Geographical constraints and spatial mobility: the case of two-earner households

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Abstract: We test a number of hypotheses derived from search theory about spatial job and residential moving behaviour of two-earner households using data for Denmark. In line with theory, we demonstrate that residential mobility depends positively on the commuting distance of both spouses, but negatively on the distance between workplaces. Furthermore, job mobility depends positively on the worker's commuting distance, negatively on the spouse's commuting distance and positively on the distance between workplaces.

1. Introduction

Economists have pointed out the *economic* advantages and disadvantages of marriage.[1] For example, it has been argued that marriage provides a form of informal insurance against income losses due to unemployment or disability. The main disadvantage of marriage is that both spouses are geographically constrained in the labour market by living in the same residence (Frank, 1978; Costa and Kahn, 2000; Rouwendal and Van der Straaten, 2004)). In this paper we test the implications of search theory about residential and job moving behaviour of employed workers belonging to two-earner households.[2]

The basic idea of search theory is that workers are *not* fully compensated for their commuting costs by higher wages (or lower house prices) due to labour and housing market search frictions (see e.g. Manning, 2003, for a theoretical and empirical foundation of this claim). Hence, workers are not in their optimal labour-housing market situation, but improve their position through job and residential moves. For single-earner households, the implication is that commuting distance positively affects job and residential moving behaviour. This implication has empirically been well established (e.g. Van Ophem (1991), Zax (1991), Van den Berg (1992), Henley (1998)). Because workers of two-earner households are constrained to live in the same residence as the spouse, the implications turn out to be more subtle, because residential moves influence future job moving behaviour of both spouses, whereas job moves influence future residential moving and spouse's job moving behaviour (Van Ommeren et al., 1998).[3] In the current paper, we shortly review the theory and then analyse the effect of the commuting distances of both spouses and the distance

[1] We do not distinguish between marriage and cohabitation, because for the current paper the difference is not meaningful.

[2] Most search-theoretical papers focus on one-earner households. One exception is Burdett and Mortensen (1978) who apply search theory to derive predictions about two-earner household's labour supply under uncertainty.

[3] In particular, it turns out that search theory makes precise predictions about the distance between the workplaces of both spouses on mobility. Because this distance between workplaces does *not* enter the instantaneous utility function of the household (there is no reason to believe that it should), it must be the case that when moving job or residence, households takes future moves into account.

between the workplaces on job and residential mobility of two-earner households employing Danish register data.

2. Theory

Our starting point is a labour and housing market where search imperfections are present, so workers are not fully compensated by higher wages (or lower prices). For expositional reasons, it may be easier to consider a two-earner household in which the commuting distances of both workers are the only consideration in the household's instantaneous utility function, the utility enjoyed during a certain (very short) period.[4] We will assume that the instantaneous utility of the household depends negatively on the commuting costs, which are proportional to the commuting distance, of both spouses. Assume that space is homogeneous and the household receives residence and job offers for each worker, which arrive at a fixed rate in each period randomly throughout space. At a fixed rate, workers may become unemployed. Presume now that households maximise lifetime utility, the expected discounted utility, taking into account moving behaviour in future periods.

In this highly stylised case, workers will move residence and jobs to reduce the workers' commuting distances.[5] One can easily see that the probability of moving residence therefore depends positively on the commuting distance of both workers. Furthermore, and more interestingly, it can be seen that the probability of moving residence depends negatively on the distance between the workplaces. The latter result has an intuitive explanation. In case that the distance between workplaces is longer (conditional on the commuting distances), the less likely it is for the household to reduce the commuting distance of one worker without increasing the commuting distance of the other worker.[6]

[4] The formal theoretical model is discussed in Van Ommeren et al. (1998). This model allows also for wage and residence heterogeneity and job and residence moving costs.

[5] Note that in this set up, any move will be a move over space. Note also that some moves may occur which imply an *increase* in the sum of the commuting distances, if it is expected that in the (near) future, the sum of the commuting distances may be reduced with a larger probability. For example, if the residence location is exactly in between the workplaces, then it may be beneficial to accept residence offers that reduce the commuting distance of one spouse, although the sum increases, when the other spouse is more likely to receive a job offer to reduce the commute. Note further that in a more general set up, which includes moving costs, moves only occur over longer distances. When wages are included, workers may increase the distance as simultaneously wages are increased. These extensions have no substantial effect on the predictions discussed here (Van Ommeren et al., 1998).

[6] For example, in the extreme case that the distance between workplaces is equal to the sum of the commuting distances, so the residence is exactly in between the workplaces, and the marginal effect of the commuting distances on the household's utility is constant and the same for both workers, moving residence may not improve the household's utility. In the other extreme case that both workplaces are at the same location, any residential move that reduces the commute for one wage earner reduces the commute for the other, so moving residence is more likely to occur.

So, how do the commuting distance, the distance between workplaces and the commuting distance of the spouse affect *job* mobility? Clearly, similar to the one-earner worker, the worker's commuting distance will positively affect the job mobility of the worker. Furthermore, it can be seen that the distance between workplaces has a *positive* effect on the job mobility of both spouses. This effect exists because by moving job and reducing the distance between workplaces via a job move, it is more likely to reduce *both* commuting distances via a *residential* move in a future period. Hence, the positive effect of the distance between workplaces on job mobility will hold when households anticipate to move residence to reduce the commuting distances after the job move. Further, it can be seen that the commuting distance of the spouse has a negative effect on the probability of moving job of the other wage earner. This is also intuitive because a long commuting distance of the worker's spouse makes it more likely that the household will move residence closer to the spouse's workplace, so it is less advantageous to move job closer to the residence.

We summarise the theoretical results as follows:

Table 1 Spatial moving behaviour

	Job mobility	Residential mobility
Commuting distance	+	+
Commuting distance of spouse	-	
Distance between workplaces	+	-

In the remainder of the paper, we will test the above predictions.

3. Results

The data used in the empirical analysis are derived from register data from Statistics Denmark in 1999 and 2000. Our period of observation is thus one year. We select households that consist of two employed workers of different gender. Both workers are between 25 and 40 years. In our analysis, we make a distinction between households with children (125,217 observations) and without children (40,370 observations). One reason for this distinction is that for households with children, the location of the school (which we do not observe) may be relevant for their spatial moving decisions. Another reason is that it is well known that the residential moving rate is much lower for households with children (e.g. Henley, 1998), in

particular for moves over longer distances.[7] Hence, a priori, we expect that the effect of spouse's commuting distance and the distance between workplaces on job mobility are smaller in size for workers belonging to households with children, because these effects are expected to exist, because of future residential mobility.

The distances have been calculated using information on the location of the municipalities (not of the address). Because municipalities are rather small and employment tends to be concentrated in the centre of municipalities, the inaccuracies of this approximation will be small. Distances between municipalities have been calculated via the shortest route. The mean commuting distances for males and females without children are 15 and 13 km respectively. The mean distance between workplaces is 18 km, which exceeds therefore the mean commuting distances. For households with children, the distances are slightly shorter (15, 10 and 16 km respectively). We will distinguish between moves *of address* and moves *between municipalities*. The main advantage of the analysis of moves between municipalities is that the search-theoretical predictions are about spatial moves.

We have estimated separate probit models of residential, male and female job moving behaviour. The data allow us to observe whether residence or/and job moves have occurred during the period of observation. We do not know *when* during this period a move has occurred. Estimation based on the whole sample may therefore give biased estimates of the effect of the distances, because the distances change due to other moves during the period of observation. To address this issue when estimating the moving residence model, we select observations for which holds that the municipality of *both* workplaces does not change during the period of observation and then estimate the probability of moving residence correcting for the double selection effect employing a Heckman procedure. To estimate the probability of moving job, we select observations for which the residence municipality and the workplace municipality of the other spouse do not change, and correct for these two selections by using a Heckman procedure.[8]

We include a large number of regressors in the residential mobility models (e.g., age, education, homeownership, residence duration) and job mobility models, (e.g., age, education, job experience, regional unemployment rate, sector).[9] We have included residence

[7] In our data, the annual residential moving rate and the moving rate to another municipality for households without children are 15.6 and 7.6, whereas those for households with children are 7.7 and 2.7 respectively.
[8] We have experimented with different variables in the 'selection equations', but the results do hardly change. Furthermore, the results without correction are very similar, but slightly less pronounced.
[9] We do not observe wages. Because wage and commuting distance are weakly positively correlated (Manning, 2003) and the effect of the wage on job mobility is negative, the effects of commuting distance on job mobility

municipality dummies in the residence moving model and workplace municipality dummies in the job moving models. These municipality dummies control for fundamental differences between regions (e.g. housing prices or municipal service standards), but also for the geographical size of the municipality, which affects the probability of moving to another municipality. Because we are mainly interested in the effect of the distances we have experimented with different functional forms for distance (e.g. linear, log-linear) and with different spatial configuration dummies (e.g. the workplace locations are in the same municipality or not). It turns out that the (qualitative) results are identical for all different functional forms. In the current paper, we report only the results of the log-linear specification.[10] One advantage of this specification is that the correlations between the three estimated distance coefficients are only moderate avoiding problems with multicollinearity.

Note that *all* empirical results are in line with job search theory. The results hold for all groups between which we distinguish. The results are not only statistically significant, but the size of the effects of the distances on mobility is rather large (see Tables 2, 3 and 4). The size of the effects may be understood better when focusing on different spatial configurations. For example, the probabilities that a household moves residence, a male worker moves job, or a female worker moves job to another municipality are on average about 6, 16 and 14 percent respectively. When the household is spatially in the ideal situation, so all distances are zero, the above probabilities drop to 3, 9 and 7 percent respectively.

In line with theory, the probability of moving residence is particularly high when both commuting distances are long, and the workplaces are closely located to each other. In this situation, the *job* moving probabilities are close to the mean. For example, when both commuting distances are 50 km and the distance between workplaces is zero, the three above probabilities are 12, 18 and 14 percent respectively. Furthermore, it appears that the probability of moving job is particularly high and the probability of moving residence is low when the commuting distance is long *and* the spouse's commuting distance is short. For example, when the male's commuting distance is 50 km, and the female's commuting distance is zero, the moving probabilities are 4, 27 and 9 percent respectively.

Let us focus now on the difference between households with and without children. As predicted, in households with children, job mobility is *less* sensitive to the spouse's commuting distance. Further, it appears that females with children are more likely than other

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will be slightly underestimated (see e.g. Table 4 in Manning (2003)). Hence, our estimates are somewhat conservative.

[10] Because distances are sometimes zero, we have added one to all distances.

female workers to change job given a long commuting distance. Both results make sense because households with children move less and females tend to be more involved in childcare, hence the marginal disutility of commuting is higher for the female's than for the male's commute.

4. Conclusion

We have tested the predictions of search theory about spatial moving behaviour of two-earner households in Denmark. In line with theory, we find that residence mobility is positively affected by the commuting distances of both spouses, and negatively affected by the distance between the workplaces, whereas job mobility depends positively on the commuting distance, positively on the distance between the workplaces and negatively on the spouse's commuting distance. These estimates are not only as predicted by search theory, it appears that the sizes of the effects are rather large.

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Table 2. Residential mobility

	No children						With children					
	Address mobility			Municipality mobility			Address mobility			Municipality mobility		
	Coef.	Std.err.	Marg. Eff.	Coef.	Std.err.	Marg. Eff.	Coef.	Std.err.	Marg. Eff.	Coeff.	Std.err.	Marg. Eff.
Commuting distance male	0.076	0.019	0.00049	0.259	0.028	0.00099	0.052	0.015	0.00016	0.181	0.027	0.00015
Commuting distance female	0.045	0.019	0.00033	0.161	0.027	0.00064	0.044	0.016	0.00018	0.249	0.030	0.00030
Distance between workplaces	-0.055	0.018	-0.00026	-0.053	0.025	0.00012	-0.036	0.013	-0.00009	-0.093	0.023	-0.00005
Number of obs.	27,999			25,990			96,525			88,354		
R^2 (pseudo)	0.134			0.103			0.146			0.169		

Table 3. Male job mobility

	No children						With children					
	Workplace mobility			Work municipality mobility			Workplace mobility			Work municipality mobility		
	Coef.	Std.err.	Marg. Eff.	Coef.	Std.err.	Marg. Eff.	Coef.	Std.err.	Marg. Eff.	Coeff.	Std.err.	Marg. Eff.
Commuting distance male	0.088	0.012	0.00112	0.220	0.014	0.00209	0.108	0.007	0.00118	0.244	0.009	0.00194
Commuting distance female	-0.066	0.012	-0.00089	-0.062	0.014	-0.00056	-0.021	0.009	-0.00029	-0.024	0.010	-0.00021
Distance between workplaces	0.052	0.013	0.00054	0.118	0.015	0.00087	0.057	0.007	0.00053	0.119	0.009	0.00076
Number of obs.	30,907			30,886			107,578			107,578		
R^2 (pseudo)	0.036			0.075			0.029			0.069		

Table 4. Female job mobility

	No children						With children					
	Workplace mobility			Work municipality mobility			Workplace mobility			Work municipality mobility		
	Coef.	Std.err.	Marg. Eff.	Coef.	Std.err.	Marg. Eff.	Coef.	Std.err.	Marg. Eff.	Coeff.	Std.err.	Marg. Eff.
Commuting distance male	-0.037	0.013	-0.00042	-0.056	0.016	-0.00036	-0.018	0.008	-0.00017	-0.020	0.010	-0.00010
Commuting distance female	0.057	0.012	0.00078	0.245	0.015	0.000229	0.113	0.006	0.00164	0.345	0.008	0.00323
Distance between workplaces	0.056	0.013	0.00056	0.144	0.016	0.00090	0.071	0.007	0.00064	0.150	0.009	0.00077
Number of obs.	30,033			30,011			104,902			104,869		
R^2 (pseudo)	0.047			0.091			0.035			0.093		