the years (SEK 7 300 - 26 800). There is also a great deal of variation across households, as seen in the column showing the maximum values of CGT^-. Between 34 and 68 per cent of the households in the sample were subject to taxation until 1991, when CGT^- and CGT^+ were equalized. The

Table 2 Expected Capital Gains Taxes, in 1979 Prices (SEK).

Year	CGT^+ Mean	Share $CGT^+>0$	CGT^- Mean	CGT^- Max	Share $CGT^->0$
1981	1,400	20 %	22 700	342 600	62 %
1982	1 300	19 %	16 400	165 000	51 %
1983	1 000	16 %	11 300	118 500	42 %
1984	900	14 %	8 800	110 000	36 %
1985	1 000	15 %	7 300	91 400	34 %
1986	1 100	16 %	8 300	102 100	36 %
1987	1 100	16 %	12 100	136 200	42 %
1988	1 200	17 %	17 900	211 900	50 %
1989	1 300	21 %	25 800	278,500	63 %
1990	1 400	20 %	26 800	256 200	68 %
1991	23 300	100 %	23 300	88 900	100 %

Note: The share figures represent the proportion of households that are liable to taxation. CGT^+ is the actual amount of taxes when buying up, whereas CGT^- is the maximum tax payment when buying down. The column CGT^- max expresses the highest maximum tax for any household.

tax reform in 1991 produced little change in average CGT⁻ as compared to the two previous years, but all households became subject to taxation when buying down.

Table 3 contains data regarding some important variables for households who buy up, buy down and for the whole sample. The data refer to the households included in our estimations 1984-90. Those buying up are, on average, younger, have more children, higher income and shorter duration in the current dwelling than those buying down.

Table 3. Sample Means.

Variable	Households buying up. At time of move.[a]	Households buying down. At time of move.[b]	All households. Average 1984-1990.[c]
Age	44.9	49.1	49.0
No. children	2.2	2.0	2.0
Permanent income[i]	63 445	56 423[d]	60 282[e]
Duration	8.7	9.8	17.2
CGT⁺	462[f]	808[g]	1 089[h]
CGT⁻	9 366[f]	14 114[g]	15 674[h]
Capital gains	-8 861	16 696	22 375

Notes: [a]65 households.[b]107 households.[c]3 648 observations (households x years). [d]104 households.[e]3 563 observations. [f]64 households.[g]106 households. [h]3 575 observations. [i]Permanent income is defined as in text.

Although those buying up on average make a capital loss they will pay a positive capital gains tax. This, however, amounts to only SEK 462 which is slightly lower than for those moving down had they decided to buy up, SEK 808. The maximum tax in case of buying down is considerably higher; SEK 9 366 for those buying up had they decided to buy down, and SEK 14 114 for those buying up.

IV.c *The Regressions.*

Before presenting the results, it is appropriate to discuss some estimation problems. First, there is an obvious possibility of sample selection bias in the estimates. As mentioned in Section III, we had to exclude households that moved more than once during the period, since the CGT variables cannot be computed for this group. A standard method to deal with such a sample selection bias is Heckman´s two-step procedure. We have performed binomial logit estimations on period-averages for the whole sample, where the dependent variable indicates whether the household has moved or not moved during the period. As explanatory variables we used household income, family size, duration, duration squared and age. Based on these cross-section estimates we have computed Heckman´s λ for each household and included this as a separate variable in the estimations in order to control for selection bias.[14]

Secondly, there may be a problem with omitted variables that affect the household´s propensity to move. Some households in our sample may be more mobile than others, due to e.g. unmeasured personal traits. If these omitted variables are correlated with the included variables, our estimates will be biased. It is reasonable to assume that such influences on mobility vary across households but are fixed over time, so that a fixed-effects specification is appropriate. The traditional method to control for fixed effects is to first-difference the data or introduce dummy variables. In models with discrete dependent variables, however, this is not feasible. Instead we focus only on those households that have moved during the period, and delete the observations for households that have not moved. This enables us to control for fixed effects (see e.g. Baltagi, 1995, and Greene, 1993).

Table 4 shows the estimates with fixed effects for the probabilities of buying up and buying down, respectively. (The corresponding estimates without consideration of fixed effects are presented in an appendix.) Since non-moving

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[14]It would have been preferable to include also CGT^+ and CGT^- in the estimations of Heckman´s λ. However, these variables are not observed for households that have moved more than once.

Table 4. Maximum-likelihood estimates of the multinomial logit model, household panel data 1984-90. Dependent variables: The (log of) probability to buy up and the probability to buy down, both divided by the probability to stay. Fixed effects.

Variable	Buy up		Buy down	
	α	γ	α	γ
Constant	-12.3101*** (2.226)		-7.6610*** (1.926)	
Change in permanent household income	1.1891** (0.560)	0.03988	0.6598 (1.445)	0.03151
Change in family size	1.5883*** (0.456)	0.05357	0.7297 (0.499)	0.03432
CGT$^+$ x dummy for increased income x 1000	-0.12 (0.127)	-0.0040	-0.10 (0.071)	-0.0049
CGT$^-$ x decreased income x 1000	1.16 (0.838)	0.0418	-0.82** (0.404)	-0.0443
CGT$^-$ x decreased income squared	-0.0163 (0.016)	-0.000570	0.0028** (0.001)	0.000175
Capital gain x 1000 000	-8.39*** (3.218)	-0.28989	-0.287 (2.734)	0.0016
Change in regional house prices	1.9392 (2.177)	0.0739	-3.4584* (1.909)	-0.1811
Duration in current dwelling	1.2059*** (0.255)	0.0398	1.0256*** (0.198)	0.0502
Duration squared	-0.0431*** (0.013)	-0.0014	-0.0324*** (0.009)	-0.0016
Age	0.0026 (0.018)	0.00007	0.0105 (0.015)	0.00053
Heckman's λ	0.1645 (0.804)		-0.2415 (0.822)	
Likelihood ratio	2 916			
No. observations	1 476			

Notes: Only those households that have moved during the period are included in the sample. Coefficient estimates are denoted by α and slope estimates by γ. Year dummies are included in all regressions. Standard errors in parentheses. * = significance at the 10 per cent level, ** = 5 per cent, *** = 1 per cent.

households have been excluded, and after having accounted for the fact that permanent income depends on income lagged up to three years, the sample size is reduced from 4 536 to 1 476 observations over the period 1984-90. We excluded 1991, since we suspected the classification of households buying up and buying down to be unreliable for this year.[15]

As the coefficient estimates (α) in Table 4 are not easily interpreted we also present the slope estimates (γ).[16] The latter show how much the probability to buy up (or down) is changed from a unit increase in a variable (see, for instance, Greene, 1993).

Increases in permanent income yield a significant and positive effect on the probability to buy up. As the change in permanent income rises by 1 percentage unit, the probability rises by .04. Decreases in income, however, do not seem to increase the probability to buy down. A possible interpretation of this result is that households in general have large enough margins for income losses and are not forced to move when incomes fall.[17]

Increases in family size produce an expected increase in the probability to buy up. As the change in family size increases by 1 percentage unit, the probability of moving to a more expensive (and presumably larger) house rises by .05. Also, capital gains affect residential mobility by unexpectedly lowering the propensity to move up.

The duration variables exert a significant influence on the probabilities of moving. Our specification of the duration variables implies that duration is treated as a household characteristic and not as an integral part of the transaction costs. (See Section IV.a.) This interpretation is supported in the regressions. An increase in duration raises the probability of buying up and the probability of buying down at decreasing rates. The estimates of the duration variables thus imply a hump-shaped pattern, which is in line with several studies that deal with the determinants of housing demand.

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[15] We do not know whether the households that have moved during 1991 have reported the assessed tax values of their houses before or after the move.

[16] Standard errors are presented for coefficient estimates only and may be different for slope estimates.

[17] Such income margins would normally be a requirement for obtaining the necessary loans for the house.

Consider now the effects of capital gains taxes. It can be noted that the estimates where CGT⁻ is multiplied by decreased income (i.e. with the degree of mismatching to buy down) yields a significant estimate of the expected negative sign on the probability of buying down. Also, non-linearities are present. The total effect, including the non-linearities, implies that if CGT⁻ rises by SEK 1 000, the probability of buying down falls by .00031 (not shown in the table). As expected, the decision to buy up is unaffected by CGT⁻.

The estimates concerning the probability to buy down thus imply that the effects of taxation depend on the degree to which the household is mismatched to buy down. In Figure 1, we have plotted the effect on the probability of buying down following a 1 per cent increase in CGT⁻ against the degree of mismatching.[18] The absolute value of the derivative increases at a decreasing rate as the degree of mismatching rises. While the effect is small at the mean, .016, it is considerably larger when the degree of mismatching approaches its maximum value in our sample, .41. The figure shows the lock-in effects increase drastically in income mismatch and that large income reductions are necessary for the tax to have a sizeable negative influence on residential mobility.

Are the effects we find small or large? The elasticity of the variable where CGT⁻ is interacted with a decrease in income is -0.078 (the total effect) with respect to the decision to buy down. The elasticities of changes in permanent income and family size with regard to the decision to buy up are .025 and .006, respectively. Thus the tax effects are not at all small when compared to the effects of other variables that commonly are considered in analyses of residential mobility.

In the appendix we report the results obtained with the larger sample (4 536 observations), where fixed effects have not been accounted for. In many cases the estimates are now quite different. The effects of capital gains taxes are, though, fairly robust. As in the fixed effects regression, we find that an increase in CGT⁻ lowers the probability to buy down and the effect depends on the degree of income mismatch. Moreover, as in the fixed effects regression, CGT⁺ does not seem to affect the probability to move in either direction. These results show the importance of accounting for the fixed effects.

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[18] As explained in Section IV.a, ΔY^- assumes a zero value for a household with increasing income.

We have performed several additional regressions (available on request). Previously we argued that duration and age also may act as proxies for transaction costs. We therefore interacted these variables with the degree of mismatch. Compared to the results in Table 4, the effects of taxes were very similar and the estimates of the transformed duration variables were also highly significant. One may thus argue that duration can affect residential mobility as a household characteristic as in Table 4 (by making the household mismatched) as well as representing transaction costs. It should be recognized, however, that composition effects may make the interpretation of the duration estimates difficult.

In creating a data set like the present one, there are naturally risks for measurement errors. For instance, we have assumed that the assessed tax value reflects the true market value of the house. This may not necessarily be so. While we have quite accurate data on which households that have moved, there may be cases where a household buying up (down) is incorrectly classified as buying down (up). The risk for measurement errors is naturally larger for those households that have made only small changes in housing consumption. Relatively few households have made small changes. In our data, 13 per cent of those buying up, bought up less than 5 per cent, while 11 per cent of those buying down, bought down less than 5 per cent.

V. Concluding Remarks.

We have calculated the capital gains taxes applicable when moving to a more expensive house and when moving to a less expensive one. This has been done for households in the Level of Living Surveys and the data have been described at some length. We believe that such data are of interest in their own right since there is very little information on the transaction costs in the housing market. Our data obviously have a variety of applications and in this paper we have estimated the effects of CGT on residential mobility.

Our approach is based on the notion that residential mobility is driven by households becoming mismatched. The empirical results concerning changes in income and family size are, in general, supportive of this model. Assuming that CGT only matters if the house-owner has been mismatched due to changes in income, we found that higher

taxes for those mismatched to buy down (in terms of lower income) reduce the probability to buy down. The effect of the taxes on the probability of buying down depends on the size of the income loss, i.e. on the degree of mismatching. Given that the taxes in the case of buying up are low and never exceed SEK 15 000, we were not surprised to find that this tax does not affect residential mobility.

Our results highlight the importance of distinguishing the transaction costs involved in buying down from those applicable when buying up. Moreover, it is necessary to take into account the degree of mismatch when analyzing the effects of CGT. These aspects have largely been ignored in the previous literature on residential mobility.

The elasticity of residential mobility with respect to capital gains taxes is not negligible and comparable to those obtained for other variables like changes in income and family size. Still, one should remember that even if CGT is abolished, other transaction costs remain that hamper residential mobility.

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APPENDIX

Table A.1. Maximum-likelihood estimates of the multinomial logit model, household panel data 1984-90. Dependent variables: The (log of) probability to buy up and the probability to buy down, both divided by the probability to stay.

Variable	Buy up		Buy down	
	α	γ	α	γ
Constant	-10.5010*** (1.857)		-8.0299*** (1.538)	
Change in permanent household income since last move	0.5367 (0.764)	0.00652	-1.5422 (1.589)	-0.02683
Change in family size since last move	0.3777 (0.303)	0.00443	-0.3377 (0.494)	-0.005929
CGT⁺ x dummy for increased income x 1000	-0.1 (0.122)	-0.0011	-0.04 (0.066)	-0.00067
CGT⁻ x decreased income x 1000	0.983 (0.688)	0.01149	-0.67* (0.352)	-0.01181
CGT⁻ x decreased income squared	-0.0131 (0.0126)	-0.000152	0.0020** (0.001)	0.0000380
Capital gain x 1000 000	1.773 (2.711)	0.0188	8.051*** (2.011)	0.1391
Change in regional house prices	-1.3360 (1.699)	-0.01442	-4.8818*** (1.499)	-0.0843
Duration in current dwelling	0.8993*** (0.214)	0.01022	0.8224*** (0.156)	0.01406
Duration squared	-0.0484*** (0.011)	-0.000550	-0.0423*** (0.007)	-0.000723
Age	0.0026 (0.017)	0.0000238	0.0290** (0.013)	0.000502
Heckman's λ	0.5540 (0.533)		0.5675 (0.405)	
Likelihood ratio	9 036			
No. observations	4 536			

Notes: Coefficient estimates are denoted by α and slope estimates by γ. * = significance at the 10 per cent level, ** = 5 per cent, *** = 1 per cent. Year dummies are included in all regressions. Standard errors in parentheses.

Figure 4.1 Lock-in effects and mismatching. Effects on the probability of buying down of a 1 per cent increase in capital gains taxes (CGT⁻) at various income reductions.
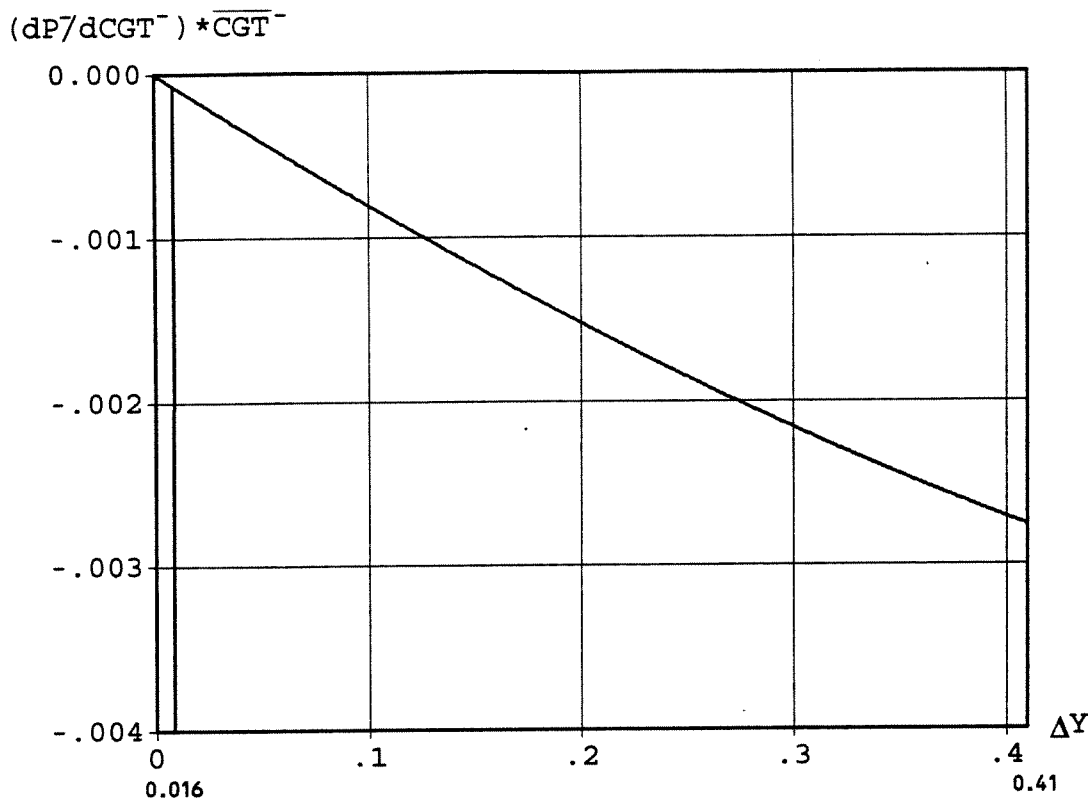
Note: .016 is the average income reduction and .41 the maximum.