
# Friendship ties and geographical mobility, evidence from the BHPS

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ABSTRACT

A common finding in analyses of geographic mobility is a strong association between past movement and current mobility, a phenomenon that has given rise to the so called ‘mover-stayer model’. We argue in this paper that one of the driving forces behind this heterogeneity is the strength of local social ties. We use data from the BHPS on the location of the three closest friends and the frequency of contacts. We estimate the processes of friendship formation and residential mobility jointly, allowing for correlation between the two processes. Our results show that the location of the closest friends matters substantially in the mobility decision, and matters more than the frequency of contacts.

## 1 Introduction

A common finding in analyses of geographic mobility is a strong association between past movement and current mobility, a phenomenon that has given rise to the so called 'mover-stayer model'. That is, it appears that there are some people more prone to movement than others. Table 1 shows that this association is also evident in the British Household Panel Study (BHPS) data that we use in this paper: 45% of persons who moved house last year move in the current year compared with 16% who did not move last year.[1] Table 2 shows that the further away people moved in the previous year, the further away they are likely to move this year. A related argument is that "the simple experience of migration seems to change the taste and the preferences of individual immigrants" (Piore 1979).

The data in Tables 1 and 2 may not, however, just reflect heterogeneity in the population. These data also may be generated by a dynamic process operating through the intrinsic value of friendships. If people with more 'close friends' are less likely to move, particularly over longer distances, and if movement breaks-up these ties, then those who move have weaker friendship ties after the move, which encourages further movement. The friendships of those who stay put are maintained and may become larger and stronger, further discouraging mobility.

The paper puts forward a model in which people's welfare depends on the number of 'close' friendships as well as consumption. Geographic movement can generate increases in income, but at the expense of

destroying friendships because of the costs of maintaining them over long distances. Building up new friendships requires the investment of time and money at the new location. Our main hypothesis is that this trade-off is important in decisions about geographic mobility.

We are not the first to stress the importance of social ties for geographic mobility. The drawback of the existing evidence is that it does not have information on *actual* social ties and their intensity (e.g. frequency of contacts). To our knowledge, we are the first to provide a direct measure of social ties, friendship in our case, and use it to measure its effect on mobility and the effect of mobility on social ties.

While our paper is related to the literature on the value of social networks (e.g. for finding jobs through friends and acquaintances), it differs from it because the network literature focuses on the instrumental value of social networks linked through friends. We focus on the intrinsic value of friendship and its interaction with mobility. In Granovetter's (1973) terminology, we study the effects of "strong ties" in contrast to "weak ties". The former characterise people who interact intensely and regularly, and who may come to know one another. The latter characterises acquaintances who are unlikely to be socially involved with one another. Weak ties are very important in the diffusion of information (e.g. concerning jobs), because information reaches a larger number of people when passed through weak ties than strong ones.

The interaction of friendship and mobility does not only affect individual welfare directly. When economic and non-economic activities are intermixed, non-economic activity (in this case friendship) can affect the costs and benefits of economic activity. This mixing of activities is what Granovetter (1985) has called 'social embeddedness' of the economy. Here geographic mobility, which affects the efficient allocation of labour and housing, is embedded in friendship.

It is not straightforward to estimate the causal effect of the number of close friends on geographical mobility. For instance, some people are more prone to movement than others, and this tendency maybe be correlated with attributes (e.g. 'sociability') affecting the formation of friendships. Also, those who expect to move soon again may invest less in new friendships.

In order to identify a causal effect, we estimate the processes of friendship formation and residential mobility jointly, allowing for correlation between the individual-specific unobserved factors. We exploit the variation within individuals over time in the size of networks and mobility decisions.

Although this is not necessary for identification, we also propose a set of instrumental variables for the individual size of networks, based on the family background of individuals. We argue that characteristics of the family and its structure (e.g. sib-ship size) influence the composition of the social networks at a later age.

Our estimates show that an additional close friend living nearby reduces the probability of moving by about two percentage points, which is 40% of the

average 20-mile-plus mobility rate. Ignoring the endogeneity of friendship networks leads to an upward bias of the absolute negative effect of the number of close local friends on mobility. This means that unobserved factors leading to larger local friendship networks also discourage mobility. So, those with smaller networks seem to be more prone to movement. Furthermore, our results show that it is the location of friends that matters rather than the frequency of meetings.

The remaining of the paper is structured as follows. In Section 2, we discuss the recent literature. We present a simple theoretical model in Section 3, present the data in Section 4 and discuss the results of the empirical analysis in Section 5. We conclude in Section 6.

## 2 Related literature

There is a longstanding belief in the migration literature that social ties play an important role in geographical mobility. Levy and Waldacki (1973) provide probably the earliest form of evidence, using cross-sectional individual data. They found that the probability of moving from one region to another was strongly correlated with past aggregate movement in that same direction, using data from Venezuela. Mincer (1978) found a similar result, using data from the PSID. This is what the literature currently refers to as “network effects”, which are well-documented in many studies of

migration. Carrington et al. (1996) present a theoretical model where moving costs are endogenous, and depend inversely on the number of people of the same community who already migrated to a given destination. These studies focus on the role of social ties at destination, rather than at origin. There is little evidence on the role of social ties at origin. Almost all the evidence concerns the social ties within the same household. For example, it is well-known that married couples are less likely to move, and so are families with school-aged children. The role of social ties *between* households has been much less investigated, partly because of the lack of data. Konrad et al. (2001) looked at the role of family structure on mobility behaviour in Germany. Their theory predicts that second-born children should be more "tied" to their parents than first-born children, because of strategic considerations with respect to providing care for their parents in the future. Taking care of the parents is a public good of which the costs can be split between children. First-born children have a first-move advantage and can therefore force their younger siblings to stay living close to the parents. Rainer and Siedler (2005) use German data as well (from the German Socioeconomic Panel) and find that only children locate closer to their parents than children with one sibling. The empirical evidence in both studies is based on reduced-form equations showing a link between family structure and mobility, that they explain with a theory based on strategic considerations with respect to care-giving for their parents. They are unfortunately not able to test directly for the care-giving theory.

Spilimbergo and Ubeda (2001) look at the role of the extended family on geographical mobility, using microeconomic data. They compare Blacks and Whites in the US and argue that the higher the concentration of family members within the same neighbourhood, the less likely people will move away from that neighbourhood. They show that this can explain a substantial part of the difference in mobility behaviour between Blacks and Whites. Blacks typically have more family members living close by and are also much less likely to leave than Whites.

The drawback of the existing evidence is that they do not have information on the *actual* social ties, their intensity (e.g. frequency of contacts), etc. To our knowledge, we are the first to provide a direct measure of social ties and use it to measure the effects on mobility.

## 3 Theoretical considerations

To help structure our thoughts, it is useful to present a simple model where mobility and friendship networks are both endogenous.

### 3.1 Generalities

Our first conjecture is that *location* itself matters for the formation and maintenance of friendships. Obviously, the probability of meeting someone from one's neighbourhood is higher than of meeting someone living far away, and the physical distance usually increases the costs of maintaining

social contacts (transportation, time, phone, etc.)[2]. We consider a simple framework where people form friendships with local people only. Movement breaks-up these friendships entirely.

Our second conjecture is that having more close friends may discourage mobility. We think of two main reasons why this may be the case: First, friends living close by provide utility directly, i.e. they have an 'intrinsic value'. Second, friendship networks could determine the flow of information about other jobs and locations. There is a growing literature on the role of informal networks in finding a job. In European countries, personal contacts appear to be the most important channel that lead people into jobs (see Pelizzari, 2004). In our context, we expect those with a social network that is essentially 'local' to be less likely to hear about other jobs and locations, and therefore less likely to move. We start with a model capturing the first channel (friends have an intrinsic value) and then discuss the implications of the second channel.

### 3.2. A simple model

Consider a simple framework where people (indexed by $j$) derive utility from the number of close friends $S_j$ and from a monetary income $w_j$. Denote the utility function by $u(w_j,S_j)$, and assume that their utility is separable.

The timing of the decisions is as follows. At t = 0, people start living in a new neighbourhood and decide how much to invest in local friendships ($i$). It is a once-for-all investment, made at the beginning of residence in a

particular neighbourhood. Think for example of a "house warming party". We assume that the cost of the investment is equal to a function *c(i)*, with $c'(i) > 0$ and $c''(i) > 0$, and to ensure an interior solution c(0) = 0 and c(1) = ∞. We model the friendship decision as unilateral, which is obviously simplistic. In a more complex setting, one would probably model friendship as the result of two investment decisions. This should not, however, affect the essence of our results. Also, we assume pure randomness in the friendship formation (e.g. we do not allow for selective matching between individuals, such that 'high-type' people would tend to choose their friends among other high-types).

We assume that $S_j = (a_j + i_j)\eta$ ,where $\eta$ corresponds to a random draw from an exponential distribution G. The realization of the friendship variable differs across individuals, depending on their investment $i_j$ and on individual characteristics $a_j$ (social skills, number of people living in the neighbourhood, structure of the family network, etc For simplicity, the realisation of the income variable is assumed to be either high ($w_h$) with probability *p*, or low ($w_l$) with probability (1-*p*), with $w_h > w_l$. At t = 1, people observe the realisation of both the friendship and the income variables. Finally, we assume that the first period is infinitely small and that people live forever. We also neglect time discounting. These assumptions do not matter for the essence of the results.

We now turn to the optimisation problem of the individual. First, note that individuals will choose the same investment across spells, i.e. they will

always invest exactly the same amount $i_j$ at the beginning of each new spell. This means that the only differences between staying at a particular location at a point in time and moving elsewhere are the economic gain from moving and the precise realization of the number of close friends. One can therefore derive combinations of income and friendship realizations such that people are indifferent between staying and moving.

Denote the expected utility, or "value", at a new location by $V_j$, given by

$$V_j = -c(i) + \begin{pmatrix} (1-p)\int_{\tilde{\eta}_{l,j}}^{\infty} u(w_l,(a_j+i)\eta)dG(\eta) + p\int_{\tilde{\eta}_{h,j}}^{\infty} u(w_h,(a_j+i)\eta)dG(\eta) \\ +(1-p)G(\tilde{\eta}_{l,j})V_j + pG(\tilde{\eta}_{h,j})V_j \end{pmatrix}$$

where $\tilde{\eta}_{l,j}$ and $\tilde{\eta}_{h,j}$ are the values of $\eta$ for which the individual is indifferent between moving and staying, when the income variable is low and high respectively.

People will move if and only if $u(S_j, w_j) < V_j$. All else equal, having more close friends should reduce the probability of moving. Note that this does not mean that people with more friends are less likely to move. It is easier to understand this if we assume that friendship formation is deterministic and costless. Then people with the same social skills should expect to get exactly the same number of friends in all locations. This means that differences in friendships due to differences in social skills should not lead to differences in mobility behaviour. Thus, conditioning on individual heterogeneity in social skills, we should observe that individuals who have more close friends by coincidence (i.e. because there is some randomness in

the friendship formation process) should be less likely to move because it is less likely that $u(S_j, w_j) < V_j$. This is the causal effect that we wish to estimate. The next section shows that people with better social skills should be *more likely* to move.

We denote by $\tilde{S}_{l,j}$ and $\tilde{S}_{h,j}$ the friendship values for which the individual is indifferent between moving and staying, when the income variable is low and high respectively. It is clear that $\tilde{S}_{l,j} > \tilde{S}_{h,j}$. If the income realization is low, people will be more inclined to move, such that the number of close friends should be larger in order to make them indifferent between moving and staying. Given the process we assumed for the friendship formation, it is straightforward to derive the threshold values for $\eta$ such that people are indifferent between moving or not: $\tilde{\eta}_{l,j} = \frac{\tilde{S}_{l,j}}{a_j + i_j}$ and $\tilde{\eta}_{h,j} = \frac{\tilde{S}_{h,j}}{a_j + i_j}$, and so $\tilde{\eta}_{l,j} > \tilde{\eta}_{h,j}$.

### 3.3. Optimal investment

People determine the amount of investment in local friendships upon their arrival in a new neighbourhood. They maximize the following program:

$$i_j^* = \arg\max_i \left[ -c(i) + \begin{pmatrix} (1-p)\int_{\tilde{\eta}_{l,j}}^{\infty} u(w_l, (a_j + i)\eta) dG(\eta) + p\int_{\tilde{\eta}_{h,j}}^{\infty} u(w_h, (a_j + i)\eta) dG(\eta) \\ + (1-p)G\left(\frac{\tilde{S}_{l,j}}{i + a_j}\right)V_j + pG\left(\frac{\tilde{S}_{h,j}}{i + a_j}\right)V_j \end{pmatrix} \right]$$

Using the Leibniz' rule, the first-order condition is then such that:

$$c'(i_j^*) = \left( (1-p)\int_{\tilde{\eta}_{l,j}}^{\infty} \frac{\partial u(w_l, S_j)}{\partial S_j} \eta dG(\eta) + p\int_{\tilde{\eta}_{h,j}}^{\infty} \frac{\partial u(w_h, S_j)}{\partial S_j} \eta dG(\eta) \right)$$

From this first-order condition and the separability of $u(w_j,S_j)$, the right-hand side of this expression is smaller when $p$ is larger and for persons with higher $a_j$. It follows that the incentives to invest in friendships decrease with the probability of a high shock ($p$), and that people with higher social skills invest less in friendships. So even though social people would keep the same expected number of close friends when moving, the amount of investment cost they would have to bear upon arrival would be smaller than for less sociable people. This should increase their propensity to move.

Clearly, results would change if social skills also affected the marginal cost of investment, $c'(i_j)$. But for our heuristic purposes, this model allows us to distinguish causal effects of close friendships from correlation between mobility and individual attributes such as 'social skills'. We now discuss a series of extensions and relaxation of assumptions and see how this would affect our results.

### 3.4. Extensions

*3.4.1. Differences in initial close friendships (home bias)*

So far we have assumed that people start their residence in a new neighbourhood with no friends. This may be too restrictive, and in particular, there may exist important differences between the 'first'

neighbourhood and other locations. Obviously, people start making their location decisions only when they become adults, such that until then, their location is exogenous to them. Also, because of family ties, people may have more people they are connected with in the neighbourhood where they grew up than in any other place.

It is easy to see that the more close friends in the initial neighbourhood, the larger the loss associated with moving. This would introduce a source of variation in the number of close friends at the beginning of adulthood and would feed back into future mobility behaviour. We will partly use this argument in the empirical analysis, using information about the friendship ties and family background at a young age.

*3.4.2. Heterogeneity in the population and multiple shocks*

The model we presented assumed that there was only one possible shock at each location. We also assumed that all people faced the same distribution of income shocks. One could imagine that people face different distributions, with some people more vulnerable to negative shocks than others. For example, some jobs require frequent movement, or simply, some people could have a stronger taste for moving. Also, when a person moves, he is not only moving from one set of local friendship ties to another, but also establishing a link between them that can promote future mobility. While referring to job mobility, the following quote from Granovetter (2005, p.37) could equally apply to geographic mobility: “The point is that

when mobility results from network connections, it changes network structure that then feeds back into future mobility patterns". If there are multiple shocks, one would expect that the people with a higher propensity to move will move first, such that the structure of the population will change over time. In other words, people with a longer residence at a particular location will not be comparable to people with a short residence. If friendship networks grow over time in a deterministic way, we would observe a negative correlation between these networks and mobility, independently of any causal effects. This is the well-known selection effect, which makes it hard to identify the effect of a 'treatment' on a transition rate, when individuals who stayed longer at particular location are more likely to have been treated.

### *3.4.3. Individual heterogeneity*

It could also be that people value differently local friendships, i.e. that the utility derived from a local friendship is not identical for everyone. Take the extreme case of an individual that does attach any value to local friendships. Then, clearly, the value of his social network will be irrelevant to the mobility decision. If these people are also more prone to movement, then the relationship between friendships and movement would be negative, even in the absence of any causal effect on mobility.

## 4. Friendship ties and geographical mobility in the UK

### 4.1. Data

We use data from the British Household Panel Survey (waves 1 to 12), which were collected every year since 1991. We limit our analysis to the sample of single individuals, between age 18 and 50, thereby excluding interactions between the network of the partner and one's own mobility decision.

Ideally, we would like to have detailed information about the entire structure of friendship networks of people. The BHPS only provides information about the location of residence and the frequency of contacts with the *three* closest friends. This truncation is typical, and as Granovetter (1973) points out, it encourages the naming of persons 'strongly tied' to the respondent. These *strong* friendship ties are probably the important ones for the intrinsic value of friendship, which we stress in this paper. The information is available in six waves (waves 2, 4, 6, 8, 10, 12, wave 6 does not contain the information on the location).

We constructed two variables that are meant to measure the number of *close* friends. The first variable indicates how many of the three closest friends live within 5 miles. Obviously, a geographical move will have a direct negative effect on this variable, almost certainly if the respondent moves

further than 20 miles (unless the individual immediately rebuilds a close friendship network in his new neighbourhood). As we discussed earlier, movers should on average have smaller local networks.

The second variable is based on the frequency of *meetings* with the three closest friends. Meetings are interesting because they are the most obvious way friends actually benefit from geographical proximity. One would expect that the more people exploit the geographical proximity with their friends (by seeing them often for example), the more they will matter in the location decision. Also, this variable gives some idea of the strength of the friendship tie, and the intrinsic value of the friendship: "the more frequently persons interact with one another, the stronger their sentiments of friendship for one another is apt to be" (Homans, 1950, .133). Our variable measures the number of friends the respondent meets frequently (i.e. most days or at least once a week).

Table 3 shows the distribution of the two variables in our sample. Note that, despite the truncation of the friend variables at 3, there is considerable variation in the close friend variables, particularly that based on distance. Not surprisingly, we also observe that there is a strong negative correlation between the geographical distance and the frequency of 'physical' contacts.

We now turn to the relationship between close friendships and mobility. The information on geographical mobility is quite detailed in the BHPS. Starting from the first wave, we know the date (months and year) that the respondent moved to their present address. Since we also know the date of the interview

(in month and year), we can calculate quite precisely the residential tenure at the date of the interview. Also, we obtained precise information on the geographical distance associated with a change of residence for moves during the panel.[3] We focus on residential mobility of 20 miles or more, and in order to eliminate 'boundary measurement effects', movement over this distance is compared with no movement or mobility of less than 5 miles (i.e. movement of 5-19.9 miles is ignored). Table 4 shows that such mobility declines with the number of close friends derived from the 'within 5 miles' definition.

How does residential movement affect the number of "close" friends? Figures 1 and 2 compare the evolution of friendship networks over time for people who did not move during the panel and for those who moved only once. As one would expect, the figures show that movement does indeed break-up friendships, at least partly, for those who move farther than 5 miles. More interesting is the fact that while those who move have fewer friends just after the move, they rebuild friendships over time. The conjecture we made earlier seems therefore to be supported by the evidence: People seem to form new friendships with people living close by. The figures even suggest that the rate at which friendship networks are created is relatively high.

## 5. Empirical model

### 5.1 Specification

We estimate the processes of friendship formation and residential mobility jointly. We estimate different specifications, allowing for unobserved heterogeneity and for correlation between both processes. We also estimate a joint model without instruments, exploiting the within-individual time variation only. We also allow for duration dependence in both processes.

We model the process of friendship formation as an ordered probit model, since the number of friendship ties can only take three values and is truncated from above at the value 3. Denote by $N^*$ the true value of the size of friendship networks, such that:

$$N^*_{it} = \beta' X_{it} + \gamma' Z_i + \varepsilon_{it} + u_i,$$

where $N$, the reported number of friends is such that:

$$N = \begin{cases} 0 \, if \quad N^* < \tau_1; \\ 1 \, if \; \tau_1 \le N^* < \tau_2; \\ 2 \, if \; \tau_2 \le N^* < \tau_3 \\ 3 \, if \quad N^* \ge \tau_3 \end{cases}$$

$X_{it}$ is a vector of individual characteristics that can vary over time, $Z_{it}$ is a set of instrumental variables affecting the formation of networks only, $\varepsilon_{it}$ captures the unobserved factors varying across individuals and over time and $u_i$ captures the individual-specific unobserved heterogeneity such as the degree of sociability or the individual preferences regarding the location of close friends. It is assumed that $u_i$ and $\varepsilon_{it}$ are not correlated and are

orthogonal to $X_{it}$ and $Z_i$. We normalize the variance of the transitory residual $\varepsilon_{it}$ to 1 and will estimate the variance of $u_i$.

We estimate the mobility decision with a probit model. Denote by $U_{it}$ the corresponding latent variable such that:

$$U_{it} = \delta' X_{it} + N_{it} + \eta_{it} + v_i$$

where $\eta_{it}$ captures the unobserved factors varying across individuals and time, and $v_i$ captures the individual heterogeneity in propensity to move. It is assumed that $v_i$ and $\eta_{it}$ are not correlated and are orthogonal to $X_{it}$ and $Z_i$.

Again, we normalize the variance of the transitory residual $\eta_{it}$ to 1 and will estimate the variance of $v_i$.

Note that we will introduce time dummies to control for the residential tenure of individuals in their neighbourhood. Ideally, we would like to have a measure of the duration of stay in a particular *neighbourhood*. Since we only observe the location of residence starting from the first wave and do not know where they were moving from before that, we are unable to construct a true "neighbourhood tenure" variable, except for those we observe moving at least once outside their neighbourhood (5 mile-circle). We use the residential tenure instead, which corresponds to the length of stay at the same address. Because a large proportion of moves takes place within a very short distance, the residential tenure variable will probably understate the true "neighbourhood tenure". We introducing 5 time dummies $T_i = \{T_0, T_1, T_2, T_3, T_4\}$ for the following tenure intervals [0,1[ ($T_0$), [1,3[($T_1$), [3,6[($T_2$), [6,15[($T_3$), >15 years ($T_4$).

Our benchmark will be a model allowing both for unobserved heterogeneity in both processes and for correlation between the unobserved heterogeneity factors. For example, one could expect that those who are more prone to movement differ in their social skills from those who prefer to stay in the same neighbourhood. It could be that sociable people are more likely to benefit from different job opportunities or that those who move tend to be those who have a lower propensity to create local friendships (because they value less local friendship ties for example). Hence, in order to estimate a causal effect of friendship ties on mobility, we cannot directly compare movers to stayers. A more promising route is to use the variation within individuals. Since we observe people across time, we can test how changes in the size of networks correlate with moving decisions.

One criticism may be that the variation in size of networks we observe is not random, i.e. individuals may decide to invest more or less in local friendship ties for reasons that are correlated with the moving decision. For example, they could move around and then find a location they enjoy and start investing in local friendship networks. This criticism is actually working in our advantage since the only reason why we would expect that people change their investments in friendship ties according to their intention to stay in the neighbourhood is because friendship ties have an intrinsic value that would be lost if they would move around. Hence, even if the correlation we find is driven by this endogeneity, it still provides evidence of the causal relationship between friendship networks and mobility.

### 5.2. Basic estimates and econometric issues

We have estimated the joint model using aML.[4] We report our benchmark estimation in Table 5. We report the results for the variable measuring the number of close friends located within 5 miles.

The most important result is that the size of friendship networks matters: An additional local friend reduces the probability of moving by 2.2 percentage points, which is more than 40% of the average 20-mile-plus mobility rate. The estimated correlation between individual-specific unobserved factors is negative, suggesting that those who are more prone to movement tend to have less friends on average. Then we find that a series of individual characteristics matter in the formation of social ties. The presence of children for example is positively associated with the number of local friends. Higher-educated people, men and students tend to have less local friends. Surprisingly, owners have less local friends on average. We also find evidence that the number of local friendship ties increases over time. These results are interesting because these characteristics are usually directly associated with mobility as well. For example, higher-educated people are on average more likely to move. We do find evidence of this as well, in the mobility equation. But the process of network formation also increases their propensity to move. It could be that higher-educated people tend to meet people from different places and, therefore, are less likely to create friendship ties with people living close by. This would increase

further their propensity to move. The same reasoning applies to people with school-age children. Parents of school-aged children are likely to meet other parents and create social ties with them. Even if the presence of school-aged children itself can have a direct effect on mobility decisions, it could be that it is further reinforced by the process of friendship formations. Some characteristics seem to matter only through the formation of networks. Gender for example. Men tend to have less local friends than women. This seems to be the main reason why we observe men moving more often than women. Our benchmark includes a series of "exogenous" variables, i.e. variables that supposedly affect mobility only through the formation of friendship ties. The instruments are based on characteristics of the environment in which the individual grew up as a child. The idea is that some characteristics of the environment where the individual grew up as a child should bias the composition of initial networks, i.e. the networks young adults have at the time of their first location decision, towards local social networks. The 13$^{th}$ wave of the BHPS (year 2003) includes a series of family background variables that one could use as instruments for the size of social networks. For each individual, we have information on the number of biological siblings in the household when he was fourteen years old, his birth-order, the level of education of his parents and the type of region where the individual grew up (rural, urban area, etc.).

Obviously, these instruments are valid if they affect mobility only through the current size of friendship networks. A first immediate criticism would be

that the size of the sib-ship itself is a form of network, which will probably be positively correlated with the size of friendship networks and could of course affect mobility directly. The bad news would be that we do not estimate the effect of an "extra friend"; we estimate something else. The good news is that this "something else" is still related to social networks. One could argue that our coefficient does not necessarily reflect the effect of friendship networks, but of social networks in general.

Of greater concern is the existence of reasons other than "social ties", which drive a causal effect from family background to mobility. One could argue for example that the level of education of parents affects mobility through other channels as well. It is well known that family background variables determine individual educational achievements, which in turn affect mobility. To limit this problem, we control for a series of individual characteristics such as the individual's own education and income.

These instruments turn out to be very significant. For instance, we find that children in large families tend to have larger local friendship networks, controlling for the education level of the parents. However, we do not need these instruments for the identification as we have multiple observations for each individual.

Table 6 shows the estimation results for various specifications. The effect of the number of local friendship ties is very similar in all specifications allowing for correlation between the unobserved individual-specific factors. Not allowing for correlation would lead to an overestimation of the absolute

effect of local ties, precisely because those to tend to move more seem to be the less sociable types.

Table 7 shows the estimation results using the second measure of friendship ties, based on the frequency of meeting. The results are less conclusive here. The effect disappears completely when we allow for correlation between the unobserved individual-specific factors. Again, this suggests that the movers tend to see their friends less often. This seems to suggest that it does not matter very much how often you see your friends, what matters is where they are located. Hence, one explanation could be that people attach a value to friends being reachable, i.e. being in the neighbourhood but do not necessarily attach more value to how frequently they actually see them.

**Conclusion**

This paper investigates the role of friendship ties in mobility behaviour, using data from the BHPS. Social ties could explain the persistence in mobility behaviour, which has lead to the "mover-stayer" model. Geographical movement breaks local friendship networks, at least partly. Those who move are likely to have smaller friendship networks and this could feed back into their future mobility behaviour.

We used data from the BHPS to construct a unique set of variables enabling us to capture the "intensity" of friendship networks and the extent to which they are locally embedded. We estimate the process of network formation and the mobility decision jointly and find that networks have a substantial

negative effect on the probability of moving. An additional local friend reduces the probability of moving farther than 20 miles by more than 40%.. Moreover, we find that the frequency of contacts does not matter in the mobility decision. We also present results of an IV approach, using characteristics of the family where individuals grew up as children as instruments for the size of networks. We find that assuming the exogeneity of friendship networks overestimates their absolute negative effect on mobility. Our results suggest that social ties play a major role in mobility decisions.

Social ties generate a source of negative duration dependence and can explain the persistence in mobility behaviour. Also, if social ties deter mobility, then characteristics determining the formation of social ties will also be negatively associated with movement. Hence, one explanation for the observed correlation between education and movement, or between the presence of children and movement, could also run through the type of social ties these people have.

**References**

Carrington, W.J., E. Detragiache and T. Vishwanath (1996), Migration with Endogenous Moving Costs, American Economic Review 86(4), 909-30.

Granovetter, M. (1973) The Strength of Weak Ties, *The American Journal of Sociology* 78(6), 1360-1380.

Granovetter, M. (1985) Economic Action and Social Structure: The Problem of Embeddedness, *The American Journal of Sociology* 91(3), 481-510.

Granovetter, M. (2005), The Impact of Social Structure on Economic Outcomes, *Journal of Ecconomic perspectives* 19(1), 33-50.

Homans, G. (1950) The Human Group. New York: Harcourt, Brace and World.

Konrad, K., Künemund, H., Lommmerud, K.E. and Robledo, J. (2002), Geography of the family, *American Economic Review*, 92(4), 981-998

Levy, M.B. and Waldycki, W.J. (1973), The Influence of Family and Friends on Geographical Labor Mobility: An International Comparison, *Review of Economic and Statistics* 55, 198-203.

Marmaros, D. and Sacerdote, B. (2006), How Friendships Form, *Quarterly Journal of Economics*, 121(1), 79-119.

Pelizarri, M. (2004), Do friends and relatives really help in getting a good job?, Discussion Paper 623. CEP: London.

Piore, M.J. (1979), Birds of Passage: Migrant Labor in Industrial Societies, Cambridge, Cambridge University Press.

Mincer, J. (1978), Family Migration Decisions, *Journal of Political Economy* 86(5), 749-73.

Rainer, H. and T. Siedler (2005), O Brother, Where Art Thou? The Effect of Having a Sibling on Geographic Mobility and Labor Market Outcomes, Discussion Paper 513, CRIEFF, School of Economics and Finance, University of St Andrews.

Spilimbergo, A. and Ubeda, L. (a) (2001), Family Attachment and the Decision to Move: Blacks and Whites, IMF Working Paper.

Spilimbergo, A. and Ubeda, L. (b) (2001), A Model of Multiple Equilibria in Geographical Labor Mobility, IMF Working Paper.

## Notes

[1] Note that the data include singles only, for reasons that we will explain later.

[2] The empirical evidence of this link is challenging, because the location of residence is generally a decision variable, and people with 'common characteristics' tend to cluster geographically. Several studies provide convincing evidence that location matters, using a source of exogeneity in the spatial distribution of people. For example, Marmaros and Sacerdote (2004) exploit a rule of random assignment of rooms and dorms for freshmen at Dartmouth College. They find that spatial proximity matters substantially in the formation of friendships; it is even a greater determinant of social interaction than common interests, majors, or family background. They also find that the residential proximity effects are quite local (within the same building).

[3] The geographical distance has been derived using information from the postcodes of addresses. We obtained information about distances between postcodes.

[4] aML is a statistical software for multilevel and multiprocess models developed by Lee Lillard and Constantijn (Stan) Panis. Information and free downloading of the software are available on http://www.applied-ml.com.

**Table 1: Current mobility by movement last year, Singles aged 18-50**

| | **Previous year movement status** | | |
|---|---|---|---|
| **Movement this year** | **No move** | **Moved** | **Total** |
| **No move** | 11,844 | 1,689 | 13,533 |
| | **84.4%** | **54.8%** | 79.1% |
| **Move** | 2,184 | 1,395 | 3,579 |
| | **15.6%** | **45.2%** | 20.7% |
| **Total** | 14,028 | 3,084 | 17,112 |
| | 100% | 100% | 100% |

**Source: BHPS 1992-2002**

**Table 2: Current mobility by movement last year, Singles aged 18-50**

| | No move | Move<5 miles | Move 5-20 miles | Move >20 miles |
|---|---|---|---|---|
| **No move** | 87.4% | 7.9% | 1.8% | 3.0% |
| **Move<5 miles** | 61.9% | 27.0% | 3.3% | 7.8% |
| **Move 5-20 miles** | 64.0% | 15.4% | 15.4% | 5.1% |
| **Move>20 miles** | 43.7% | 26.6% | 5.2% | 24.5% |

**Source: BHPS 1992-2002**

**Table 3: Location of friends and frequency of contacts, Singles aged 18-50**

| | Number of close friends with frequent of contacts | | | | |
|---|---|---|---|---|---|
| **Number of close friends living within 5 miles** | **0** | **1** | **2** | **3** | **Total** |
| **0** | 2.2% | 3.3% | 4.2% | 5.6% | **15.3%** |
| **1** | 0.9% | 7.1% | 6.7% | 8.7% | **23.3%** |
| **2** | 0.5% | 2.6% | 10.5% | 14.0% | **27.6%** |
| **3** | 0.4% | 1.6% | 5.3% | 26.5% | **33.9%** |
| **Total** | **4.0%** | **14.6%** | **26.7%** | **54.7%** | **100%** |

**Source: BHPS 1992-2002**

**Table 4: Movement of 20 miles or more and number of close friends living within 5 miles, Singles aged 18-50**

| **Close friends:** | **0** | **1** | **2** | **3** | **Total** |
|---|---|---|---|---|---|
| **No move or** | 827 | 1443 | 1829 | 2345 | 6444 |
| **move<=5mi.** | 89.2% | 92.9% | 95.9% | 97.6% | 94.9% |
| **Move** | 100 | 110 | 78 | 58 | 326 |
| **20 miles+** | **10.8%** | **7.1%** | **4.1%** | **2.4%** | **5.1%** |
| **Total** | 927 | 1553 | 1907 | 2403 | 6790 |
| | 100% | 100% | 100% | 100% | 100% |

**Source: BHPS 1992-2002**

**Table 5 : Joint estimation of friendship ties and mobility**

| | Ordered probit estimates Dependent variable: Number of friends living within 5 miles | | Probit estimates Dependent variable: Dummy for moving further than 20 miles | |
|---|---|---|---|---|
| Number of friends living within 5 miles | | | -0.2108*** | (0.0412) |
| Age | -0.0343 * | (0.0181) | -0.0389 | (0.0406) |
| Age squared | 0.0003 | (0.0002) | 0.0003 | (0.0006) |
| Higher qualification (above A-level) | -0.3664 *** | (0.0388) | 0.2765*** | (0.0722) |
| Female (0-1) | 0.1758 *** | (0.0433) | -0.0195 | (0.0686) |
| One child 0-4 (0-1) | 0.0543 | (0.0367) | 0.1195 | (0.0894) |
| One child 5-11 (0-1) | 0.1487 *** | (0.0335) | -0.2235** | (0.1000) |
| One child 12-15 (0-1) | 0.1269 *** | (0.0368) | 0.0338 | (0.1077) |
| One child 16-18 (0-1) | 0.0565 | (0.0797) | 0.0324 | (0.1949) |
| Student (0-1) | -0.2836 *** | (0.0878) | 0.9757*** | (0.1383) |
| Living with parents (0-1) | 0.1084 * | (0.0629) | -0.1659 | (0.1274) |
| Owner (0-1) | -0.1332 *** | (0.0422) | -0.2924*** | (0.0971) |
| Partnership formation | 0.1431 * | (0.0832) | 0.6973*** | (0.1279) |
| **Residential tenure** | | | | |
| 1 - 3 years | 0.2666 ** | (0.1178) | -0.2763 | (0.1997) |
| 3 – 6 years | 0.3029 ** | (0.1185) | -0.3711* | (0.2065) |
| 6 – 15 years | 0.4571 *** | (0.1187) | -0.3112 | (0.2143) |
| > 15 years | 0.5809 *** | (0.1239) | -0.4623** | (0.2241) |
| **Childhood – Family structure** | | | | |
| Not sole child (0-1) | -0.1367 * | (0.0806) | | |
| Log (number siblings) | 0.1234 *** | (0.0387) | | |
| Eldest (0-1) | 0.0029 | (0.0482) | | |
| **Education level parents**[1] | | | | |
| mother low | -0.2176 *** | (0.0716) | | |
| mother medium | -0.3027 ** | (0.1256) | | |
| mother high | -0.0722 | (0.0562) | | |
| father low | -0.1764 *** | (0.0558) | | |
| father medium | -0.4487 *** | (0.1077) | | |
| father high | -0.2777 *** | (0.0650) | | |
| **Thresholds** | | | | |
| Tau1 | -2.0436 *** | (0.3366) | | |
| Tau2 | -0.9084 *** | (0.3368) | | |
| Tau3 | 0.2122 | (0.3366) | | |
| Correlation | -0.3487 ** | (0.1356) | | |
| ln-L | -13227.72 | | | |

[1] Reference category: no qualifications; Low: Left school with some qualifications, Medium: Got Further Education qualifications, High: Got university/higher degree

**Table 6 - Effects of friendship ties (location) across specifications**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Estimated coefficient | -0.2108*** (.0412) | -0.2631*** (.0346) | -0.2741*** (.0371) | -0.1846 *** (0.0457) | -0.1705 *** (0.0454) |
| Correlation | -0.3487** (0.1356) | - | - | -0.6370 (0.4715) | -0.6227* (0.3183) |
| Instruments | Yes | Yes | Yes | No | No |
| Residential tenure dummies | Yes | Yes | Yes | Yes | No |
| Allow for unobserved heterogeneity | Yes | No | Yes | Yes | Yes |
| Allow for correlation | Yes | No | No | Yes | Yes |

**Table 7 - Effects of friendship ties (frequency) across specifications**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Estimated coefficient | -0.0258 | -0.1273*** | -0.1352** | -0.0145 | -0.0099 |
| | (0.0415) | (0.0286) | (0.0325) | (0.0418) | (0.0417) |
| Correlation | -0.4241*** | - | - | -0.4569*** | -0.4679*** |
| | (0.1092) | | | (0.1098) | (0.1036) |
| Instruments | Yes | Yes | Yes | No | No |
| Residential tenure dummies | Yes | Yes | Yes | Yes | No |
| Allow for unobserved heterogeneity | Yes | No | Yes | Yes | Yes |
| Allow for correlation | Yes | No | No | Yes | Yes |

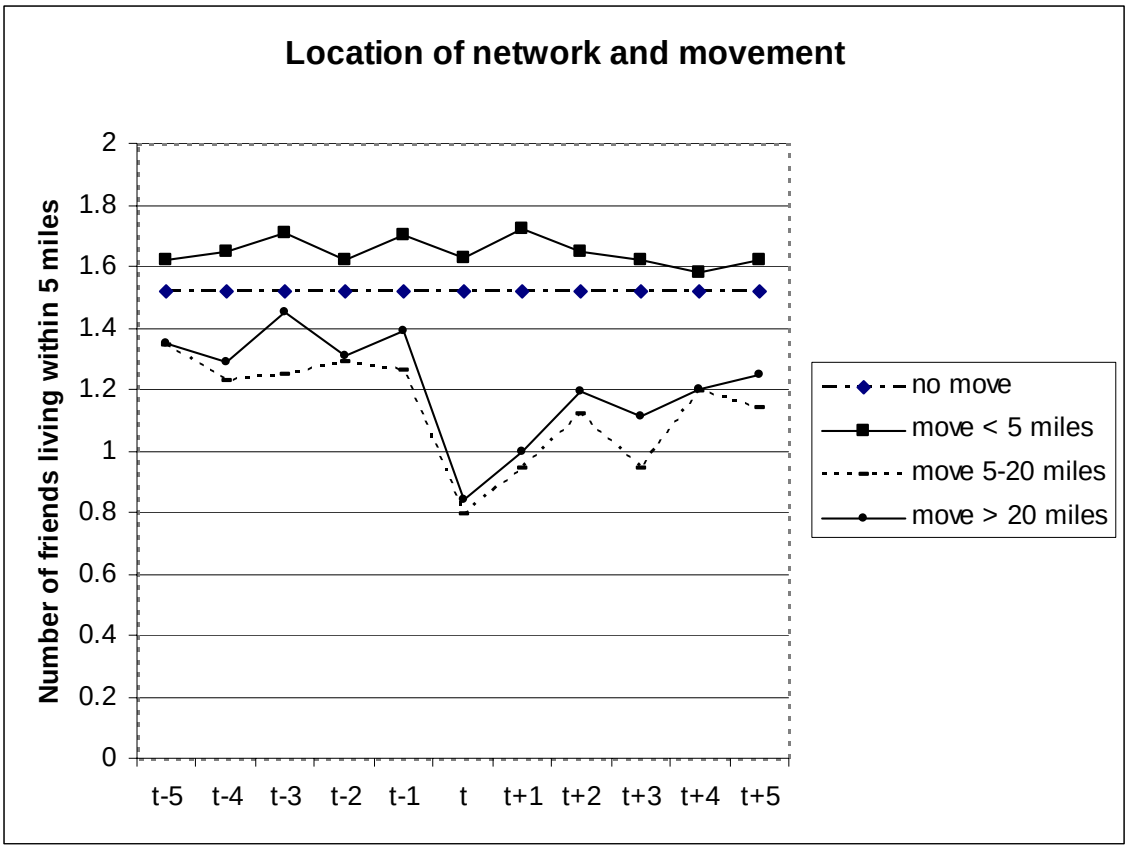
Location of network and movement
Number of friends living within 5 miles
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
t-5
t-4
t-3
t-2
t-1
t
t+1
t+2
t+3
t+4
t+5
no move
move < 5 miles
move 5-20 miles
move > 20 miles

Figure 1

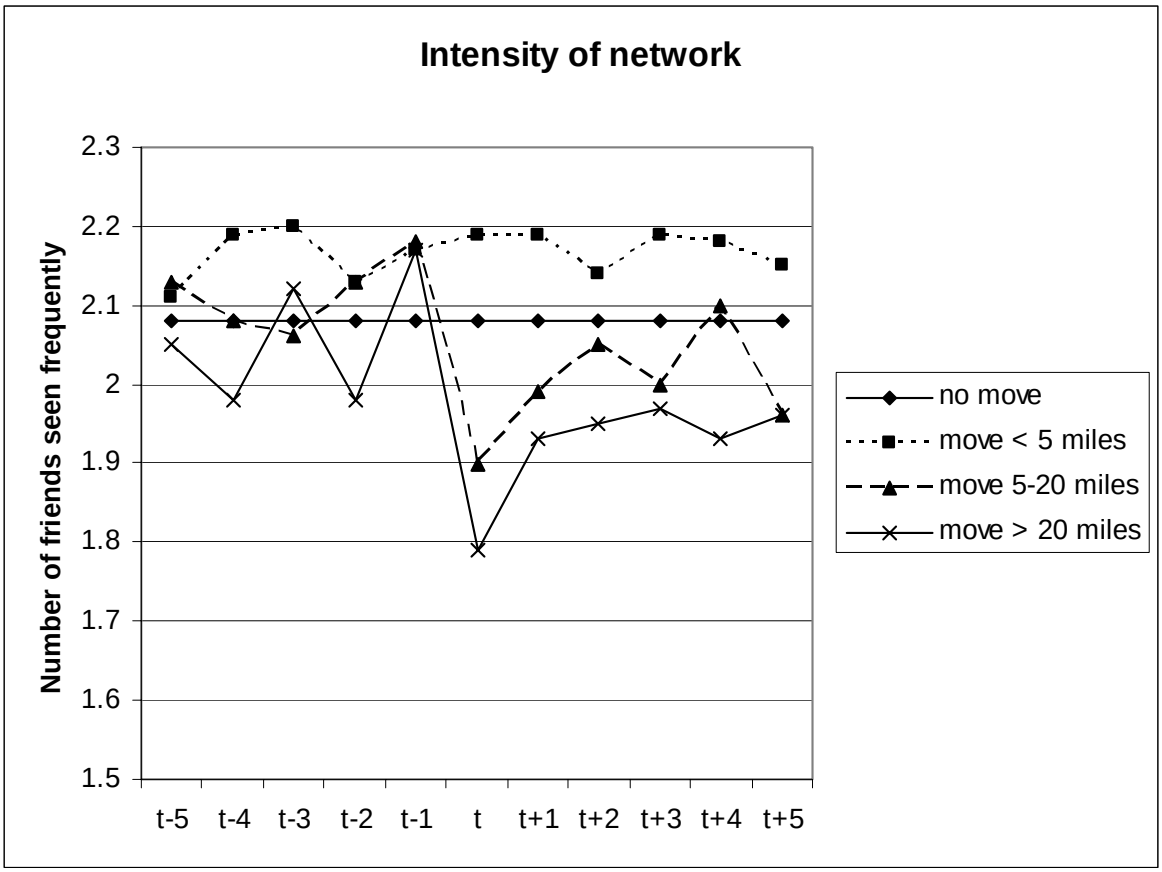
Intensity of network
Number of friends seen frequently
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
t-5
t-4
t-3
t-2
t-1
t
t+1
t+2
t+3
t+4
t+5
no move
move < 5 miles
move 5-20 miles
move > 20 miles

Figure 2