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- ▶ **Family Migration and Relative Earnings Potentials**
- ▶ Mette Foged

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Family Migration and Relative Earnings Potentials

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Abstract

I document that couples are more likely to migrate if household income is disproportionately due to one partner, and that families react equally strong to a male and a female relative earnings advantage. A unitarian model of family migration in which families may discount wives' private gains is used to derive testable implications regarding the type of couples that select into migrating. The empirical tests show that gender-neutral family migration cannot be rejected against the alternative of husband-centered migration. The lower response of family migration to the human capital held wives than the human capital of husbands, documented in the literature, may be attributed to more intense colocation problems and lower income among female-headed households. The more severe colocation problem stems from stronger educational homogamy among highly educated women relative to highly educated men. The results hold for internal as well as international migration of couples.

JEL Classification: F22, D19, J61.

Keywords: International migration, family migration, colocation problem, selection.

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1 Introduction

Female labor force participation rates have risen in most developed countries over the past decades (Browning, Chiappori, and Weiss, 2011), and the colocation problem of couples has worsened (Costa and Kahn, 2000). While single-earner households naturally follow the earnings prospects of one spouse, economic rationality prescribes that dual-earner couples consider the earnings potentials of both spouses in migration decisions. Different job prospects across locations represent a source of conflict of private interests when couples make joint location decisions (the colocation problem). Completely gender-neutral and rational family migration lacks empirical support. Wives' human capital characteristics appear much less important than husbands' characteristics in family migration equations, in terms of significance and magnitude, and a series of papers have therefore concluded that migration is husband-centered.¹ In the sociological terminology, migration lies within the husbands' decision domain and women are socialized to place the family before private gains. Economists usually frame it as lower weight on wives' private gains in location decisions.

This paper suggests that the horse race between *absolute* measures of husbands' and wives' characteristics does not disprove economic rationality and tests whether family migration is indeed husband-centered or rather egalitarian and symmetric in partners' private gains. The tests rely on measures of the *relative* earnings potential within the household. I also contribute to the family migration literature by providing evidence on international migration. The main contribution of the paper is to provide evidence in favor of gender-neutral family migration. I find that the human-capital model of family migration cannot be rejected against the alternative of husband-centered migration, neither for internal nor for international migration of couples. Thus, women become increasingly important in location decisions as their relative intra-household earnings potential increases. In turn, this feeds into the relative earnings of women in society.²

¹Examples are Duncan and Perrucci (1976); Lichter (1982); Shihadeh (1991); Bielby and Bielby (1992); Ni-valainen (2004); Compton and Pollak (2007); McKinnish (2008); Shauman (2010); Tenn (2010).

²Frank (1978) highlights family migration as one important determinant of the unexplained gender wage gap. Sorenson and Dahl (2013) show that for Denmark it might explain as much as 36 percent of the gender wage gap.

The theoretical framework of the paper is a unitarian model of families' location decisions where returns to relocating are functions of individual earnings potentials and the relative weight on wives' private returns is possibly smaller than one. Using equal weight on partners' private returns, as mandated by the human-capital model, it follows that couples with more dispersed intra-household earnings are more likely to migrate, and migration propensities are more skewed towards households with higher male earnings the more families discount women's private returns.

The empirical analysis is based on husband-wife matched data on earnings and relocations from Danish registers. Denmark is an interesting case. First, it is a highly gender-equal country with female education level and labor force participation rate among the highest in developed countries and other developed countries show trends in this direction. Second, Danes are relatively unhindered in their international mobility and thus the kind of international migrants we would like to study not to confound self-selection with the impacts of migration policies. Denmark is also relative unique in having data on international migration of its citizens. This allows me to link international migration to the family migration literature which is on relocations within countries (Junge, Munk, and Poutvaara, 2013, is an exception providing a theoretical and empirical analysis of emigration of Danish couples). This paper shows that the same type of selection characterizes internal and international migration of couples but internationally migrating couples are more intensively selected on the intra-household earnings asymmetry, presumably due to worse prospects for the trailing spouse in foreign labor markets.

Sometimes, dependents are prohibited to work by immigration policies.³ This will tend to intensify the selection of asymmetric couples in terms of intra-household earnings.⁴ Whether that is beneficial to the destination country is a complicated question beyond the scope of this paper. But the high share of accompanied migrants in the international skill flows suggests that this is a relevant question for further research. More than 60 percent of international labor migrants from

³For example, family members accompanying the holder of a temporary work visa like H1B to the United States are often not entitled to work.

⁴More than two thirds of household income is due to one partner in 31 percent of Danish households emigrating to the US and 26 percent of households emigrating to other countries. US, Germany and UK are the top three destination countries for Danish couples; together they attract 34 percent of the emigrating couples.

Denmark are in a relationship.⁵ At the microeconomic level, this paper contributes to the literature on determinants of family migration and labor market effects of family migration; specifically, whether we should think that gains to relocation are functions of gender or rather relative earnings potentials. In fact, I show that the intra-household dispersion in earnings is an important determinant for migration, and migration propensities of families react equally strong to larger male and female earnings advantages, implying that migration intensifies the initial earnings asymmetry.

Section 2 discusses the literature on family migration with special emphasis on its implications for the symmetry or asymmetry of family migration. Section 3 outlines the theoretical setup and derives the testable predictions regarding the families that agree on migrating. Section 4 describes the data and section 5 explains the empirical implementation of the tests and shows the results. The final section concludes.

2 The empirical literature

Research on family migration recognizes that relocation decisions are part of a household decision-making process. Hence, the composition of the household matters and expected gains and losses of husbands and wives are compared when deciding on a location. The literature has two main strands: one focusing on the determinants of family relocation and one focusing on the labor market outcomes of migrating husbands and wives (Appendix B provides a schematic overview).

Sandell (1977) and Cooke (2003) find that migration increases husbands' earnings and has little effect on wives' earnings such that the total effect on the household is positive.⁶ Negative labor market effects for married women and positive effects for married men have been widely documented.⁷ These findings are not surprising given the sex gap in earnings and the general presumption that gains to geographic mobility increase with earnings or education (e.g. Sandell,

⁵Labor migrants are defined as those who have completed their education and been in the labor force at least two years prior to migrating.

⁶Axelsson and Westerlund (1998) and Rabe (2011) find evidence of zero or negative effects on household income.

⁷E.g. Grant and Vanderkamp (1980); Lichter (1980, 1983); Spitze (1984); Shihadeh (1991) for internal mobility and Foged (2014a) for international mobility.

1977). Husband-driven migration is inconsistent with economic rationality, insofar as the wife has higher earnings prospects than the husband.

Education and occupational characteristics have been used in the literature to shed light on the earnings potentials of husbands and wives. Duncan and Perrucci (1976) and Shauman (2010) show that family migration is positively related to the occupational prestige of the husband but is less responsive or unrelated to the wife's occupational migration potential or prestige.⁸ Lichter (1982), Nivalainen (2004), Compton and Pollak (2007) and Swain and Garasky (2007) find that the effect of wife's education is small and insignificant controlling also for husband's education. Tenn (2010) calculates the relative explanatory power of wives' and husbands' human capital characteristics using variance decomposition on five waves of the US decennial census and concludes that husbands' human capital is the most important determinant of family migration and this has been remarkably stable over a forty year period where the female labor force participation has risen. Using the same data as this paper, Junge, Munk, and Poutvaara (2013) find that international mobility of couples is increasing in male earnings, but unrelated to the earnings of the female partner.

Bielby and Bielby (1992) find women express significantly higher reluctance to relocate for personal career opportunities because of family considerations. Wallston, Foster, and Berger (1978) follow dual-career couples and find that the actual location decisions most often favored the man even though these couples expressed egalitarian views on location decisions before entering the job market and both possess relative high levels of human capital. Shihadeh (1991) reports that 74 percent of women and as little as 4 percent of men state they are accompanying their partner in the migration decision.

Hence, it is often concluded that families put lower weight on wives' private return in migration decisions (e.g. Duncan and Perrucci, 1976; Lichter, 1982; Shihadeh, 1991; Bielby and Bielby, 1992; Cooke, 2003; Nivalainen, 2004; Compton and Pollak, 2007; McKinnish, 2008; Tenn, 2010). However, the inhibiting effect of working wives on family migration (e.g. Long, 1974; Sandell,

⁸They include a linear effect of wife's percent of family income, but it has no significant effect on family migration. This paper shows that one should expect a U-shaped relationship between family migration and contributions to total income provided that colocation problems are more severe for partners with more similar earnings.

1977; Lichter, 1980, 1982; Nivalainen, 2004) suggests that husbands abstain from migrating not to hurt the career of the their wife placing them as tied stayers. Thus, at least the weight on wives' private return cannot be zero. Rabe (2011) calculates the potential private wage gains from geographic mobility for husbands and wives and finds that the wage gain of the wife has a positive and large effect on migration propensities of couples indicating that a positive weight is attached to both spouses in migration decisions.

The average earnings effects for married men and married women and the gender differences in reasons for migrating may reflect the gender gap in earnings, as already mentioned. The horse race between husbands' and wives' human capital characteristics in the migration equations estimated in the literature does not provide conclusive evidence either: educational attainment may not be an equally good indicator of earnings potentials for men and women, for instance due to differences in specialization, and the effect of *absolute* measures of human capital held by husband and wife are biased by the omitted intensity of the colocation problem.⁹

I find that, 54 percent of university educated women and only 34 percent of university educated men in dual-earner households in Denmark have university educated partners, and we should expect two with high earnings potentials to be less mobile than more asymmetric couples, conditional on overall household income (see section 3). Moreover, I document that households with a female primary earner are less wealthy than households with a male primary earner. Hence, the robust evidence that wife's human capital is a weaker predictor of family migration than husband's human capital may be attributed to the stronger correlation of female education with the omitted intensity of the colocation problem and the lower correlation of female education with high income and high gains from migrating. This paper provides evidence in favor of egalitarianism and income-maximization at the household level using an approach that relies on *relative* earnings potentials as explained in the next section.

⁹Assortative mating poses an additional problem, but collinearity of husband's and wife's characteristics affects only the precision, not consistency. Nivalainen (2004) notes that insignificance of wives' education can be attributed to collinearity problems, but concludes that "*it continues to be the human capital of the husband that rules*" (page 170).

3 Theory

3.1 Existing work

The human-capital model of migration assumes, for families as for singles, that migration occurs when the change in lifetime earnings exceeds migration costs. Thus, migration is a human capital investment (Sjaastad, 1962; Sandell, 1977; Mincer, 1978). Migration costs include all monetary and non-monetary costs associated with the relocation. Direct and indirect moving costs as well as psychic costs of leaving familiar surroundings, family and friends, and differences in local amenities enter the calculation of the prospective migrants.¹⁰

Mincer (1978) describes how less than perfect correlation between net gains of family members creates tied movers and tied stayers where tied stayers and movers are those whose private optimum differs from the family optimum. The difference between the gain an individual would have at his/her privately optimal location and the gain he/she experiences when locating with the family is a measure of the private externalities in joint location problems. These negative private externalities are assumed to be internalized within marriage by transfers between the spouses (Coase Theorem), or family dissolution may become optimal if the gains from marriage are smaller than the losses from privately suboptimal location decisions within the family (Becker, 1973).¹¹ It is possible that both spouses are tied if the location that maximizes family welfare is privately suboptimal for both spouses (Mont, 1989). Junge, Munk, and Poutvaara (2013) show that emigration is increasing in the earnings of the primary earner, while the effect of a small increase in the earnings of the secondary earner is negative if the income difference between the partners is initially large, and ambiguous if the income difference is initially small.

An alternative explanation of family migration is founded in gender-role theory and argues that women are socialized to forgo own career opportunities in location decisions, and the provider-role is allotted to the husband with no or little regard to the job opportunities of the wife (Shihadeh,

¹⁰Sjaastad (1962) provides an elaborate discussion of each component in the individual migration decision.

¹¹Borjas and Bronars (1991) assume that the externalities can be internalized while Mincer (1978) discusses the possibility of family dissolution. Gemici (2011) builds a structural model in which location and marital status are jointly determined in a Nash-bargaining game.

1991; Bielby and Bielby, 1992; Tenn, 2010). In a microeconomic model of family migration this means that families maximize husband's private returns or at least attach a lower relative weight to the returns of the wife.

3.2 Distinguishing gender-neutral and husband-centered family migration

The theoretical model below is designed to encompass the human-capital theory and the gender-role theory of family migration in a unified framework and derive testable predictions about the types of couples who are more likely to agree on migrating. To simplify things assume that the marriage decision is given and ignore the possibility of family dissolution. Furthermore, the family behaves like a single unit, and we can abstract from the intra-household allocation of resources.¹²

Let Y_i denote the lifetime earnings of individual i at origin and suppose the returns to geographic mobility is a multiplicative function of this earnings potential. The rate of return to migrating for i is given by r_i and the associated costs are C . Similarly, Junge, Munk, and Poutvaara (2013) specify gains from migrating as a rate of return which can be positive or negative multiplied by pre-migration earnings. It means that the actual returns are higher for individuals with higher earnings consistent with the higher mobility among more educated and higher earning individuals.¹³ Cultural and linguistic differences across countries may constitute extra costs for international compared to internal migration, and direct moving costs are most likely increasing with the distance moved. Hence, we can think of international migration as being characterized by higher costs compared to internal relocations. It implies that international migration propensities are shifted downwards compared to internal migration propensities. Table 1 confirms this. About one percent of couples migrate to another region in Denmark and 0.2 percent emigrate from Denmark every year.¹⁴

¹²Browning, Chiappori, and Weiss (2011) provide a review of unitarian and non-unitarian approaches to modelling family behavior. The model of this paper falls within the unitarian framework. I obtain similar predictions from a collective bargaining model where the trailing spouse can be compensated. A strong positive correlation between the earnings asymmetry and the risk that negative externalities cannot be internalized would threaten to the U-shape.

¹³Larger geographic labor markets (Sandell, 1977) and better access to information in distant labor markets (Bowles, 1970) for high skilled have been offered as possible explanations for this.

¹⁴Migration of Danish couples shows no clear time-trend (Figure A.1 in Appendix A). It is slightly procyclical as

The potential private return to an individual, r_i , is a random variable. We can think of the distribution as being potential job-offers across multiple destinations or aggregate all potential destinations into one and think of the distribution as the distribution of potential job-offers at this alternative location. Individuals are in the beginning of their working life when job-offers are realized.

A single individual only migrates if $Y_i r_i - C > 0$, and $E[Y_i r_i - C]$ must be negative since the majority do not migrate. It is also clear that international migrants must be more positively selected from the population since costs are higher. The more intense selection of international migrants is confirmed in section 5 (Table 3).

In order to focus on selection based on the intra-household earnings asymmetry, define total household earnings at origin, $Y = Y_h + Y_w$, where subscripts h and w refer to the husband and the wife. The contribution of the husband to the total earnings is denoted $s = \frac{Y_h}{Y_h + Y_w}$. Costs of family migration are simply the sum of the individual costs (no economies of scale in moving). A family consisting of husband and wife then migrates if the net gain to the household, X , is positive

$$X = Y s r_h + Y(1 - s) \delta r_w - 2C > 0 \quad (1)$$

where $0 \leq \delta \leq 1$ is the relative weight attached to the returns of the wife. Families migrate whenever total net gains are positive, possibly discounting the returns of the wife (gender-role theory). The private return to one spouse may be negative, and he/she is then a tied spouse as defined by Mincer (1978). The likelihood that the return of the wife is negative increases as lower weight is put on her returns in the family migration decisions.

Assume that each individual draws a private return to geographic mobility, r_i , from a normal distribution with mean μ and variance σ and allow for a correlation between spouses' returns $-1 < \rho \leq 1$. The migration probability for a family with total income, Y , and husband's share, s ,

suggested by Saks and Wozniak (2011); unemployment peaked in the early 1990s when migration propensities were low. Among the international migrants, 70 percent have returned within 5 years from emigration and more than 80 percent have returned after 10 years (Figure A.2 in Appendix A).

is given by

$$\Pr(X > 0) = 1 - \Phi \left(\frac{2C - \mu Y(s(1 - \delta) + \delta)}{\sigma Y z_s} \right) \quad (2)$$

where Φ is the standard normal distribution function and $z_s = \sqrt{\delta^2 - s2(\delta^2 - \delta\rho) + s^2(1 + \delta^2 - 2\delta\rho)}$.¹⁵ Family migration is decreasing in the costs of migrating (C), and increasing in the expected rate of return (μ), the total earnings of the household (Y) as well as the dispersion of returns to migrating (σ) since more couples pass the threshold where migration becomes optimal.

The purpose is to analyze how the probability of family migration relates to the intra-household earnings dissimilarity captured by the parameter s . To ease exposition define the mean net gain to households: $\mu_X = \mu Y(s(1 - \delta) + \delta) - 2C$.

$$\frac{\partial \Pr(X > 0)}{\partial s} = \phi \left(\frac{-\mu_X}{\sigma Y z_s} \right) \frac{\mu Y(1 - \delta)z_s^2 - \mu_X [s(1 + \delta^2 - 2\delta\rho) - (\delta^2 - \delta\rho)]}{\sigma Y z_s^3} \quad (3)$$

The numerator determines the sign in equation (3). It reduces to $(2C - \mu Y)(2s - 1)(1 - \rho)$ under gender-neutral family migration ($\delta = 1$).¹⁶ Thus it follows immediately that the derivative is negative to the left of $1/2$, zero at $1/2$ and positive to the right of $1/2$.¹⁷ It means that the least migratory couples are those with equal earnings and the migration propensity is increasing in the intra-household earnings asymmetry. Family migration propensities are increasing functions of husbands' earnings and the correlation of gains within the household becomes irrelevant in the extreme case with zero weight on private returns to wives ($\delta = 0$).¹⁸ Moderate husband-centered migration ($0 < \delta < 1$) places the least migratory family in between that of the human-capital model ($\delta = 1$) and the extreme case of gendered migration ($\delta = 0$), as illustrated in Figure 1 plotting the migration propensities against the relative earnings potential in the household.¹⁹

¹⁵Notice that $\delta^2 - s2(\delta^2 - \delta\rho) + s^2(1 + \delta^2 - 2\delta\rho)$ is always positive if ρ is larger than -1 (or $\delta = 0$). This is because $\delta^2 - s2(\delta^2 - \delta\rho) + s^2(1 + \delta^2 - 2\delta\rho) > 0 \Rightarrow \frac{\delta^2(1-2s+s^2)+s^2}{2\delta(s^2-s)} < \rho$ and the left-hand side is concave and has -1 as its maximum value.

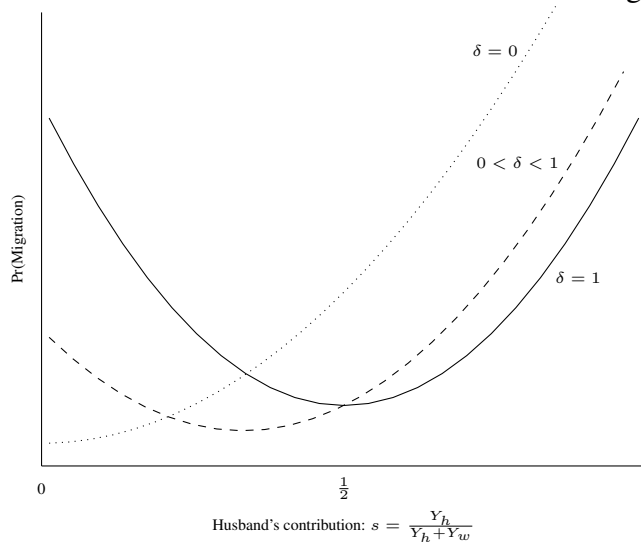
¹⁶Equation (3) becomes $\frac{\partial \Pr(X>0)}{\partial s} = \phi \left(\frac{2C-\mu Y}{\sigma Y(1-2(1-\rho)(s+s^2))^{1/2}} \right) \frac{(2C-\mu Y)(2s-1)(1-\rho)}{\sigma Y(1-2(1-\rho)(s-s^2))^{3/2}}$ if $\delta=1$.

¹⁷Family migration is unrelated to earnings shares, $\frac{\partial \Pr(X>0)}{\partial s} = 0$, in the special case where $\delta = 1$ and $\rho = 1$.

¹⁸Equation (3) becomes $\frac{\partial \Pr(X>0)}{\partial s} = \phi \left(\frac{2C-\mu Y s}{\sigma Y s} \right) \frac{2C}{\sigma Y} s^{-2}$ if $\delta=0$ and is positive for all s between zero and one.

¹⁹The U-shape is driven by the variance of families' net gain from migrating. The variance is minimized at $s = 0$ if $\delta = 0$ and at $s = 1/2$ if $\delta = 1$. The expected net gain to families does not depend on s for $\delta = 1$ but the gain is

Figure 1: Gender-neutral versus husband-centered migration



Benson (Forthcoming) shows that men face higher expected returns to geographic mobility due to occupational sorting of men and women prior to marriage. Gender discrimination in the foreign labor market could be a further argument that men face a higher expected rate of return to international mobility. A higher mean and/or a larger dispersion of men's returns to migrating would be observational equivalent to families discounting women's private returns in location decisions. Hence, any evidence of a U-shaped relationship between migration propensities and husband's contribution centered around $s = 1/2$ would be strong evidence in favor of gender-neutral family migration because these likely sources of rational prioritization of husband's career will tend to bias conclusions towards gender-role theory.

The spouse who contributes the most to the total family income gains the most from migrating when migration is gender-neutral, whereas husband-centered migration favors the husband (see Appendix C for proof).

$$E(r_h|X > 0) > E(r_w|X > 0) \Leftrightarrow s > \frac{\delta}{1 + \delta} \quad (4)$$

Hence, family migration magnifies initial earnings asymmetries within the household, and the increasing in s if families discount women's private return ($\delta < 0$).

spouse who stands to gain the most rank higher than the trailing spouse in the income distribution at origin when families are rational. The latter point links the model to those of the international migration literature where selection is framed in terms of positions in the income distribution of the sending country and the “quality” of arriving immigrants rather than the colocation problem is the focus.²⁰ Foged (2014a) shows that the primary earner of stable couples emigrating from Denmark gains, the trailing spouse loses, and migration increases the intra-household earnings asymmetry as expression 4 suggests.

The first step of the empirical analysis is a non-parametric examination of the relationship between relative earnings potentials and family migration propensities (section 5.1). Tests for gender-neutral versus husband-centered family migration are then performed using parametric models (section 5.2 and 5.3). The proposed tests exploit that the human-capital model of family migration is completely symmetric while the gender-role model is asymmetric and skewed towards male dominance as shown above. The theoretical insights are based on the assumption that returns to geographic mobility are functions of lifetime earnings potentials at origin. The empirical analysis is robust to alternative measures of relative earnings potentials and inclusion of known determinants of family migration. The employed data are described in the next section.

4 Data

The analysis requires husband-wife matched data for multiple periods, measures of the earnings and information on the geographic location of the couples. This information can be extracted from administrative registers in Denmark. The mobility of dual-earner couples is considered for the years 1987–2002 (t) using characteristics of the husbands and the wives for the years preceding migration.

I restrict my sample to couples where both spouses are Danish citizens to exclude international

²⁰The seminal model is that of Borjas (1987). Borjas and Bronars (1991) show that family migration “dilutes” the selection characterizing single migrants. Couples with more similar earnings are more likely to agree on migrating in these models due to one-dimensional sorting on earnings. The colocation problem is introduced in this paper by less than perfect positive correlation between partners’ job offers from abroad, $\rho < 1$.

migration that is driven by the return migration of one or both spouses. Further restrictions are imposed to make sure the sample consist of prime-age workers. Each partner is between 25 and 39 years old,²¹ and has made a permanent transition to the labor market in the sense that they are wage earners and have completed their highest level of education two years prior to entering the sample. These restrictions are important to exclude mobility associated with the completion of studies and to have at least two years of sound earnings information ($t - 2$ and $t - 1$). It also implies that I focus on dual-earner couples. Single-earner couples can be expected to behave as singles if migration is driven by returns to human capital.

Couples are usually defined by marital status, only stable household constellations are considered, and family migration is defined as the joint migration of both spouses. Cohabitation, however, is widespread in Denmark. 69 percent of the selected couples are married and 95 percent of the couples are stable. I choose couples that had been together at least two years leading up to the migration year as my unit of analysis.

Earnings are the annual income from labor. This is the income that should matter in location decisions. Family earnings are simply the sum of the earnings of the two spouses and contributions sum to one and measure for each spouse his/her share of the total family earnings. I also use information on the age of each spouse, employment, highest completed education of each spouse (field of education and level of education), and the presence of children in the household by age groups (0-2 years old children, 3-6 and 7-17 years old children).

International migrants are those who leave Denmark. Internal migrants are those who move across one of the 36 commuting areas in Denmark as defined by Andersen (2002). Results are not sensitive to migration to the Faroe Islands and Greenland. The Faroe Islands and Greenland are autonomous parts of the Danish Kingdom, but they represent relatively long-distance moves compared to internal migration or international migration to neighboring countries of Denmark. The results in the paper exclude migration to the Faroe Islands and Greenland and results including them are available upon request.

²¹Costa and Kahn (2000) use the same age restriction on husbands to study trends in location decisions of college educated couples in the US.

5 Empirical analysis

5.1 Non-parametric evidence and alternative earnings measures

We would like to capture the relationship between the true relative earnings potentials in the household and family migration. Figure 2 plots family migration against the intra-household earnings dissimilarity using two alternative measures of relative lifetime earnings in the household. A simple two-year average of earnings prior to migrating is applied in Panel A. Panel B uses more sophisticated methods to arrive at the relative earnings potentials of the partners.

Research on the association between current and lifetime earnings shows that earnings at early ages are poor proxies for lifetime earnings whereas earnings from age 35 measure permanent earnings relatively well (Haider and Solon, 2006). Böhlmark and Lindquist (2006) show a similar pattern for Sweden whose earnings structure is comparable to the Danish. Current earnings, however, are downward biased measures of lifetime earnings for women who are at home taking care of children. It is also a potential concern that migrants relocate in response to adverse labor market shocks making pre-migration earnings asymmetries endogenous to the migration decision.²² My preferred measure of lifetime earnings potential is therefore the earnings of each individual calculated at age 35 and adjusted for non-employment and the presence of small children in the household. To obtain this measure, I estimate earnings profiles for each education level and field of study and predict the earnings the individual would have at age 35, with no small children, and at full employment.²³

Figure 2 shows that migration is increasing in the intra-household earnings asymmetry. Even more, migration is remarkably U-shaped but few families have female primary earners. The adjusted earnings measure (Panel A) is less noisy compared to the simple average of earnings prior

²²Unemployment reduces the opportunity cost of migrating (Saben, 1964).

²³Earnings profiles for each field (f) and level (l) of education are estimated separately for men and women using the following specification: $Y_{it} = X_{it}'\gamma_0 + \sum_f \sum_l \mathbb{1}(field = f, level = l) (\gamma_{1fl}age + \gamma_{2fl}age^2) + v_t + u_i + e_{it}$, where X_{it} includes a dummy for children under the age of 3 and a variable measuring employment as a fractional value of a full working year. v_t is a vector of year fixed effects and u_i is the individual fixed effect. Hence, earnings at age 35 in the absence of small children and under full employment can be calculated using the following formula: $Y_i^{adj} = \hat{\gamma}_{0,empl}1 + \sum_f \sum_l \mathbb{1}(field = f, level = l) (\hat{\gamma}_{1fl}^k 35 + \hat{\gamma}_{2fl}^k 35^2) + \hat{u}_i$.

to migrating (Panel B) and produce a steeper relationship between earnings asymmetry and migration. A partner who currently receives a lower pay may face higher lifetime earnings and returns to migrating. Such misclassification of the relative earnings potential in the household can generate the flatter curves in Panel B. Migration in response to unemployment, to the contrary, would tend to boost the U-shape when pre-migration earnings are used.²⁴ Guler and Taşkın (2013) report a similar picture for interstate migration in the US using pre-migration wages. The analysis proceeds with the adjusted earnings measure. Qualitatively similar results can be found in (Foged, 2014b) using average earnings.

Table 2 reports the shares of families in three categories of husband's contribution. As a percent of all families one percent are in 0-0.4, sixty eight percent of families are in 0.4-0.6, and thirty one percent of families are in 0.6-1. When this distribution is shown by quintiles of family earnings we see that male earnings advantages are most prevalent among the richest households, and female earnings advantages are common among the poorest households. The two rightmost columns of Table 2 report the migration rates. Migration rates are monotonically increasing in lifetime family income. International migration is 14 times more frequent in the top quintile compared to the bottom quintile of family earnings. This may explain the seemingly lower responsiveness of international migration to female earnings advantages. As the theory in section 3 pointed out, we should observe mobility to increase in earnings asymmetry for a given income while the general positive sorting may blur the raw correlation between migration and within household earnings dispersion.

International migrants have higher household income than internal migrants, and migrating families with male primary-earners are richer than families with female primary-earners, as Table 3 shows. The table also shows that relative years of education within the family follows the relative earnings. The proportions with a university degree follow the same pattern. The age of wife and husband do not vary much across the family types. Internally (internationally) migrating wives

²⁴Figure A.3 explores this possibility further showing similar graphs to Figure 2 using instead earnings one and two years prior to migrating. There is weak evidence that earnings closer to the migration date are more U-shaped indicating that unemployment does stimulate the U-shape when earnings prior to migration is used.

and husbands are on average 31 (32) and 32 (33) years old, respectively.

5.2 Tests for symmetry

A simple parametric model is used to control for possible factors influencing the relationship between relative earnings potentials and migration propensities and formally test whether the response of the migration propensity is gender-neutral or skewed towards husband's advantage. Equation (5) relates family migration M to husband's contribution to household earnings s and variables contained in the vector X . The calculation of husband's contribution is based on adjusted earnings (similar to Panel A of Figure 2), and X is measured the year prior to migrating.

$$M = X'\beta_0 + \beta_1 s + \beta_2 s^2 + \varepsilon \quad (5)$$

The non-parametric analysis of section 5.1 verifies that we include a quadratic function of relative earnings potential and we expect $\beta_1 < 0$ and $\beta_2 > 0$. X contains a constant and possible confounding factors to be discussed below. The human-capital model of family migration ($\delta = 1$ in the theoretical model of section 3) predicts that the vertex of the convex parabola in husband's contribution is located in $s = \frac{1}{2}$. Husband-centered migration would imply that it is located to the left of $\frac{1}{2}$ ($\delta < 1$). Migration is simply an increasing function of s if the family attaches zero weight to the return of the wife ($\delta = 0$). This amounts to the following testable predictions:²⁵

$$H_0 : \beta_1 + \beta_2 = 0 \quad (\text{symmetry})$$

$$H_1 : \beta_1 + \beta_2 \neq 0 \quad (\text{asymmetry})$$

or

$$\tilde{H}_1 : \beta_1 + \beta_2 > 0 \quad (\text{husband-centered})$$

The quadratic function restricts slopes to be identical (in absolute value) around the axis of symmetry. Alternatively, we might ask whether the migration propensities respond equally strong

²⁵ $\frac{-\beta_1}{2\beta_2} = \frac{1}{2} \Rightarrow \beta_1 + \beta_2 = 0$.

to increasing male and female relative advantages by allowing for different changes in migration propensities for an increase in the intra-household earnings dissimilarity going towards higher male or female earnings share

$$M = X'\beta_0 + \beta_{1w}s \times \mathbb{1}(s < .5) + \beta_{1h}s \times \mathbb{1}(s \geq .5) + \varepsilon \quad (6)$$

Hence, we test for symmetry of sensitivity to husband's and wife's earnings advantage as follows

$$H_0 : \beta_{1w} + \beta_{1h} = 0 \quad (\text{symmetry})$$

$$H_1 : \beta_{1w} + \beta_{1h} \neq 0 \quad (\text{asymmetry})$$

or

$$\tilde{H}_1 : \beta_{1w} + \beta_{1h} > 0 \quad (\text{husband-centered})$$

A more flexible specification allowing for different quadratic terms in equation (6) was also estimated and joint F -tests for symmetry of both first and second order terms were carried out. These tests were sensitive to the thin data on female-headed households and outliers in both tails of s while conclusions based on the reported tests are robust to censoring on s (see Table 6). Hence, I choose the specifications above in order not to rely on outliers in relative earnings potentials.²⁶

5.3 Parametric results

Table 4 and Table 5 report parameter estimates and tests for symmetry based on equation (5). The columns represent different models with successively larger set of controls. Model 1 is the simplest model with only a quadratic function of husband's contribution. The level and trend in family income are included in Model 2, and Model 3 adds demographic variables to the list of explanatory variables. Migration is increasing in household earnings as expected, and school age children have large negative effects on the mobility of families (as previously documented in e.g. Long, 1974). The educational attainment of each spouse is controlled for in Model 4. Relocation between

²⁶For example, husband's share is less than 20 percent for 0.04 percent of couples and there are only four internationally migrating couples in this part of the sample.

commuting zones in Denmark is increasing in the education level of each partner. International migration is most prevalent among university educated, followed by medium and short higher educations (community colleges) and vocational trained are the least internationally mobile.

The F -statistic and corresponding p-value for the test of symmetry in equation (5) are reported in the bottom of Table 4 and Table 5. These tests show mixed evidence of strict symmetry; the minimum differs from $s = \frac{1}{2}$ in Model 1-3 for internal migrants and Model 2-3 for international migrants. The one-sided tests show that family migration is either completely symmetric or skewed towards female earnings advantage implying strong evidence in favor of gender-neutral family migration if the alternative being tested is husband-centered migration. International migration is insignificantly skewed towards husband's advantage (positive t -statistic) when the higher earnings of male-headed households have not been controlled for.

Figure 3 shows the predicted relationship between the probability of family migration and husband's contribution to household earnings for each of the models in Table 4 and Table 5, fixing the influence of other control variables at their means. These graphs confirm the results of the formal tests: symmetry cannot be rejected against the alternative of husband-centered migration, neither for internal nor for international migration. This conclusion is insensitive to successive inclusion of possible confounding factors.

Table 6 report the coefficients of interest and the tests for symmetry based on equation (6) controlling for overall household earnings. Again, the null hypothesis of symmetry cannot be rejected against the one-sided alternative of husband-centered migration. Internal mobility seems slightly wife-centered while international migration is symmetric in partners' earnings advantages irrespective of the alternative being tested using a one percent confidence level. Using the model where the response to male and female comparative advantages in earnings are constrained to be equal (columns to the right), a 10 percentage points increase in either male or female comparative advantage increase the probability of family migration by 0.2 percentage points. The response to increased dispersion of earnings potentials within the household is stronger in percent of the baseline probability for international migration. The internal migration propensity increases by 20

percent and the international migration propensity doubles going from one partner earns 60 to one partner earns 70 percent of household income. The lower panel of Table 6 shows that conclusions are insensitive to observations in the tails of husband's contribution.

6 Conclusion

This paper provides a theoretical model relating migration propensities of couples to the relative earnings potentials in the household and shows empirical evidence that international and internal migration of Danish couples are consistent with a unitarian household setting in which households are gender-neutral when maximizing the gains from migrating.

Rational responses of households to higher returns to migration for men, e.g. due to pre-marriage sorting of men and women into occupations (Benson, Forthcoming), cannot be distinguished from discounting of wives' private returns in families' migration decision process. Still the paper finds strong evidence of gender-neutral family migration relying both on non-parametric methods and regression analysis. The regression analysis shows that the results are robust to control variables which are known predictors of family migration. The U-shape documented in this paper has also been found for the US in Guler and Taşkın (2013) who calibrate a model of joint job search to US data to explain the decline in interstate migration observed in the US. Migration rates of Danish couples do not show a similar downward time trend. While rising labor force participation of women reduces the overall gender wage gap it also makes households with female primary earners more likely and this paper suggests that they are as mobile as households with male primary earners.

I show that the U-shape is not driven by endogenous unemployment prior to migrating, and I find that the selection of couples where income is disproportionately due to one partner is stronger for international migrants. An increase in the intra-household earnings asymmetry from 60 to 70 percent of household income doubles international migration propensities and leads to a twenty percent increase in migration propensities between commuting zones in Denmark.

The lower migration rates for more similar couples reflect more intense location problems. The paper shows that the colocation problem is non-negligible in the sense that couples with more asymmetric intra-household earnings potentials significantly select into migrating. The absolute human capital measures used in family migration equations in the literature may bias conclusions towards husband-centered migration for two reasons: different specialization of men and women prior to marriage (Benson, Forthcoming), and more intense location problems among high skilled women relative to high skilled men. The stronger educational homogamy among the highly educated women means that very few women have a relative earnings advantage in the household.

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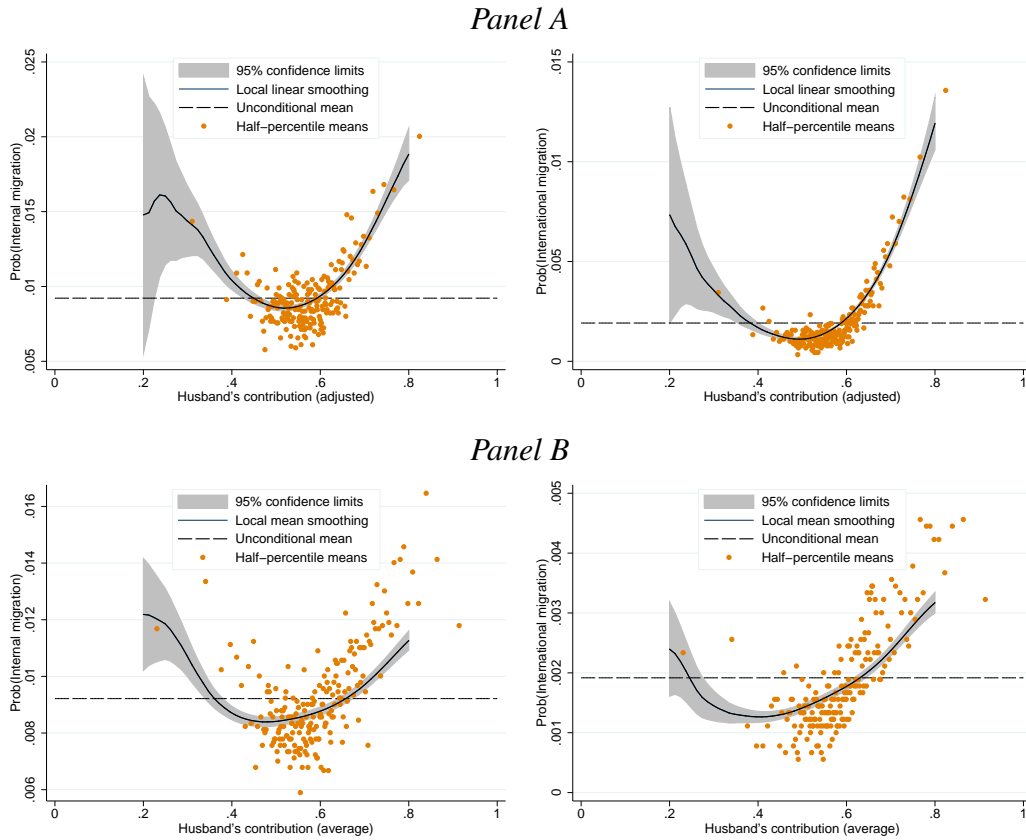
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Table 1: Migration rates

	Internal	International
Pr(Migration Single, Man)	3.37	0.64
Pr(Migration Single, Woman)	3.09	0.61
Pr(Migration Single)	3.27	0.63
Pr(Family migration Couple)	0.92	0.19

Notes: Migration rates are in percent. Family migration is the joint migration of both partners.

Figure 2: The association between family migration and relative earnings



Notes: Weighting function: Epanechnikov kernel. Width of smoothing: 0.15.

Husband's contributions are: Panel A, $s = \frac{Y_h^{adj}}{Y_h^{adj} + Y_w^{adj}}$; and Panel B, $s = \frac{Y_h^{avg}}{Y_h^{avg} + Y_w^{avg}}$.

Table 2: Family earnings and migration

	Husband's contribution			Migration	
	0-0.4	0.4-0.6	0.6-1	Internal	International
1st quintile	1.78	70.35	27.87	0.65	0.04
2nd quintile	0.26	77.04	22.70	0.67	0.04
3rd quintile	0.35	73.57	26.08	0.83	0.09
4th quintile	0.65	65.89	33.46	1.10	0.16
5th quintile	1.74	52.83	45.43	1.36	0.62
All	0.96	67.94	31.11	0.92	0.19
Observations	17207	1221253	559184	1797644	1797644

Notes: Each row of the table show distribution according to husband's (adjusted) contribution to household earnings and the family migration rates. The rows are quintiles of (adjusted) family earnings. All table entries are in percent.

Table 3: Family migrants' characteristics and relative earnings

	Husband's contribution				
	0-0.4	0.4-0.6	0.6-1		
	<i>Internal migration</i>				
Family earnings	61.31	**	66.85	74.01	***
Husband/family yrs of education	0.49	**	0.50	0.51	***
Wife has university degree	0.34	***	0.13	0.06	***
Husband has university degree	0.22	*	0.16	0.19	***
Age of wife	31.11		30.76	30.73	
Age of husband	32.72		32.28	32.20	
Observations	207		10405	5958	
	<i>International migration</i>				
Family earnings	67.59	*	79.40	91.04	***
Husband/family yrs of education	0.49		0.50	0.52	***
Wife has university degree	0.32		0.25	0.11	***
Husband has university degree	0.24		0.34	0.38	**
Age of wife	31.66		31.46	31.81	**
Age of husband	33.20		32.60	33.10	***
Observations	41		1482	1924	

Notes: Each entry of the table is the variable mean by intervals of husband's (adjusted) contribution to family earnings. Significance levels (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$) of a t-test of the difference in means (allowing for unequal variances) between "primary-earner" and "dual-earner" families are reported next to the mean for the respective "primary-earner" type. Family earnings are in 1000 USD (2000 prices).

Table 4: Internal migration

	Model 1	Model 2	Model 3	Model 4
Husband's contribution	-13.558*** (1.050)	-13.661*** (1.051)	-15.430*** (1.052)	-11.847*** (1.050)
Husband's contribution (squared)	13.064*** (0.926)	13.025*** (0.928)	14.265*** (0.928)	11.731*** (0.926)
ln(Family earnings)		0.173*** (0.031)	0.364*** (0.032)	-0.420*** (0.036)
Dif. ln(Family earnings)		0.908*** (0.061)	0.753*** (0.061)	0.780*** (0.061)
Husband's age			-0.055*** (0.003)	-0.056*** (0.003)
Wife's age			-0.010*** (0.003)	-0.031*** (0.003)
Children aged 0-2			0.096*** (0.018)	-0.028 (0.018)
Children aged 3-6			-0.219*** (0.014)	-0.252*** (0.014)
Children aged 7-17			-0.378*** (0.017)	-0.219*** (0.017)
Husband, vocational				0.026 (0.015)
Husband, community college				0.779*** (0.028)
Husband, university				1.323*** (0.049)
Wife, vocational				0.055*** (0.015)
Wife, community college				0.436*** (0.022)
Wife, university				0.893*** (0.059)
Constant	Yes	Yes	Yes	Yes
Observations	1797644	1797644	1797644	1797644
R^2	0.000	0.001	0.002	0.005
F -statistic (H_0 : symmetry)	9.1	15.1	49.6	0.5
P -value	0.003	0.000	0.000	0.484
t -statistic	-3.016	-3.883	-7.041	-0.699
P -value (\tilde{H}_1 : husband-centered)	0.999	1.000	1.000	0.758

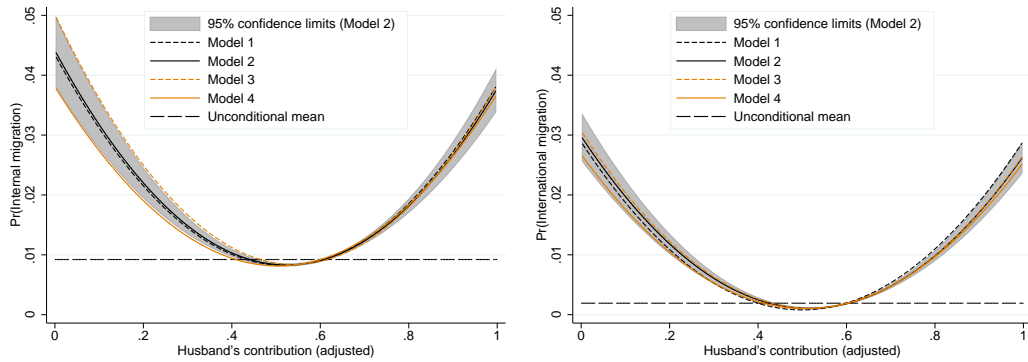
Notes:* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses. Coefficients and standard errors scaled by a factor 100.

Table 5: International migration

	Model 1	Model 2	Model 3	Model 4
Husband's contribution	-11.240*** (0.723)	-11.161*** (0.722)	-11.426*** (0.723)	-10.166*** (0.726)
Husband's contribution (squared)	11.255*** (0.653)	10.829*** (0.650)	11.021*** (0.650)	10.029*** (0.652)
ln(Family earnings)		0.594*** (0.018)	0.613*** (0.018)	0.351*** (0.018)
Dif. ln(Family earnings)		-0.011 (0.025)	-0.028 (0.025)	-0.022 (0.025)
Husband's age			-0.012*** (0.001)	-0.013*** (0.001)
Wife's age			0.005*** (0.001)	-0.001 (0.001)
Children aged 0-2			0.038*** (0.008)	0.001 (0.008)
Children aged 3-6			-0.029*** (0.006)	-0.039*** (0.006)
Children aged 7-17			-0.097*** (0.008)	-0.049*** (0.008)
Husband, vocational				-0.039*** (0.006)
Husband, community college				0.156*** (0.013)
Husband, university				0.669*** (0.031)
Wife, vocational				-0.019** (0.006)
Wife, community college				0.053*** (0.010)
Wife, university				0.128*** (0.034)
Constant	Yes	Yes	Yes	Yes
Observations	1797644	1797644	1797644	1797644
R^2	0.001	0.002	0.003	0.005
F -statistic (H_0 : symmetry)	0.0	13.1	19.1	2.1
P -value	0.869	0.000	0.000	0.146
t -statistic	0.165	-3.622	-4.367	-1.453
P -value (\tilde{H}_1 : husband-centered)	0.434	1.000	1.000	0.927

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses. Coefficients and standard errors scaled by a factor 100.

Figure 3: Predicted family migration rate
 Internal International



Notes: Each graph plots the predicted migration rate against husband's contribution fixing the influence of other control variables at their means. Model 1 includes a quadratic function of husband's contribution and model 2-4 sequentially include additional control variables corresponding to the models listed in Table 4 and Table 5.

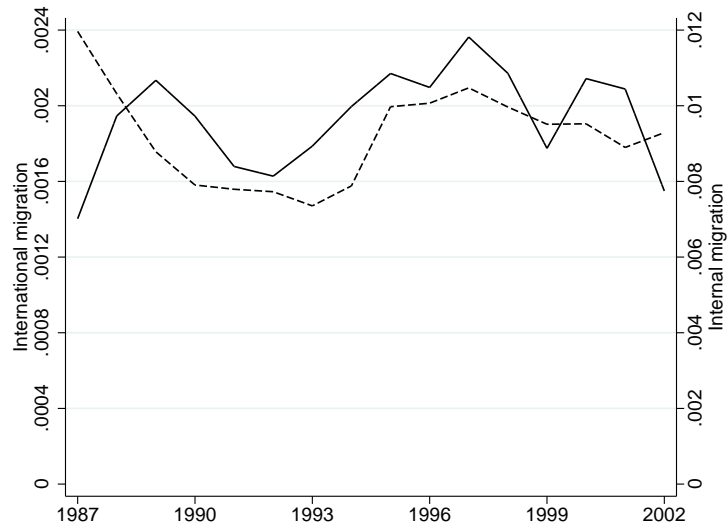
Table 6: The responsiveness of internal migration

	Unconstrained		Constrained	
	Internal	International	Internal	International
$s \times \mathbb{1}(s < .5)$	-3.582*** (0.411)	-2.389*** (0.217)	-2.223*** (0.142)	-1.959*** (0.083)
$s \times \mathbb{1}(s \geq .5)$	2.206*** (0.142)	1.954*** (0.083)	2.223*** (0.142)	1.959*** (0.083)
Observations	1797644	1797644	1797644	1797644
F -statistic (H_0 : symmetry)	12.4	4.7		
P -value	0.000	0.029		
t -statistic	-3.53	-2.18		
P -value (\tilde{H}_1 : husband-centered)	1.000	0.985		
		<i>Censor $s < .2$ and $s > .8$</i>		
$s \times \mathbb{1}(s < .5)$	-3.825*** (0.448)	-2.153*** (0.211)	-2.035*** (0.144)	-1.756*** (0.079)
$s \times \mathbb{1}(s \geq .5)$	2.032*** (0.144)	1.755*** (0.079)	2.035*** (0.144)	1.756*** (0.079)
Observations	1790951	1790951	1790951	1790951
F -statistic (H_0 : symmetry)	18.1	4.2		
P -value	0.000	0.041		
t -statistic	-4.25	-2.04		
P -value (\tilde{H}_1 : husband-centered)	1.000	0.979		

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses. Coefficients and standard errors scaled by a factor 100. s denotes husband's contribution to total earnings. The models are similar to Model 2 of Table 4 and Table 5, where the quadratic function of husband's contribution has been substituted with separate slope parameters for female ($\mathbb{1}(s < .5)$) and male ($\mathbb{1}(s \geq .5)$) relative earnings advantage.

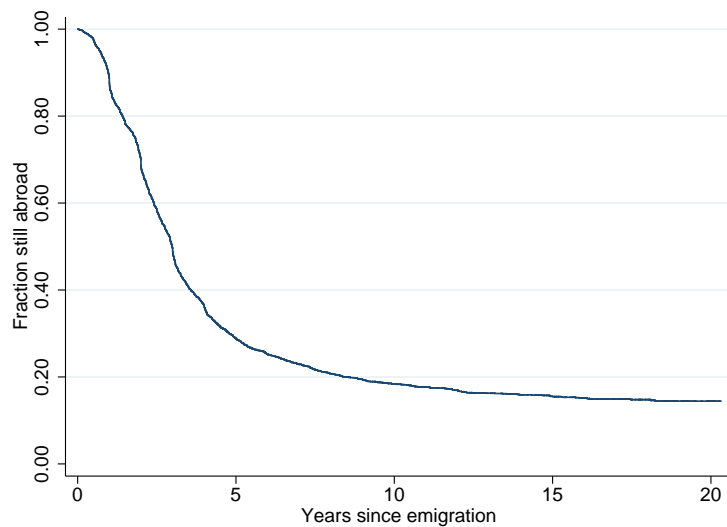
Appendix A

Figure A.1: Family migration 1987-2002



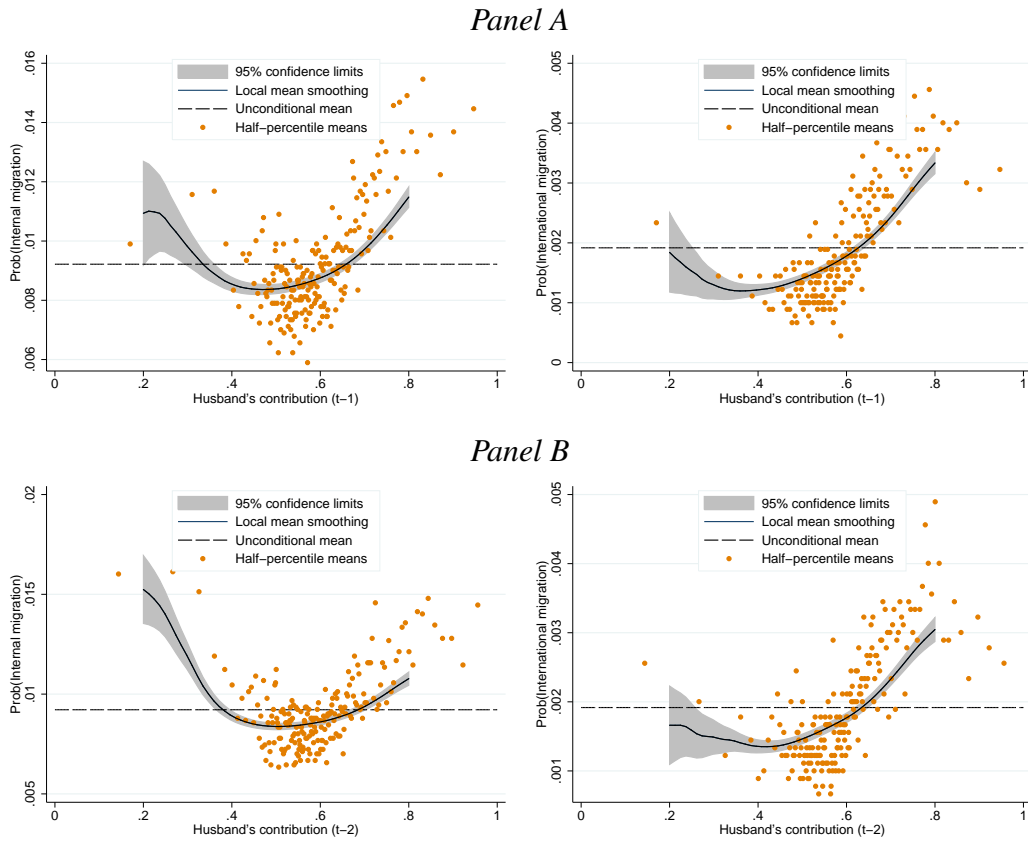
Notes: International family migration (solid line) is a couple leaving Denmark and internal migration (dotted line) is a couple relocating between commuting zones in Denmark.

Figure A.2: Duration abroad for international family migrants



Notes: Couples who emigrate between 1987-2002 and are non-censored at time t contribute to the estimate of the stay-abroad rate in period t (Kaplan-Meier survival estimate). Duration is measured as the difference between the emigration and return date of the husband.

Figure A.3: The association between family migration and relative earnings



Notes: Weighting function: Epanechnikov kernel. Width of smoothing: 0.15.

Husband's contributions are: Panel A, $s = \frac{Y_h^{t-1}}{Y_h^{t-1} + Y_w^{t-1}}$; and Panel B, $s = \frac{Y_h^{t-2}}{Y_h^{t-2} + Y_w^{t-2}}$. income.

Appendix B

Table B.1: Family Migration Literature

Author(s)	Type	Method	Finding	Remark
		<i>Internal</i>		
Axelsson and Westerlund (1998)	Sweden (30 km)	Family <i>income-change equation</i> with <i>Heckman correction</i> for selectivity of migrants	No effect on family disposal income. Usual predictors of migration like education and age are insignificant	No selectivity cannot be rejected. Generally, noisy estimation of migration and family-income growth
Bielby and Bielby (1992)	US (100 miles)	<i>Probit model</i> of expressed reluctance to move for a better job due to family considerations	Potential losses for the spouse deter wives from pursuing job opportunities, not husbands	<i>Gender-role theory</i> . Use the coefficient on gender as test for symmetry
Cooke (2003)	US (county)	<i>Lagged-variable model</i> in husband's, wife's and pooled income (two data waves)	No effect on wife's income, positive effect for high-income husbands	Migration maximizes husband's income, income effects are a function of gender
Compton and Pollak (2007)	US (MSA)	<i>Probit model</i> of migration and <i>multinomial logit</i> of migrating to small, medium or large MSA	Education of husband and not of the wife affects the propensity to migrate to a large MSA	Part-power couples are the most likely to migrate, this is driven by male power couples. Power types are defined by Costa and Kahn (2000)
Costa and Kahn (2000)	US (different sized cities)	<i>Triple-dif</i> in location propensities. Defines high (low) power couples as those where both (neither) are college graduates.	Power couples increasingly locate in large cities controlling for the growing urbanization of the college educated and trends for low-power couples	Worsening of the colocation problem (increasing female labor force participation) leads to increased location of power couples in large cities
Duncan and Perrucci (1976)	US (state)	<i>Linear probability model</i> of migrant status on indices of occupational prestige, migration possibility and compatibility	Migration responds positively to occupational prestige and occupation-specific migration rates of husbands, not of wives	Focus on occupational determinants of family migration and include also wife's percent of family income (insignificant)

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Author(s)	Type	Method	Finding	Remark
Gemici (2011)	US (census division /grouping of states)	<i>Structural dynamic model</i> where partners decide each period whether to relocate and whether to stay together	Family ties deter migration and dampen wage growth of both men and women. Colocation problems increase divorce rates	Decisions are repeated, contrary to the one-time decisions of the classical <i>human-capital model</i> (e.g. Mincer, 1978)
Grant and Vanderkamp (1980)	Canada (100 miles)	<i>Lagged-variable model</i> in earnings by sex and marital status	Negative earnings effects for married women and positive effects for married men	The estimated earnings effects are too low to rationalize migration for most groups
Lichter (1980)	US (state)	<i>Contingency tables</i>	The effect of wife in labor force is negative on average, but wives in professional positions enhance mobility	Lower employment of wives post migration confirms earlier findings (e.g. Mincer, 1978)
Lichter (1982)	US (county or SMSA)	<i>Logit model</i> of migrant status on education, labor force attachment and occupational prestige	Employment and job tenure of wives deter migration. Small positive but insignificant effect of wife's education	Effect of wife's education is positive and large when husband's education is left out, author suggest due to assortative mating
Lichter (1983)	US (county or SMSA)	<i>Lagged-variable model</i> in wife's earnings	Temporary negative effect, more severe (often not significant) for higher education and occupational prestige	On the duration and the heterogeneity of the effects for wives
Long (1974)	US (county or state)	<i>Migration probabilities</i> by age, marital status and employment status of wife before and after a move	Working wives deter long distance moves but increases short distance mobility. Housing considerations account for 2/3 of intra-county family migration	Upgrading of family housing is an important motivation for working for married women. Tied mover status of wives help explain the gender wage gap
McKinnish (2008)	US (MSA or similar)	<i>Logit model</i> of migrant status and <i>earnings equations</i> , focussing on the effect of the occupational level migration rate	Husband's occupational characteristics matter more than wife's, irrespectively of the power types defined in Costa and Kahn (2000)	Duncan and Perrucci (1976) too have occupational level mobility measures

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Author(s)	Type	Method	Finding	Remark
Mincer (1978)	US (county or state)	<i>Migration probabilities</i> , repeats Long (1974) and adds probabilities by employment and unemployment rates	Show family migration is associated with increase in wife's unemployment and labor force withdrawal	Defines " <i>tied movers</i> " and " <i>tied stayers</i> " and shows descriptive evidence consistent with his <i>human-capital theory</i>
Nivalainen (2004)	Finland (municipality or province)	<i>Multinomial logit</i> comparing staying, short and long distance moves	Wife's education insignificant; working wife deters migration; larger husband/wife income ratio increase migration	Asymmetric; "it continues to be the human capital of the husband that rules"
Rabe (2011)	GB (Local Authority Districts)	<i>Endogenous switching model</i> of wage effects corrected for selection into migration and employment. 2nd stage probit of migration on predicted wage returns	Women suffer a temporary wage penalty, no wage effect for men. The predicted gains of husband and wife positively affect migration	The predicted wage gain is negative for 12 percent of wives and 1 percent of husbands in migrating families
Sandell (1977)	US (county or SMSA)	<i>Earnings-change equation</i> for husband's, wife's and family (with lagged earnings)	Positive effect for husbands, negative or insignificant for women and family earnings goes up.	Earnings gains of husbands are large enough to offset their wives' losses
Shauman (2010)	US (county or MSA)	<i>Logit model</i> of migrant status on education, labor force attachment, occupation-level variables and measures of the comparative advantage in each variable	Occupational variables do not eliminate the gendered effects of usual controls, effects of occupational variables and educational advantage differ by gender	Adds occupational determinants to usual controls (education, employment and income). Includes also wife's percent of family income (insignificant)
Shihadeh (1991)	Canada (province)	<i>Logit model</i> of reason for migrating (in sample of migrants)	Family income and husband reporting job-reasons increase the odds that the wife is accompanying in the migration decision	4% of husbands and 74% of wives state they are accompanying in the migration decisions
Spitze (1984)	US (county or SMSA)	<i>Lagged-variable model</i> in wife's employment and earnings	Temporary negative effects on wives' employment and earnings that do not depend on age	On the duration and the age-distribution of the effects for wives

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Author(s)	Type	Method	Finding	Remark
Swain and Garasky (2007)	US (county and SMSA)	<i>Two-level logit model</i> of family migration decisions. First individual characteristics, second neighborhood characteristics	Change in husband's earnings has no effect, increase in wife's earnings makes migration less likely. Wife's education insignificant	Mixed evidence on the importance of husband's and wife's characteristics
Tenn (2010)	US (state)	<i>Probit model</i> of migrant status and small <i>structural model</i>	Wife's education and occupation have lower explanatory power than husband's due to lower weight on wife's private return	Migration follows husband's potential return and this pattern has been stable 1960-2000
Wallston, Foster, and Berger (1978)		Psychological. Interviews dual career couples (both are professionals)	Actual location decisions favor career of male partner. It seems to be a forced choice; it happens when only one job-offer is available	Institutional constraints generate location decisions that favor the husband
		<i>International</i>		
Junge, Munk, and Poutvaara (2013)	Emigration of Danes	<i>Probit model</i> of migrant status for all and subgroups defined by children and education of couples	International migration is increasing in husband's earnings but the effect of wife's earnings is zero (small insignificant estimates that bounce around zero)	High power couples (as defined by Costa and Kahn, 2000) are most likely to emigrate, followed by male power couples, then female power couples.

Notes: "Type" refers to type of migration (location) and migration is either defined by distance or by being across geographic borders. Costa and Kahn (2000) study location choices, while the remaining papers study migration decisions and/or labor market effects of family migration. All considered migration is family migration, i.e. joint migration of husband and wife.

Appendix C

$$X \sim N(\mu Y(s(1-\delta) + \delta) - 2C, \sigma^2 Y^2 (\delta^2 - s2(\delta^2 - \delta\rho) + s^2(1 + \delta^2 - 2\delta\rho)))$$

As in the main text let $\mu_X = \mu Y(s(1-\delta) + \delta) - 2C$ and $z_s = \sqrt{\delta^2 - s2(\delta^2 - \delta\rho) + s^2(1 + \delta^2 - 2\delta\rho)}$

$$\begin{aligned}\text{Corr}(X, r_h) &= \frac{s(1 - \delta\rho) + \delta\rho}{z_s} \\ \text{Corr}(X, r_w) &= \frac{s(\rho - \delta) + \delta}{z_s}\end{aligned}$$

ϕ and Φ are the standard normal density and distribution functions, while subscripts r_h, r_w and X on ϕ and Φ indicate their respective density and distribution functions. λ is the inverse Mills ratio.

$$\begin{aligned}\mathbb{E}(r_h|X > 0) &= \int_{-\infty}^{\infty} r_h \phi_{r_h}(r_h|X > 0) \, dr_h \\ &= \int_{-\infty}^{\infty} r_h \frac{\int_0^{\infty} \phi_{r_h}(r_h|X = x) \phi_X(x) \, dx}{\mathbf{P}(X > 0)} \, dr_h \\ &= \frac{1}{\mathbf{P}(X > 0)} \int_0^{\infty} \left(\int_{-\infty}^{\infty} r_h \phi_{r_h}(r_h|X = x) \, dr_h \right) \phi_X(x) \, dx \\ &= \frac{1}{\mathbf{P}(X > 0)} \int_0^{\infty} \left(\mu + (x - \mu_X) \frac{s(1 - \delta\rho) + \delta\rho}{z_s} \frac{\sigma}{\sigma Y z_s} \right) \phi_X(x) \, dx \\ &= \frac{s(1 - \delta\rho) + \delta\rho}{z_s} \frac{\sigma}{\mathbf{P}(X > 0)} \int_0^{\infty} \left(\frac{\mu z_s}{(s(1 - \delta\rho) + \delta\rho)\sigma} + \frac{x - \mu_X}{\sigma Y z_s} \right) \phi_X(x) \, dx \\ &= \frac{s(1 - \delta\rho) + \delta\rho}{z_s} \frac{\sigma}{\mathbf{P}(X > 0)} \left(\frac{\mu z_s}{(s(1 - \delta\rho) + \delta\rho)\sigma} + \int_0^{\infty} \frac{x - \mu_X}{\sigma Y z_s} \phi_X(x) \, dx \right) \\ &= \frac{\mu}{\mathbf{P}(X > 0)} + \frac{s(1 - \delta\rho) + \delta\rho}{z_s} \frac{\sigma}{\mathbf{P}(X > 0)} \int_0^{\infty} \frac{x - \mu_X}{\sigma Y z_s} \phi_X(x) \, dx \\ &= \frac{\mu}{\mathbf{P}(X > 0)} + \frac{s(1 - \delta\rho) + \delta\rho}{z_s} \frac{\sigma}{\mathbf{P}(X > 0)} \int_0^{\infty} \frac{x - \mu_X}{\sigma Y z_s} \frac{1}{\sqrt{2\pi}\sigma Y z_s} \exp\left(-\frac{1}{2} \left(\frac{x - \mu_X}{\sigma Y z_s}\right)^2\right) \, dx \\ &= \frac{\mu}{\mathbf{P}(X > 0)} + \frac{s(1 - \delta\rho) + \delta\rho}{z_s} \frac{-\frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2} \left(\frac{x - \mu_X}{\sigma Y z_s}\right)^2\right) \Big|_0^{\infty}}{\mathbf{P}\left(\frac{X - \mu_X}{\sigma Y z_s} > \frac{-\mu_X}{\sigma Y z_s}\right)} \\ &= \frac{\mu}{\mathbf{P}(X > 0)} + \frac{s(1 - \delta\rho) + \delta\rho}{z_s} \frac{\phi\left(\frac{-\mu_X}{\sigma Y z_s}\right)}{1 - \Phi\left(\frac{-\mu_X}{\sigma Y z_s}\right)} \\ &= \frac{\mu}{\mathbf{P}(X > 0)} + \frac{s(1 - \delta\rho) + \delta\rho}{z_s} \lambda\left(\frac{-\mu_X}{\sigma Y z_s}\right)\end{aligned}$$

Likewise for spouse w

$$\mathbf{E}(r_w|X > 0) = \frac{\mu}{\mathbf{P}(X > 0)} + \frac{s(\rho - \delta) + \delta}{z_s} \lambda \left(\frac{-\mu_X}{\sigma Y z_s} \right)$$

Examine the inequality

$$\begin{aligned} \mathbf{E}(r_h|X > 0) &> \mathbf{E}(r_w|X > 0) \\ s(1 - \delta\rho) + \delta\rho &> s(\rho - \delta) + \delta \\ s(1 - \rho)(1 + \delta) &> (1 - \rho)\delta \\ s &> \frac{\delta}{1 + \delta} \end{aligned}$$