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## TIME AND MONEY TRANSFERS: SOCIAL NETWORKS AND KINSHIP IN MIGRATION

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## Time and money transfers: social networks and kinship in migration

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**Abstract:** This study investigates transfers given by different donors to parents in need for help whose children migrated abroad. We develop a formal model of time and money transfers given to the elderly parents by kin and non-kin individuals taking into account the elderly's social network and proximity between transfer's donor and recipient. We find that migrant children specialize in money and non-migrant children in time transfers, provided that the difference in wages and proximity between siblings is substantial, and parental social networks do not compress. The dynamics in the size and composition of parent's social network triggered by child's migration affects the transfers received by parents not only from children, but also from other individuals. The overall effect on total time transfers might be positive even if donors decide to decrease their transfers of time, provided that the set of donors is enlarged.

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**Keywords:** private transfers, care, time transfers, money transfers, kinship, family, social network, proximity, migration, ageing, elderly

**JEL codes:** D02, D03, D19, D64, H31

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## 1. Introduction

Population ageing along with increased internal and international mobility affects private intergenerational transfers of time and money. In this study we are particularly interested in the transfers given by different donors to elderly parents whose children migrated abroad. On the one hand, migration driven by wage differential could result in increased money transfers from migrant children (i.e. remittances); on the other hand, large physical distance could decrease face-to-face time transfers (non-financial services such as care and personal help) from migrant children. These intuitions might be misleading, because parents, in addition to migrant children, receive transfers from other individuals. Factors such as family composition and availability of alternative to family sources of support are relevant for the private transfers received by the parents. For instance, friends could assist with bathing and neighbours could help with seeing a doctor. Social networks linking individuals independently from kinship relations are especially important in families with migrant children. In this study, we take into account the elderly's social networks (including its size and kinship composition) and proximity to the elderly (travel time and cost) and develop a formal model of time and money transfers given to the elderly in migrant and non-migrant families by kin and non-kin individuals.

We address main shortcomings of our study now. Firstly, we omit time transfers that do not need face-to-face contact, because they are insensitive to proximity (and migration). Technology allows transfers of time such as emotional support at no hassle or financial cost, but we are interested only in care and help given personally. Secondly, we assume that labour supply is exogenous, because the tension between attention to the elderly and attention to others is particularly important to our research problem. Many caregivers have dependent parents and children, and rarely can they afford not working. Taking into account labour market's imperfections, the assumption on exogenous labour supply in short-term is feasible. Finally, intrahousehold transfers of time and money reach beyond the scope of our analysis. Although intrahousehold time transfers are essential for meeting elderly's need for care, they are qualitatively different from interhousehold transfers.

In the following section we present our analytical framework heuristically and in Section 3 we present model formally. We prove claims derived from the model in Section 4 and delineate propositions based on the claims in Section 5. We discuss results in Section 6. Final section briefly concludes.

## 2. Theoretical setting

Migration of an adult child might affect transfers of time and money given to the elderly parent via two channels. Firstly, migration is often connected with larger wage. Secondly, migration reduces the physical proximity between the elderly and the transfer donor. The former channel is straightforward, but the latter needs discussion. The sole physical distance is not as relevant for time transfers as the time needed to travel this distance. Alternative transportation means, depending on the distance at stake, differ with respect to travel time. A combination of travel time and its cost per hour determines the total two-way travel cost. Presumably, the smaller travel time is accompanied with the larger cost. However, this is not always the case. For example in some cities, walking can be less time-consuming than taking a bus. Other factors such as traffic, existing routes, ticket tariffs, booking timing, gas prices etc. affect the travel cost. Thus, it is plausible to assume that the travel cost per hour might depend on the travel time non-monotonically. The total two-way travel cost is a hassle cost of a single time transfer, which affects not only how much time can be transferred, but also how frequent time transfers can be. The availability of money transfer services and the Internet banking make the hassle cost of money transfers negligible and independent from the physical proximity.

It has been established that private transfers, especially of money, take place foremost within a nuclear or, in some cultures, extended family. The extent of kinship relatedness is an important factor explaining altruistic behavior. In our model, we distinguish between partners, children and other relatives, as far as the family of the transfer's recipient is concerned. Then we refer to the concept of social network defined as a set of individuals close to and trusted by the elderly (Cornwell et al. 2009), making distinction between kin and non-kin members of the network. Note that belonging to family is independent from belonging to social network. Finally, we include other individuals who do not belong either to family or social network, such as volunteers. All these individual types might engage in provision of time and money transfers to the elderly. We assume for simplicity that the propensity to give appears with the same strength regardless of the type of transfers (whether money or time).

We argue that the elderly prefer time transfers from close individuals (i.e. social network's members), especially if they are related to the elderly, a notion found in previous studies (e.g. Cantor 1989). The availability of preferred sources of potential support gives the sense of security. The smaller the social network and the less kin belong to the network, the larger the risk of lack of preferred support or no support at all. Elderly in such circumstances appreciate support from close individuals a lot. They attach higher value to the received time

transfers than those with larger network of close and trusted individuals. We refer to the perceived value of received time transfers as to the elderly parent's sense of insecurity. This feature is crucial in our reasoning.

Many caregivers belong to the so called 'sandwich generation.' They take care of elderly parents, have dependent children and rarely can afford economic inactivity. Therefore, in addition to time spent on travel and face-to-face time transfers, we distinguish spare time and work time. The spare time can be spent on attention given to children or partner, chores, leisure activities or simply on reposal. The tension between needs of young and old generation can be substantial. Inelastic labour markets and limited employee's bargaining power result in a small set of alternatives for working hours. In some European economies part-time jobs are rarely offered and availability for overtime work is one of the employment criteria. Therefore, the more interesting choice is between attention to own family and attention to others, than between work and caregiving. Thus, the trade-off between spare time and time transfers is particularly interesting to us. We assume for simplicity that in short-term labour supply is exogenous.

In what follows, we develop a framework combining money transfers, time transfers, migration, kinship, and social networks. Aiming at building such a multidimensional model, we choose not to make distinction between alternative motivations underlying the willingness to give transfers akin to Couch et al. (1999). Ignoring forces shaping the inclination to give transfers allows us to cover different types of individuals with different motivations to give. For the same reason we exclude from our model transfers given by the elderly. Our theoretical considerations concern pairs of individuals living in separate households in general, including migrant individuals, in particular. Note that our theoretical framework is applicable to individuals with various family and social network structures (also childless individuals). However, our focus is limited to elderly parents of migrant and non-migrant children and all individuals giving time or money transfers to the elderly.

### 3. Formal model

Let us consider an individual **I** deriving felicity from own consumption  $C_i$  and spare time  $S_i$ . In addition, **I** enjoys individual's **E** utility that depends on time transfers  $T_{i,e}$  and money transfers  $M_{i,e}$  received from **I**, and **E**'s sense of insecurity  $\theta_e$ . The social network of **E** consists of  $n_e$  individuals, of which  $k_e$  are kin ( $\theta_e \in (0,1)$ ,  $n_e > 0$ ,  $k_e \in [0, n_e]$ ,  $\frac{\partial \theta_e}{\partial n_e} < 0$ ,  $\frac{\partial \theta_e}{\partial k_e} < 0$ ). The utility function of **I** takes the form

$$U_i(C_i, S_i, M_{i,e}, T_{i,e}) = (1 - \alpha_{i,e})u_i(C_i, S_i) + \alpha_{i,e}u_{i,e}(M_{i,e}, T_{i,e}^{\theta_e})$$

Where  $\alpha_{i,e}$  – I's propensity to give transfers to E ( $\alpha_{i,e} \in (0,1)$ ).

Individual I faces the following budget and time constraints, respectively:

$$\begin{aligned} C_i + M_{i,e} + t_{i,e}c_{i,e} &= w_i l_i, \\ S_i + T_{i,e} + t_{i,e} + l_i &= \tau, \end{aligned}$$

where:

$t_{i,e}$  – time spent on travel between I's and E's households ( $t_{i,e} > 0$ ),

$c_{i,e}$  – cost per hour of the travel between I's and E's households ( $c_{i,e} = c(t_{i,e}) > 0$ ).

$w_i$  – I's wage per hour ( $w_i = w(t_{i,e}) > 0$ ,  $w' = \frac{\partial w_i}{\partial t_{i,e}} > 0$ ),

$l_i$  – I's labour hours ( $l_i > 0$ ),

$\tau$  – time endowment ( $\tau = cons > 0$ ).

For simplicity, we assume that  $u_i(C_i, S_i) = \ln(C_i S_i)$  and  $u_e(M_{i,e}, T_{i,e}^{\theta_e}) = \ln(M_{i,e} T_{i,e}^{\theta_e})$ , and remove superscripts  $i$  and  $e$  from the equations. We maximize utility function  $U(C, S, M, T) = (1 - \alpha)\ln C + (1 - \alpha)\ln S + \alpha\ln M + \alpha\theta\ln T$  subject to the set of constraints  $g_1 = wl - (C + M + tc) = 0$ ,  $g_2 = \tau - (S + T + t + l)$  using the following Lagrangian function:

$$F = (1 - \alpha)(\ln C + \ln S) + \alpha(\ln M + \theta\ln T) + \mu_1(wl - C - M - tc) + \mu_2(\tau - S - T - t - l).$$

FOCs

$$\frac{\partial F}{\partial C} = \frac{1 - \alpha}{C} - \mu_1 = 0,$$

$$\frac{\partial F}{\partial S} = \frac{1 - \alpha}{S} - \mu_2 = 0,$$

$$\frac{\partial F}{\partial M} = \frac{\alpha}{M} - \mu_1 = 0,$$

$$\frac{\partial F}{\partial T} = \frac{\alpha\theta}{T} - \mu_2 = 0,$$

$$\frac{\partial F}{\partial \mu_1} = wl - C - M - tc = 0,$$

$$\frac{\partial F}{\partial \mu_2} = \tau - S - T - t - l = 0$$

yield  $x^* = (C^*, S^*, M^*, T^*)$ . Because functions  $U$  and  $g_1, g_2$  are  $C^1$ ;  $g_1, g_2$  are linear;  $U$  is concave on its domain and FOCs are met at  $x^*$ , then the SOC's for strict global maximum at  $x^*$  on the constraint set  $g_1, g_2$  are met.

The optimal solution is  $x^* = (C^*, S^*, M^*, T^*)$ , where:

$$C^* = (1 - \alpha)(wl - tc),$$

$$S^* = \frac{1 - \alpha}{1 - \alpha + \alpha\theta}(\tau - t - l),$$

$$M^* = \alpha(wl - tc),$$

$$T^* = \frac{\alpha\theta}{1 - \alpha + \alpha\theta}(\tau - t - l).$$

If  $wl \leq tc$  and  $\tau \leq t + l$ , individual **I** would not be able to consume anything and would have no time at all to rest; these cases are excluded.

#### 4. Claims

**Claim 1:** The larger the propensity to give transfers, the larger the total money transfers and the smaller the consumption *ceteris paribus*.

**Proof:** Because  $wl > tc$ , then  $\frac{dM^*}{d\alpha} = wl - tc > 0$  and  $\frac{dC^*}{d\alpha} = -(wl - tc) < 0$  ■

**Claim 2:** The larger the wage, the larger the total money transfers and the consumption *ceteris paribus*.

**Proof:** Because  $\alpha \in (0, 1), l > 0$ , then  $\frac{dM^*}{dw} = \alpha l > 0$  and  $\frac{dC^*}{dw} = (1 - \alpha)l > 0$  ■

**Claim 3:** The larger the labour hours, the larger the total money transfers and the consumption *ceteris paribus*.

**Proof:** Because  $\alpha \in (0, 1), w > 0$ , then  $\frac{dM^*}{dl} = \alpha w > 0$  and  $\frac{dC^*}{dl} = (1 - \alpha)w > 0$  ■

**Claim 4:** The larger the travel cost per hour, the smaller the total money transfers and the consumption *ceteris paribus*.

**Proof:** Because  $\alpha \in (0, 1), t > 0$ , then  $\frac{dM^*}{dc} = -\alpha t$  and  $\frac{dC^*}{dc} = -(1 - \alpha)t$  ■

**Claim 5:** For:

- sufficiently small hourly cost of travel decreasing in travel time and
  - sufficiently small hourly travel cost increasing in travel time with a sufficiently small increase,
- the larger the travel time, the larger the total money transfers and consumption *ceteris paribus*.

**Proof:** Because  $\alpha, \theta \in (0,1)$  and  $w', c, t, l > 0$ ,  $\frac{dM^*}{dt} = \alpha(w'l - c - c't) > 0$  and  $\frac{dC^*}{dt} = (1-\alpha)(w'l - c - c't) > 0$  if and only if  $w'l - c - c't > 0$ , where  $c' = \frac{\partial c}{\partial t}$ . If  $c' < \frac{w'l}{t}$  and  $c < w'l - c't$ , then  $w'l - c - c't > 0$  and therefore  $\frac{dM^*}{dt} > 0, \frac{dC^*}{dt} > 0$  ■

**Claim 6:** For:

- sufficiently large hourly cost of travel decreasing in travel time and
  - sufficiently large hourly cost of travel increasing in travel time with a sufficiently small increase and
  - sufficiently large increase of travel cost in travel time
- the larger the travel time, the smaller the total money transfers and the consumption *ceteris paribus*.

**Proof:** Because  $\alpha, \theta \in (0,1)$  and  $w', c, t, l > 0$ ,  $\frac{dM^*}{dt} = \alpha(w'l - c - c't) < 0$  and  $\frac{dC^*}{dt} = (1-\alpha)(w'l - c - c't) < 0$  if and only if  $w'l - c - c't < 0$ , where  $c' = \frac{\partial c}{\partial t}$ . If  $c' > \frac{w'l}{t}$ ,  $c > w'l - c't$  or  $c' < \frac{w'l}{t}$ , then  $w'l - c - c't < 0$  and therefore  $\frac{dM^*}{dt} < 0, \frac{dC^*}{dt} < 0$  ■

**Claim 7:** The sense of insecurity is irrelevant for the total money transfers and consumption *ceteris paribus*.

**Proof:**  $\frac{dM^*}{d\theta} = 0$  ■

**Claim 8:** The larger the sense of insecurity, the larger the total time transfers and the smaller the spare time *ceteris paribus*.



**Proof:** Because  $\alpha, \theta \in (0,1)$  and  $\tau > t+l$ , then  $\frac{dT^*}{d\theta} = \frac{\alpha(1-\alpha)(\tau-t-l)}{(1-\alpha+\alpha\theta)^2} > 0$  and  $\frac{dS^*}{d\theta} = -\frac{\alpha(1-\alpha)(\tau-t-l)}{(1-\alpha+\alpha\theta)^2} > 0$  ■

**Claim 9:** The larger the propensity to give transfers, the larger the total time transfers and the smaller the spare time *ceteris paribus*.

**Proof:** Because  $\alpha, \theta \in (0,1)$  and  $\tau > t+l$ , then  $\frac{dT^*}{d\alpha} = \frac{\theta(\tau-t-l)}{(1-\alpha+\alpha\theta)^2} > 0$  and  $\frac{dS^*}{d\alpha} = -\frac{\theta(\tau-t-l)}{(1-\alpha+\alpha\theta)^2} < 0$  ■

**Claim 10:** The larger the labour hours, the smaller the total time transfers and the spare time *ceteris paribus*.

**Proof:** Because  $\alpha, \theta \in (0,1)$ , then  $\frac{dT^*}{dl} = -\frac{\alpha\theta}{1-\alpha+\alpha\theta} < 0$  and  $\frac{dS^*}{dl} = -\frac{1-\alpha}{1-\alpha+\alpha\theta} < 0$  ■

**Claim 11:** The larger the travel time, the smaller the total time transfers and the spare time *ceteris paribus*.

**Proof:** Because  $\alpha, \theta \in (0,1)$ , then  $\frac{dT^*}{dt} = -\frac{\alpha\theta}{1-\alpha+\alpha\theta} < 0$  and  $\frac{dS^*}{dt} = -\frac{1-\alpha}{1-\alpha+\alpha\theta} < 0$  ■

**Claim 12:** The wage and the travel cost per hour are irrelevant for the total time transfers and the spare time *ceteris paribus*.

**Proof:**  $\frac{dT^*}{dw} = 0$ ,  $\frac{dT^*}{dc} = 0$ ,  $\frac{dS^*}{dw} = 0$ ,  $\frac{dS^*}{dc} = 0$  ■

Table 1 summarizes all the claims.

Table 1. The signs of optimal solution's partial derivatives with respect to model's parameters

<u>d</u>	$M^*$	$C^*$	$T^*$	$S^*$
$d\theta$	0	0	+	-
$d\alpha$	+	-	+	-
$dw$	+	+	0	0
$dl$	+	+	-	-

<i>dc</i>	-	-	0	0
<i>dt</i>	+/-	+/-	-	-

Source: Author's own calculations.

## 5. Propositions

Based on the Claims proved in Section 4 we delineate the following propositions concerning the role of social network, kinship, and migration in the provision of private transfers.

As discussed earlier, the smaller the social network and the less kin, the larger the parent's sense of insecurity. Based on Claims 7 and 8, we argue that:

*Proposition 1:* The elderly with the smaller families and social networks, receive larger total time transfers from a single donor than the elderly with larger families and social networks, keeping other relevant factors constant. The sizes of family and social network do not affect the total money transfers received by the elderly from that donor.

Note that the above proposition concerns transfers received from one individual. The overall time and money transfers received from all donors by the elderly with larger families and social networks might exceed such transfers received by the elderly with smaller families and social networks, due to the larger number of donors.

Under the hypothesis of kinship altruism, the strength of propensity to give is proportional to the genetic relatedness. In particular, children are more altruistic towards parents than other relatives, who in turn are more altruistic than unrelated friends and neighbours. Johnson (1983) found that family members provide care in serial order. Byrne et al. (2009) confirmed that closer bonds between parents and children than between parents and children in-law affect transfers of care. Boaz and Hu (1997) study shows pivotal role of close relatives in the group of care-givers. Therefore, based on Claims 1 and 9 we argue that:

*Proposition 2:* Relatives give smaller total time and money transfers to the elderly than elderly's children, but larger than individuals unrelated to the elderly, keeping other relevant factors constant.

We argue that the ties between social network members might resemble the role of kinship relatedness in altruistic behavior based on Leider's et al. (2009) finding that directed altruism favors friends over random strangers, towards whom weaker baseline altruism prevails. Therefore:

*Proposition 3:* Social network's members give larger total time and money transfers to the elderly than individuals not belonging to the elderly's social network, keeping other relevant factors constant.

Social network might enforce or diminish the kinship effect for the kin belonging to the elderly's social network. Note also, that under kinship altruism non-kin members of social network are less inclined to give transfers than kin. Because the sense of insecurity alters only time transfers, we propose based on Claims 1, 7–9 that:

*Proposition 4:* Non-kin social network's members give larger total time than money transfers to the elderly, keeping other relevant factors constant.

Finally we proceed to analyze the role of migration. Let us recall that international migration is likely accompanied with larger wages and larger travel time. We are interested in comparison of transfers given to elderly parent by migrant and non-migrant children. Based on Claim 11 we argue that:

*Proposition 5:* Migrant children provide smaller total time transfers to their elderly parents and have less spare time than non-migrant children due to larger travel time, keeping other relevant factors constant. Wages and travel cost are irrelevant for the time transfers.

Our theoretical considerations yield particularly interesting predictions concerning the impact of migration on money transfers as all three factors connected with migration, i.e. wage, hourly travel cost and travel time affect optimal choice. It is plausible to assume that for sufficiently large travel time that concerns migrant children, hourly travel cost is smaller for migrant than for non-migrant children. Travel time may either enhance or inhibit wage and hourly travel cost impact. In such case, according to Claims 2, 4, 5, and 6 we argue that:

*Proposition 6:* Migrant children provide larger total money time transfers to their elderly parents than non-migrant children, keeping other relevant factors constant.

*Proposition 7:* Sufficiently small hourly travel costs decreasing in travel time enhance the difference between migrant and non-migrant children discussed in Proposition 6.

*Proposition 8:* Sufficiently large increase of hourly travel costs with travel time, diminish the difference between migrant and non-migrant children discussed in Proposition 6.

If the labour hours of migrant children are larger than of non-migrant children, the difference between siblings is reinforced: migrants give larger money transfers and lower time transfers than non-migrant children.

## 6. Discussion

Let us consider two migrant families. Suppose that an adult child in family A decides to migrate abroad for economic reasons, leaving in home country one sibling and an elderly single parent in need for daily care. The travel to parent's household takes the migrant child at least half a day<sup>1</sup> and is affordable, whereas the non-migrant child can reach her parent's household at little cost within an hour. A migrant child in family B lives abroad in a city connected with home town with direct cheap flights taking less than 2 hours whereas the non-migrant child lives in a small town poorly connected with home town. The non-migrant child can travel to parent's house by car within 2 hours or by bus within 4 hours.

What are the transfers of time and money given to parent A and parent B (from family A and B, respectively)? We are particularly interested in transfers from children, friends, neighbors and other members of parent's social network. Because in our reasoning transfers from unrelated individuals from outside of social network are relatively small, we ignore them in the following considerations. Note also that our analysis is insensitive to gender, despite the strong empirical evidence showing substantial differences in caregiving behavior of sons and daughters (e.g. Shoonover et al. 1988). We can incorporate this fact by simply allowing sons and daughters to differ with respect to the propensity to give transfers.

Let us first discuss money transfers. According to our model in both families, migrant child gives larger money transfers than the child who stayed at home country due to the wage differential. This effect is stronger in family A, because the edge of migrant's hourly travel cost over non-migrant's is substantially larger than in family B. If the hourly cost would depend on travel time in the same way in both families, unambiguously positive effect of child's migration on money transfers occurs in both families, but the parent A is better off than parent B. However, the travel costs in family A decrease in travel time, whereas in family B they increase.

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<sup>1</sup> A threshold of 4 hours is be critical for the frequency of face-to-face and other forms of contact (Dewit et. al 1988).

This alters the difference between migrant and non-migrant children. The parent in family A receives even larger money transfers from migrant child, whereas the opposite holds for the parent in family B. In sum, parent A experiences increase in money transfers from migrant child, which may not be the case of parent B.

How the time transfers change after child's migration seems to be even more complex. The size and composition of parent's social network before and after migration is crucial here. We can argue that in short-term, the composition of social network depends heavily on the relationships nurtured earlier in life (Goldscheider 1990; Whitbeck et al. 1994). Therefore, nothing happens to social network after migration. On the other hand, frequent personal contact is necessary for maintaining confidence between daughters and mothers (Lawton et al. 1994). Physical distance is the main determinant of frequency of contact (Hammel and Yarbrough 1973). However, it does not affect having important conversations with a parent (Dewit et. al 1988). Nonetheless, we should not ignore the possibility that if a daughter migrates, she might be no longer in her mother's social network.

If the child remains in parent's social network it is possible that in the long-term the network becomes larger after the child migrates. Wives typically seek to expand their social networks later in life (Kelley 1981). A study by Johnson and Catalano (1981) found that childless marrieds were more isolated than the unmarried. Childless elderly sought to extend their social networks after becoming widowed and similar mechanism can operate for the elderly with migrant children. For example parents could make new friends or distant cousins could become closer. The newly acquired members of social network are likely to take care of the parent.

Let us consider three scenarios for parents in families A and B: first, the migrant child drops out from parent's social network; second, the child remains in the network; third; the child remains in the network and the parent acquires new friends. The size of parent's social network decreases, remains unchanged, and increases, respectively in the three scenarios.

The availability of family members and friends willing to take care affects the parent's sense of insecurity. The smaller social network including fewer children increases the parent's sense of insecurity. Therefore, the sense of insecurity after migration of parents A and B increases, remains unchanged, and decreases, respectively in the three scenarios. These in turn affect the time transfers from each child.

Firstly, migration alters the provision of time transfers from migrant children due to increase in travel time. Secondly, the changes of parent's sense of insecurity affect the time transfers. Suppose that the social network remains unchanged. Then the migrant child in family A gives smaller time transfers than prior to migration. Because the travel time for migrant and non-migrant child in family B remains unchanged after migration, also the time transfers remain the same.

If the sense of insecurity increases after the child migrates, the reduction of time transfers from migrant child A is diminished and the non-migrant child A increases time transfers. Both children in family B increase time transfers to parent. The opposite holds if the sense of insecurity decreases after migration.

Table 2 summarizes the changes in time and money transfers from migrant and non-migrant children as well as in children's consumption and spare time after migration.

Table 2. The changes of optimal solution in families A and B for three scenarios of social network change

Family	A						B					
Scenario	1		2		3		1		2		3	
Child	M	N	M	N	M	N	M	N	M	N	M	N
$M^*$	+	0	+	0	+	0	+, -	0	+, -	0	+, -	0
$C^*$	+	0	+	0	+	0	+, -	0	+, -	0	+, -	0
$T^*$	-, +	+	-, -	0	-, -	-	+	+	0	0	-	-
$S^*$	+, -	-	+, +	0	+, +	+	-	-	0	0	+	+

Source: Author's own compilation.

Notes: Family: A – migrant child has larger wage, travels to parent half a day at reasonable cost; non-migrant child lives nearby, hourly travel cost decreases with travel time; B – migrant child has larger wage, travels within 2 hours at low cost; non-migrant travels within 2 hours at low cost, hourly cost increases with travel time. Scenario: 1 – social network becomes smaller; 2 – social network remains unchanged; 3 – becomes larger. Child: M – migrant, N – non-migrant.

In sum, the increased money transfers and decreased time transfers from migrant child can lead to a situation when non-migrant child gives more time and less money transfers than the non-migrant child as observed in family A. The specialization of children occurs: one gives money, the other gives time transfers. The greater the travel time accompanied with travel cost decreasing in travel time, and the greater the wage difference between home and migration countries, the greater the specialization between children. Note that the spare time decreases both for migrant (due to larger travel time) and non-migrant child (due to larger parental sense

of insecurity). If migrant children spend more time on work more than non-migrant children, the difference in their provision of time and money transfers becomes even larger. However, the specialization may not take place under certain circumstances, as observed in family B. Interestingly, full specialization between children is not optimal, which is in line with empirical studies showing that time and money transfers are rather compliments than substitutes (Geerts and van den Bosh 2012; Pezzin et al. 1996)

Note that until now, we analyzed transfers from children only, while other family members and social network's members might engage in provision of transfers as well. The changes in social network alter time transfers via the sense of insecurity. The time transfers from each donor, including both children, will increase if the sense of insecurity increases. Then the overall time transfers given to the parent by all donors are likely to increase. We could expect to observe such result in most European countries where social networks of parents in migrant families are the same or slightly smaller than in non-migrant families. This occurs at a cost of diminished spare time of caregivers.

If the sense of insecurity decreases, the overall effect on total time transfers received from all donors is ambiguous and depends on the number of donors. If the positive effect of greater social network exceeds the negative effect on time transfers from migrant child, the overall time transfers received from all donors can be larger after than before migration. Also a positive effect on caregivers' spare time occurs if the sense of insecurity diminishes. That is an important finding, as often adult children in sandwich generations are heavily burdened with caregiving duties which results in worsened health (Hiel et al. 2015) and family relations (Litwak and Kulis 1987).

## **7. Concluding remarks**

The child's migration results in specialization between children if the difference in proximity between siblings is substantial and parental social networks do not compress.

The dynamics in the size and composition of parent's social network triggered by child's migration is crucial for the time transfers received by parents not only from children, but also from other family members and social network members. The overall effect on total time transfers might be positive even if all donors decide to decrease their transfers of time. In such case both parent and donors are better off: parents receive more care while caregivers enjoy increase in spare time.

In sum, societies with stronger social ties between unrelated individuals are less challenged with supply of care to the elderly individuals, especially single and with a few relatives living in close proximity, than societies with weak social ties. In case of families with migrant children, individuals staying in home country can gain additional spare time and engage less in the provision of care to the elderly parent without any loss for the parent, if the social network is sufficiently large. In societies with strong family and weak social ties, the migration of one child could result in the increase of care duties of non-migrant children.

Further analysis could be applied to individuals with all children being migrants and to childless individuals. Interesting modifications of the model are: inclusion of specific motivation for private transfers, endogenization of labour market decisions, and interactions between children. Finally, public transfers of money and care might be incorporated into the analysis.

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