J Popul Econ (1998) 11:113–126

Journal of
Population
Economics

A panel study of migration, self-selection and household real income

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Received: 10 May 1995 / Accepted: 14 August 1996

Abstract. The impact of migration on income for Swedish multi-adult households is examined using panel data pertaining to a sample of stable household constellations during the period 1980–1990. In contrast to previous studies, data on household disposable income is employed in estimating the income function. The empirical results indicate no significant effect on real disposable income from migration. In addition, the hypothesis of no self-selection, or zero correlation between the errors in the decision function and the income function, cannot be rejected.

JEL classification: C33, J61, R23

Key words: Family migration, family income, self-selection

1. Introduction

The purpose of this study is to examine the potential influence of migration on total household real income while taking account of the potential correlation between unobserved household characteristics exerting influence on both the decision to migrate and on household income.

Empirical analyses of changes in individual income subsequent to migration indicate that the determinants of the net benefit from migration may also exert influence on the probability for mobility. That is, data on income for migrants and non-migrants respectively are non randomly selected. This should be accounted for in econometric analyses. Probably depending on

All correspondence to Olle Westerlund. We acknowledge helpful comments by Kurt Brännäs and Karl-Gustaf Löfgren, Department of Economics, Umeå University, Klaus F. Zimmermann, and two anonymous referees. *Responsible editor*: Klaus F. Zimmermann.

data limitations, the small number of previous studies on self-selection, internal migration and subsequent income, measure the effects of migration on income for only one individual in the household. We contribute to earlier research by considering the effects of migration on total household income, rather than focusing on the income of only one member of the household. Further, we consider changes in real income instead of nominal income. To our knowledge, no previous study has focused on the issue of potential correlation between the decision to migrate and household total real income.

The paper is structured in the following way: Section 2 provides a short review of earlier research relevant to the aim of this study; Sect. 3 explains the theoretical basis for the empirical analysis; description of data and presentation of estimation results are contained in Sect. 4; and the final section provides our conclusions.

2. Effects on income from geographical mobility

Empirical studies in the 1960s and 1970s generally found higher income for migrants than for non-migrants (see Greenwood (1975, 1985) for surveys). This finding, based mainly on aggregated data, has largely been confirmed in more recent research based on micro data and applying more sophisticated econometric techniques. Using a model based on location choice over the life-cycle and data pertaining to inter-state migration in the United States, Polacheck and Horvath (1977) found that households gain significantly in income from migration and that expected income gains influence the probability of migration.

Nakosteen and Zimmer (1980) represents the first attempt to explicitly acknowledge the problem with self-selectivity in assessing the returns from inter-state migration in the United States. Using micro data and an econometric model characterised by "endogenous switching" they estimated reduced and structural forms of the decision function and separate income equations for migrants and non-migrants. They found a significant effect from self-selection on the income of non-migrants but not on the income for movers and that the probability for relocation is significantly affected, in an anticipated direction, by expected gains in income from migration. Evidence of significant self-selection in the context of regional and/or interindustry mobility in the United States was found in Nakosteen and Zimmer (1982). Again, they found that expected income gains from mobility were a significant factor in the decision functions. Studying inter-provincial migration in Canada, Robinson and Tomes (1982) reported evidence of self-selection in the wage equations and found the expected wage gain to be a significant determinant in the structural-from decision function. Hunt and Kau (1985) analyzed inter-county migration of young males in the United States and found that repeat migrants receive significantly higher incomes than others. The self-selectivity was not statistically significant in their study. Nakosteen and Zimmer (1992) found that employees subject to regional interstate relocation within firms in the United States receive higher income than non-transferred workers. The observed income gains were found to depend on endogenous selection rather than being the result of relocation.

Tunali (1986) considered three different choices; stay, move once, and move more than once. Using a double-selection framework and a detailed micro data set pertaining to Turkey, it was found that selectivity is a significant factor in the standard human capital model. However, he concluded:

"… when some of the finer dimensions of the income determination process are accounted for, the evidence is no longer there. This seem to favour the "omitted variable bias interpretation of selectivity" (p. 262–263).

Falaris (1987) estimated state specific wage equations for Venezuela using a nested logit model of the choice of location. Significant selectivity effects were indicated in 6 out of 17 wage equations and observed migratory behaviour was found to be compatible with the concept of comparative advantage. That is, predicted individual income gain is a significant determinant in the structural version of the migration function. Holmlund (1984) studied the effects of job mobility (i.e., change of employer) on wages in Sweden 1968–1974. Evidence of significant influence from selectivity is found only in the wage equation for job stayers. Moreover, the empirical results indicate that prospective wage gains from a change of employer affects mobility in the anticipated direction.

As noted in the introduction, none of these studies deal with the effects of migration on total household income, in severel cases they employ data sets offering little information on household attributes that are potentially important as determinants of migration and/or income, and they ignore variation in prices over locations.

3. Analytical framework

Migration is assumed to be due to variation in utility across different locations. A household relocates simply if the utility from residing in another location is greater than the utility from staying in the present location. Heterogeneity among households causes differences in pecuniary and non-pecuniary net benefits from residing in a specific location. This is due to households having different utility functions or that they face different market prices or shadow prices (for non-market goods).

The household is assumed to choose location j^* from the set of locations J if

$$PVNB^{j*}(t) = \left\{ \max_{j \in J} \int_0^T (\mathrm{Y}_j - \mathrm{Y}_\mathrm{p})\, \mathrm{e}^{-\mathrm{r}t}\, \mathrm{d}t - \mathrm{C}_{\mathrm{m}j} \geq 0 \right\}, \qquad (1)$$

where $PVNB^{j*}(t)$ is the net present value at time t in location j^*, Y_j and Y_p indicate net benefits from residing in location j and in the present location p, r is a discount rate, and $\mathrm{C}_{\mathrm{m}j}$ is the immediate direct moving cost arising from the relocation from p to j.

Net benefits may differ between individuals in the household. Obviously, there is little reason to anticipate income-induced migration in cases where expected gain in income for one household member is outweighed by expected decreases in income for others in the household, pre-

dominantly reductions in the income of the spouse. Presumably, the availability of income opportunities for both spouses play a prominent role in the location decisions of the increasingly large number of two-earner households. An individual, included as a unit of observation in a data set, may act as a "tied" mover or "tied" stayer (Mincer 1978), that is, as an inmigrant into/stayer in a region she would find inferior to other locations if single. In fact, as shown by Mont (1989b), maximum net benefits for the household may be reached for a geographical location both spouses would find sub optimal in the alternative case of being single.

The difference between individual gain from a free optimum and the individual gain from a family optimum is a measure of "the negative private externality imposed by family migration" (Mincer 1978, p. 755). Let $PVNB_1^{\max}$ and $PVNB_2^{\max}$ represent the potential optimum for individuals 1 and 2, which would be realised in the absence of family ties. These are to be distinguished from the acual individual outcomes from the family decision, $PVNB_1$ and $PVNB_2$.[1] Family ties can be measured as

$$T = (PVNB_1^{\max} - PVNB_1) + (PVNB_2^{\max} - PVNB_2) \; . \tag{2}$$

The total net gain from migration for the family has to be positive according to (1). In addition, the negative externality has to be internalised since the two individuals will go separate ways if the gain from being a couple is less than T. In the context of the present study, we consider only stable household constellations, i.e., T can be perceived as being internalised. Ties exist if for at least one individual $PVNB_{\mathrm{i}}^{\max} - PVNB_{\mathrm{i}} > 0$. This means that both spouses may be tied movers or tied stayers. The effects on migration rates, from an increase in marriages or from an increase in spouses entering the labor force, create tied stayers and tied movers. Mincer (1978) argues that, on balance, family ties reduce migration. However, using a search-theoretic approach, Mont (1989b) shows that the effect on labourmarket related migration rates from marriages between individuals who both remain in the labour force, is ambigous.

The underlying determinants of household net benefits exert influence via individual net benefit and/or the negative externality from residing in a specific location. These variables can, broadly speaking, be divided into individual characteristics, other household characteristics, and characteristics of regions. The determinants of net benefits (including income from gainful work) will be discussed further below.

Treatment-effect model

Other things equal, we expect income over regions to be positively correlated with the net benefits over regions. Therefore, we expect variables determining household income at different locations to influence the decision to migrate. Consequently, the error terms in the decision function and in the income equation can be correlated.

Let Y indicate the level of household income and let X be a vector of observable variables that exerts an influence on income. We have observations at two points t_0 and t_1 in time and define

$$y \equiv Y_{t_1} - Y_{t_0} \quad \text{and} \quad x \equiv X_{t_1} - X_{t_0} .$$

A fraction of the households in the sample undertakes migration in the period from t_0 to t_1 which, given the values of x, is expected to increase income. A stochastic version of the income-change equation is

$$y = x\beta + \alpha M + \varepsilon , \tag{3}$$

where M is a binary variable equal to one if the household relocates during the period and equal to zero otherwise, β is a vector of coefficients, and ε is the stochastic error term. The error term is assumed to be normally distributed with zero mean and variance σ_ε^2. Direct estimation of (3) results in biased results if the sub-samples of migrants and non-migrants are non-randomly selected. We model the decision of whether to stay or to migrate as

$$M^* = W\gamma + \omega , \tag{4}$$

where W is a vector of observable variables affecting net benefits from migration, γ is a vector of coefficients, and ω is the random error term normally distributed with zero mean and variance σ_ω^2. The variable M^* is latent and

$$M = \begin{cases} 1 & \text{if } M^* = W\gamma + \omega > 0 \\ 0 & \text{if } M^* = W\gamma + \omega \leq 0 \end{cases} \tag{4'}$$

is the observed migration decision.

The expected change in income for migrants and non-migrants is given by

$$E[y|M = 1] = x\beta + \alpha + E[\varepsilon|M = 1] = x\beta + \alpha + \rho\sigma_\varepsilon \phi(W\gamma)/\Phi(W\gamma) \tag{5}$$

and

$$E[y|M = 0] = x\beta + E[\varepsilon|M = 0] = x\beta - \rho\sigma_\varepsilon \phi(W\gamma)/(1 - \Phi(W\gamma)) , \tag{5'}$$

where $\phi(\cdot)$ and $\Phi(\cdot)$ are the standard normal density and distribution functions, respectively. Assuming that ε and ω is bivariate normally distributed with correlation ρ, the difference between income changes for migrants and non-migrants can be expressed (e.g., Greene 1993, p. 706–714) as

$$E[y|M^* = 1] - E[y|M^* = 0] = \alpha + \rho\sigma_\varepsilon \left[\frac{\phi(W\gamma)}{\Phi(W\gamma)[(1 - \Phi(W\gamma)]}\right] . \tag{6}$$

Probit estimation of (4) yields estimates of γ, so that $\phi(W\hat{\gamma})$ and $\Phi(W\hat{\gamma})$ can be computed for each observation. In the next step we use OLS and estimate the income-change equation for the whole sample

$$y = x\beta + \alpha M + \rho\sigma_{\varepsilon}\lambda(W\hat{\gamma}) + \tau \ , \tag{7}$$

where $\lambda(W\hat{\gamma}) = \phi(W\hat{\gamma})/\Phi(W\hat{\gamma})$ for $M = 1$ and $-\phi(W\hat{\gamma})/(1 - \Phi(W\hat{\gamma}))$ for $M = 0, \tau$ is a normally distributed error term, and $\rho\sigma_{\varepsilon}$ a parameter to be estimated. The *t*-test associated with the estimate of this parameter is then a test of H_0: $\rho = 0$. The estimate of α is the estimated effect on income change from migration when potential effects from non-random sampling are accounted for.

4. Empirical analysis

Data

The empirical analysis is based on the Swedish household survey, Level of Living Survey 1981 and 1991 (LNU81 and LNU91).[2] The LNU is a random sample from the adult population of Sweden. Our sub-sample consists of 1309 individuals responding in 1981 and 1991 of ages 20–55 in 1980 and married/cohabitant with the same spouse throughout the period 1978–1990. Households with zero income in any year during the period 1978 to 1990 (nine households) are excluded from the sample. Moreover, information on working hours were missing in 32 cases, which reduces our sample to 1268 observations. Data on household characteristics emanate mainly from the surveys in 1981 and 1991. Data on income, place of residence and marital status is from registers providing information on the surveyed households each year in the period between the surveys. Data on regional unemployment, vacancies and labour market programs is from official statistics provided by the Swedish National Labour Market Board, and data on regional population density and housing prices is from Statistics Sweden.

Definitions and descriptive statistics for the variables included in the decision function and/or the income equation are contained in Table 1.

The results from a large number of empirical studies, e.g., DaVanzo (1978), Holmlund (1984), Reitsma and Vergoosen (1988), and Westerlund and Wyzan (1995), suggest that the determinants of migration differ with respect to the distance over which relocation occurs. This circumstance may be related to different motives for migration across different distance ranges (Molho 1986, p. 411). Our main interest lies with labour market related migration and we are less concerned with moves primarily related to residential considerations. Hence, we ignore short-distance relocation. Short-distance is defined as less than 30 km.[3] Note also that we do not separate between households relocating once and those who migrated more than once. Thus, households moving more than 30 km, at least once, during the period 1980 to 1989 are classified as migrants and others as stayers.

The variables *DI80* and *DI90* measure total real disposable income for the respondent and the spouse, including income from labour, self employment, capital and taxable transfers. Income from capital contains dividends, interests, capital gains, and imputed rents from housing. Taxable transfers includes, e.g., sickness benefits, parental leave benefits and unemploment benefits. Disposable incomes are obtained by deduction of state and local

Table 1. Variable definitions and sample means

Variable	Definition	Year	Movers	Stayers
M	Dummy variable = 1 if household migrate			
AGE	Years	80	36	38
EDUCF	Dummy variable = 1 if wife's schooling	80	0.23	0.18
	≥twelve years	90	0.32	0.22
EDUCM	Dummy variable = 1 if husband's schooling	80	0.40	0.24
	≥twelve years	90	0.45	0.27
SIZE	The number of household members	80	3.7	3.8
		90	3.4	3.2
OWN	Dummy variable = 1 if the household owns	80	0.73	0.80
	the place of residence	90	0.71	0.78
FRC	Dummy variable = 1 if the household has	80	0.56	0.54
	frequent contacts with friends or relatives	90	0.62	0.61
MIGEXP	Number of migration events 1974–1980		1.9	0.55
WW	Dummy variable = 1 if wife is gainfully	80	0.90	0.85
	employed	90	0.86	0.89
SEMP	Dummy variable = 1 if wife and/or husband	80	0.03	0.04
	are/is self-employed	90	0.08	0.14
U	Unemployment at municipality of origin Normalised with the size of the population aged 16–64 years		2.4	2.4
V	Vacanicies at municipality of origin Normalised with the size of the population aged 16–64 years		0.07	0.07
DENS	Population density at place of origin		330	382
DI80	Total household real disposable income 1980 (at the 1990 price-level)		160 500	157 300
DI90	Total household real disposable income 1990		157 700	156 500
HOURS80	Number of work hours 1980 (both spouses)		3279	3308
HOURS90	Number of work hours 1990 (both spouses)		3537	3545
Sample size			115	1153

income taxes and taxes on wealth. The income variables are expressed in 1990 prices and deflated with a weighted index for consumer prices and regional and housing prices.[4] The variables measuring total number of work hours, *HOURS80* and *HOURS90*, are derived from the respondent's own statements in 1981 and 1991 surveys.[5]

Econometric specification

The two-equation model is estimated in two stages. In the first stage we estimate the binomial probit choice equation. The coefficients obtained from this stage are used to construct the normal density and distribution functions. We then estimate the income function in a second stage, using the selectivity term as an additional explanatory variable.

In accordance with the discussion in Sect. 3, we expect determinants of individuals potential gain from a choice of location and determinants of negative externalities to influence the probability for migration. As explanatory variables in (4) we use: *AGE, EDUCF, EDUCM, SIZE, FRC, OWN, MIGEXP, SEMP, WW, U/V,* and *DENS.*

Following the implications from human capital theory (Sjaastad 1962) we expect the net gain from migration to fall with increasing age. More highly educated individuals face "thinner" local labour markets and their potential gain from relocation is, presumably, higher than for less educated. However, negative externalities from migration may increase if a highly educated spouse earns a high permanent income at the present location. Further, the potential effects on household migration from the level of education, may differ with respect to gender. The importance of the educational level of the female is likely to be reduced if occupations typical for women are characteriseted by lower wages, lower regional variation in wages, and if the womens' career considerations are dominated by those of mens' in the decision to migrate.[6] Accordingly, we include variables indicating the education level of both spouses (*EDUCF* and *EDUCM*). Mobility is likely to decrease with family size, and, in particular, the presence of school age children seems to inhibit family migration (Mincer, 1978 and Long, 1975). In this case, we use the number of household members (*SIZE*) as a regressor since we have inadequate information on the childrens' ages. Frequent contact with friends and relatives at place of origin (*FRC*) is anticipated to increase non-pecuniary costs from migration.[7] A negative effect on migration is also expected from owner occupation (*OWN*) since investments in, say, a house, may reflect a location choice based on long-term considerations. Previous studies have demonstrated a strongly significant positive correlation between recent experience from geographical mobility (*MIGEXP*) and the probability for migration in subsequent periods. This may reflect heterogeneity between individuals or it may be the result of unanticipated low net benefits from migration leading to further relocation. We expect a negative effect on mobility from being self employed (*SEMP*) due to a relatively large share of region-specific human capital and special attachment to a geographic location (e.g., inherited farms or family shops). The direction of the potential impact on migration from female labour force participation (*WW*) depends on the relationship between the tied-stayer effect and the tied-mover effect, as discussed in Sect. 3.[8]

Demand and supply of labour on local labour markets affect employment prospects and, accordingly, net-benefits from residing in a location. We expect a higher level of excess supply on the local labour market, here measured as the ratio between unemployment and vacancies in the municipality of origin, to increase the probability of migration (see, e.g., Nilsson 1995; Westerlund 1996). We anticipate a negative impact from local population density on emigration of two-earner households. The density variable (logged density, *LDENS*) is supposed to act as a proxy for labour market diversification, which is presumably a relatively more important factor when both spouses belong to the labour force. Moreover, the effect from diversification is likely to be accentuated when couples weight both spouses career equally, compared with cases were the location decision is dominated by the consideration of one spouses' career (Mont 1989b).

The dependent variable in the income equation is $y \equiv \log(\mathrm{DI}90) - \log(\mathrm{DI}80)$. The explanatory variables are: *AGE*, Δ*EDUCM*, Δ*EDUCF*, Δ*HOURS*, Δ*SIZE*, Δ*SEMP*, M, and λ. Except for the age variable, we use the first-difference form on all explanatory variables.

This reduces potential time-invariant unobserved heterogeneity across households.

We expect increases in income to decline with age and investment in education to increase income growth. A change in family income is expected to be closely related to changes in the number of work hours ($\Delta HOURS$). We also include the change of family size as a regressor, although the potential effect on income from this variable may reflect a change in preferences between labour and leisure, which, in turn, should be captured by the variable indicating the change in hours of work. However, the measurement error associated with the variable $\Delta HOURS$ can be substantial since it is the respondent's projection of yearly working hours for both spouses. It is, inter alia, uncertain if actual absence from the work place is properly accounted for. In addition, the dependent variable y includes certain transfers that are related to absence from work and the number of children in the household. We include the dummy variable indicating self-emplyoment since, for this group, year to year variation in income is relatively high and the concept of income is different. We also allow for a separate influence from working hours on income for the self employed by including the variable $SEMP^{*}\Delta HOURS$.

Results

The maximum likelihood estimates of the probit choice function are provided in Table 2. The dummy variables *MIGEXP1* and *MIGEXP2* indicate one recent migration event and recent migration at two or more occasions, respectively. We also use dummy variables indicating different age-intervals, which solved some convergence problems when heteroskedasticity was accounted for. The estimates in specification 2 are corrected for heteroskedasticity. Using likelihood ratio test we find that the assumption of homoskedasticity can be rejected.

Significant impact on migration is found only for the variables indicating migration experience. In alternative specifications we find that the variable indicating the male educational level has as significant effect only when considering long distance migration. Female educational level is insignificant throughout. This may reflect a relatively stronger weight for the career of the husband in location decisions.[9]

The coefficients on variables indicating age are insignificant in all cases. This result is not anticipated since empirical studies of migration generally confirm the implications from human-capital theory that the total discounted future gains from migration decreases with age.[10] Introducing age-squared as a regressor and/or using age as a single continuous variable does not yield different results. A possible explanation is that the way in which our sample is drawn, decreases variation in the age-variable and also for other variables related to life-cycle events. Sandefur and Scott (1981) find that age is not a significant determinant of migration when the effects of work-careers and certain life-cycle events are accounted for.

We also tried alternative specifications using different measures of the local excess supply of labour.[11] However, the hypothesised positive effect on migration from this variable cannot be confirmed. This result is puzzling considering the strong correlation between gross migration and re-

Table 2. Estimates of the binary choice equation, *t*-statistics in parentheses

Variable	1	2
Constant	–1.63	–1.64
	(–4.04)	(–2.13)
Age (20–29 years)	0.10	0.36
	(0.39)	(0.73)
Age (30–39 years)	–0.08	0.88E–02
	(–0.32)	(0.02)
Age (40–49 years)	0.02	0.05
	(0.10)	(0.11)
EDUCF	–0.07	–0.02
	(–0.45)	(–0.06)
EDUCM	0.24	1.36
	(1.80)	(1.89)
WW	0.28	0.28
	(1.63)	(1.00)
SIZE	–0.03	–0.07
	(–0.56)	(–0.66)
OWN	–0.16	–0.30
	(–1.20)	(–1.17)
FRC	–0.08	–0.19
	(–0.69)	(–0.53)
MIGEXP1	1.20	1.82
	(4.37)	(2.67)
MIGEXP2	1.16	1.39
	(9.49)	(2.51)
SEMP	–0.23	–0.25
	(–0.70)	(–0.39)
U/V	–0.01	–0.02
	(–0.49)	(–0.46)
LDENS	–0.05	–0.33
	(–1.30)	(–1.34)
N	1268	1268
LOG-L	–316.46	–308.72
R^2_{VZ}	0.26	0.29

Note: Estimate 2 is corrected for heteroscedasticity assuming Var $[\omega] = \exp(2\,Z\kappa)$, where the variables contained in the vector *Z* are *MIGEXP2, EDUCF, EDUCM, FRC, LDENS.* There is no basis for the exclusion of any variable in *W* when specifying *Z.* However, convergence is not reached when $Z \equiv W$. The goodness of fit measure is the normalized Aldrich and Nelson Pseudo – R^2 suggested by Veall and Zimmermann (1992).

gional labour market conditions found in aggregate data pertaining to Sweden. A possible explanation is that stable two-adult household constellations are relatively insensitive to variations in local demand and supply of labour. Westerlund (1995) found that variation in labour market conditions primarily trigger migration of young single individuals, most of them being new entrants to the labour force and/or unemployed, or at risk of becoming unemployed.

The results obtained in this case differ from those of Holmlund (1984) who employs data from LNU68 and LNU74, and Westerlund and Wyzan (1995) who employ data from LNU81. Again, this may result from differ-

ences in sampling rules. Correcting for heteroscedasticity causes no dramatic change. We have experimented with several different specifications of $VAR[\omega]$ with similar results to those presented in Table 2.

Turning to the estimates of the income equation (Table 3) we find that migration does not increase income and we find no support for selection bias in this case. As anticipated, the increase in income is higher for the youngest age category and the change in number of work hours in strongly correlated with income change. As indicated in Table 1, changes in mean total household disposable incomes are negative and small for both stayers and movers, –0,5% and –1.8% respectively.[12] However, data reveal that these small changes are formed by a counterbalancing effect of divergent income growth for males and females. The real income of men falls slightly less than 8% during the period 1980–1990 for both migrants and non-migrants. On the contrary, women gain in real income, 8% for migrants and 12% for non-migrants. Changes in work hours seem to be the key determinant of the observed pattern. There is a slight drop in employment for men and a marked increase in the number of working hours among females. The sharpest increase in employment is observed for females in non-migrant households.

Table 3. Estimates of the income equation, *t*-statistics in parentheses. Dependent variable=*y*

Variable	1	2	3
Constant	–0.19	–0.18	–0.19
	(–4.78)	(–4.06)	(–4.80)
M	0.05	0.11E–02	0.08
	(0.46)	(0.01)	(0.76)
Age (20–29 years)	0.19	0.19	0.18
	(3.58)	(3.51)	(3.44)
Age (30–39 years)	0.16	0.17	0.16
	(3.91)	(3.49)	(3.84)
Age (40–49 years)	0.06	0.06	0.06
	(1.52)	(1.36)	(1.50)
Δ*EDUCF*	0.39E–02	0.61E–02	–0.25E-02
	(0.09)	(0.16)	(–0.06)
Δ*EDUCM*	0.05	0.05	0.05
	(1.23)	(1.47)	(1.09)
ΔSIZE	–0.03	–0.03	–0.03
	(–3.31)	(–2.22)	(–3.26)
SEMP	0.06	0.06	0.06
	(1.99)	(1.44)	(2.08)
Δ*HOURS*	0.12E–03	0.12E–03	0.12E–03
	(11.54)	(11.53)	(11.55)
*SEMP**Δ*HOURS*	–0.82E–04	–0.82E–04	–0.85E–04
	(–3.89)	(–2.63)	(–3.98)
λ	–0.05	–0.02	
	(–0.86)	(–0.57)	
N	1268	1268	1268
R^2	0.16	0.16	0.15

Note: λ in specification 1 and 2 is computed using specification 1 and 2, respectively, in the probit stage. Specification 2 is corrected for heteroskedasticity. Specification 3 pertain to instrumental variable estimation using the predicted probabilities from the probit-equation as an instrument for *M*.

Problems with multicollinearity may explain the insignificant coefficient on M.[13] An alternative approach to deal with the correlation between ε and M is to employ an instrumental variable estimator (specification 3). In the first stage we create an instrument for M using the estimated probability from the probit stage. As can be seen, using this means of estimating the model brings about only minor changes. In fact, using a large number of alternative specifications we always find an insignificant relationship between migration and income change. This is also the case when we ignore regional variation in prices and when the cut-off distance, separating migrants from stayers, is changed. Most coefficients seem robust with respect to change in specification.

However, the estimated coefficient on λ is generally insignificant in these alternative models. Another possibility we elaborated on, is that the migrants may work more hours as a result of migration. This is likely to be the case when the local labour markets are rationed and households move from worse to better regional employment opportunities. However, regressing $\Delta HOURS$ on all exogenous variables we find no significant impact from M. In addition, using the Hausman test against endogeneity we find that H_0: ΔHOURS is exogenous cannot be rejected.[14] Finally, the potential interaction between change in family size and hours of work lacks relevance. The direct correlation between these two variables is low and removing the variable ΔSIZE causes very small changes in obtained results.

5. Conclusions

The empirical findings in this study indicate that stable two-earner households in Sweden did not gain in real disposable income from migration during the 1980s. This result seem robust with respect to model re-specifications. Furthermore, we find no indications of selection bias in the income equation.

The poor performance of most explanatory variables in the migration function is interesting since these are fairly standard in human capital and life-cycle oriented models. However, data in our sample cover a long period which may increase measurement errors. Another potential problem is the relatively small number of migration events.

Holmlund (1984) and Westerlund and Wyzan (1995) also used LNU-data on stable household constellations but their data pertain to shorter periods, five years and three years, respectively. Another difference lies in the sample rule, which in our case only includes individuals in stable household constellations and of ages relatively close to the middle of the population age distribution. Life-cycle events potentially associated with migration, such as leaving school, labour force entrance, and retirement, are probably less frequent in our sample.[15] Nevertheless, the results in this study may indicate that the migration pattern of a large portion of the population and the labour force, may be quite different than the “average” behaviour implied by the findings in earlier studies.

Endnotes

1 $PVNB^{j*} = PVNB_1 + PVNB_2$ when individual net benefits have equal weights.

2 See Eriksson and Åberg (1987).

3 This figure is arbitrarily chosen since there is no obvious method for fixing an appropriate cut-off distance. For the Swedish population as a whole, the average distance for travels between workplace and home is shorter than 30 km. According to LNU81, about 90% of the employed spend less than 30 min for a one-way trip from home to work.

4 Official statistics provide no information on regional prices except for prices of houses. Consumer price index (national level) and regional housing prices are used in calculating a deflator. The share of expenditures for housing out of total disposable income in the household sector (national level) is used as a weight for regional housing prices. The remaining part of diposable income is deflated with (national level) consumer price index.

5 Based on retrospective information in the 1981 and 1991 surveys. LNU81 provides direct information on working hours in 1980 for the respondent and the spouse. Working hours 1990 for the spouse is not directly available in the 1991 survey. However, an approximation can be derived from information on the number of working hours during the week the survey was conducted and the number of working weeks in the preceding year (1990).

6 As noted by Mont (1989 b, p. 64), if the household puts less weight on the females career, "this may be one factor in concentration of women in jobs with skills that are easily transferable across labor markets, like nursing or teaching".

7 Empirical support for this idea can be found in, e.g., Holmlund (1984) and Westerlund and Wyzan (1995).

8 Needless to say, the notation of this variable does not imply that females do not work when outside the labour force. We prefer to indicate the two-earner family this way since the typical case is (still) that the male is the income earner in two-adult/one-earner households.

9 Mont (1989 a) found, using data from the United States, that the wifes' career does influence the eventual destination but the males' career considerations dominate.

10 See, e.g., Schwartz (1976), Sandell (1977), Robinson and Thomes (1982), Da Vanzo (1983), Holmlund (1984), Hunt and Kau (1985), Tunali (1986), and Plane (1993).

11 Including specifications where the level of labour market policy measures are incorporated as a separate regressor or added to local unemployment.

12 As a comparison, official statistics reveal that the slight fall in national average change in real disposable income for married/cohabitants in two-earner households with two children is – 1.33% between 1980 and 1990.

13 About 75% of the variation of lambda is "explained" when regressing lambda on the other predetermined variables in the earnings equation.

14 At the suggestion of an anonymous referee, we have estimated separate income equations for movers and non-movers. Using the switching regression approach with endogenous switching (see, e.g., Nakosteen and Zimmer 1980; Greene 1993) we find no indication of self-selection and no significant relationship between expected earnings and migration.

15 Obviously, migration events related to marriage or divorce are not observed in this case.

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