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Explaining Reurbanization: Empirical Evidence of Intraregional Migration as a Long-term Mobility Decision from Germany

Gesa Matthes

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German Socio-Economic Panel Study (SOEP)
DIW Berlin
Mohrenstrasse 58
10117 Berlin, Germany

Contact: Uta Rahmann | soeppapers@diw.de

EXPLAINING REURBANIZATION: EMPIRICAL EVIDENCE OF INTRAREGIONAL MIGRATION AS A LONG-TERM MOBILITY DECISION FROM GERMANY

Dipl.-Ing. Gesa Matthes,
Hamburg University of Technology (TUHH), Institute for Transport Planning and Logistics, matthes@tu-harburg.de

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Abstract

Following the discussion on reurbanization (changing intra-regional migration patterns), our research project treats transport-related consequences of this spatial development in German city regions. The hypothesis is that reurbanization bears potential to spread environmentally friendly ways of organizing daily mobility – but that the chance of those positive effects might be given away, if policy does not accompany the process adequately. The aim of this project is to assess the current impact of reurbanization on passenger transport in city regions and to find further potential to reduce motorized passenger kilometres in order to deduce first planning approaches.

This paper focuses on the question whether a household decides to move or to stay in its current dwelling and also analyses how the results vary in time and space. After having deduced determinants on the decision to move, a logistic regression is run on the SOEP-data. The analysis reveals behavioural change of households with more than one employed person and related to the event "birth" since the late 1980ies. Spatial variation of the probability to move rather results from structural differences of the locations.

Keywords: Relocation, move, migration, reurbanization, transport
JEL-Codes: O18; O21; R14; R21

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Content

1. INTRODUCTION

In the past decades, suburbanization has dominated the urban development in German city regions. Several consequences such as social segregation, soil sealing or transport related impacts accompanied this development. Recently, several studies have revealed an incipient reurbanization in terms of Berg's theory of metropolitan evolution (BERG et al. 1982): Since the end of the 1990s, suburbanization has been diminishing in the German city regions and the population of West-German Cities started growing slightly (BECKMANN et al. 2007: 20). Scientists presume that the reurbanization process interferes with the previous pattern of urban development. Some say that it may weaken suburbanization or might even be able to reverse it. Taking into account that the local population development depends increasingly on migration, as the German population has been shrinking (GATZWEILER/ SCHLÖMER 2008: 245) and considering the spatial consequences of evident social changes, it is expected that reurbanization gains importance in the future (BECKMANN et al. 2007: 147; ADAM et al. 2008: 400). Furthermore, it is likely that interventions increase in order to advance reurbanization as the notion evokes positive associations in the press and among practitioners of urban planning.

Although reurbanization may sound like 'healing' the urban system from the 'nuisances' of suburbanization automatically, we need to observe it critically; for example regarding social issues, growing spatial disparities are expected (BRECKNER et al. 1998: 121). The hypothesis of a currently conducted research project at our Institute is that reurbanization bears potential to spread environmentally friendly ways of organizing daily mobility – but that the chance of those positive effects might be given away if policy does not accompany the process adequately. The project discusses the hypothesis by treating the following three issues in order to deduce first planning approaches:

1. Assessing the current importance and novelty of reurbanization: How and to what extent have intra-regional migration patterns changed recently?
2. Explaining the phenomenon of reurbanization in order to forecast its future development and to find approaches to influence it: What are the individual motives and conditions beyond the revealed migration-processes? Special attention is paid to the ring-to-core migrants, as the motives of core-to-ring migrants are well explored already.
3. Analyzing changes of individual travel behavior in order to identify potential reductions of the migrants' motorized passenger kilometers: How and why does the migrants' travel behavior change and what role does the location choice play? Where are possible approaches for planning to intervene?

A preliminary study has been conducted to operationalize the term reurbanization, to treat key-aspects of all issues and to develop and test appropriate survey methods. In light of the results of this preliminary study, this paper focuses foremost on the second of the named issues. Namely the paper deals with the question under which conditions a household decides to move or to stay. It might be that reurbanization is the result of many non-movers in the city-centers.

To examine factors influencing the relocation decision, household-data from the German socio-economic panel (SOEP) is analyzed.

2. BACKGROUND AND RESEARCH QUESTIONS

As the state of the art of the theoretical and empirical basis for the analysis is closely attached to the research questions, these points will be outlined in this chapter altogether.

2.1 Different parts of the relocation decision

Each migration includes several sequential decisions (cf. KALTER 1997: 66 ff., CADWALLAR 1992: 198 ff.). The recent literature distinguishes two main parts of the relocation decision, especially when modeling these decisions (e.g. COULOMBEL 2010: 5; WONG 2002: 224; HAUG 2000: 8). This common division is also the theoretical starting point of this paper: In the *decision to move*, a household decides whether to leave its dwelling or not. In the *residential choice* it decides to choose a new dwelling at some new place. The latter is conditional on the household's previous decision to leave its current dwelling.

While there is considerable empirical knowledge regarding the second part of the relocation decision in Germany, the question whether to leave the dwelling or not is treated rather rarely:

> *„The decision to move is undoubtly the most neglected aspect in the residential process most models putting much more emphasis on the location choice." (COULOMBEL 2010: 54)*

Anyway, this decision is of interest for transport research, especially regarding the modeling of relocations in integrated transport models. Beyond that, it is essential for the analysis of reurbanization which is subject to this paper: If reurbanization is defined as (relative) growth of population size of the core-city as compared to its ring (BERG et al. 1982: 36), reurbanization may take place because of three developments:

1. A natural development of population-size (births and deaths).
2. An upcoming migration into the cores.
3. A decrease of the previously dominating migration flow outwards.

In several German cities a decreasing out-migration is empirically evident (ADAM/STRURM 2011). The question is: why does this number change? It is true that the treatment of 'stayers' in a reurbanization context should normally imply both, the case that a household decides to leave the dwelling and the case that it decides to choose its new dwelling within the core. As these decisions have to be differently treated because one is conditionally dependent on the other (cf. HENSHER et al. 2005: 70), this first paper refers only to the very first part of the relocation decision; the decision whether to leave the dwelling or not – neglecting where the household moves afterwards.

For the analysis of the decision to move within the core, it is necessary to compare some kind of reference. Since the general assumption is that reurbanization is a *new* development, one comparison must be in the temporal dimension. A second dimension of comparison has to be a spatial one, as there might be general trends. That's why the development in the core-cities is additionally compared to other spatial types. Therefore the research question for this paper is:

What kind of change can be observed regarding the decision to move in the core-cities in the course of time and compared to the development in the rings?

2.2 The process of deciding to relocate

To explain the relocation decision, usually an economic reasoning following the 'theory of Subjective Expected Utility (SEU)' completed by behavioral aspects of the 'place utility concept' by WOLPERT (1965) is used:

> *"In a wide evaluation of theoretical approaches, they [de Jong and Fawcett 1981, GM] demonstrate that the SEU-theory represents the 'common denominator' of migration theories so far." (KALTER 1997: 47 ff., translation GM).*

Following these approaches, the relocation decision is determined by the factors *place utility* (utility of the current location), *aspiration level* and the individually *expected utility of the new location* (WOLPERT 1965; KALTER 1997: 47). Transaction- or moving costs and characteristics of the housing market have to be added (e.g. SCHLÖMER 2009; CADWALLAR 1992: 15). Summarizing the evaluated theoretical and empirical works and interpreting them for the special case of intraregional relocations, the process looks like this:

A household decides to search for a new dwelling if the utility of the current dwelling falls below a certain threshold (*aspiration level*). It then decides to leave its dwelling if it is not possible to adjust the current utility by adjusting the dwelling, the household's needs or its expectations (KALTER 1997: 45 ff.). If this is not successful, the household then moves when it finds a new dwelling whose utility is higher than the utility of the old dwelling plus transaction costs (cf. LEE 1972: 119).

The process of comparing utilities and compromising is the *trade-off* of the relocation decision. In the trade-off different factors are weighted, put into a hierarchical order and then dropped one after the other according to what the housing market supplies (cf. BECKMANN et al. 2007: 71, 111; CADWALLAR 1992: 12). The household 'calculates' its current and potential place utility.

The utility of the dwelling of a household at intraregional level consists of characteristics of the dwelling, the surroundings of the dwelling and its city-regional location (Table 1). Some factors that determine the individual utility of a dwelling are functions of household characteristics; others are psychological aspects like social ties to neighbors. Additionally, the utility includes subjective weights of all single aspects according to individual wishes, values and expectations. Nevertheless, there are indications that also the wishes are at least partly systematically related to household characteristics (cf. IWANOW et al. 1995: 35). After having got an overview of the regional housing market, the household will adjust its expectations to the supply.

Table 1: **Aspects that determine the household-specific place utility of its current dwelling**
(Source: GM)

Objective factors	Characteristics of the dwelling	Size, condition, legal status (owner/ tenant), costs, facilities, etc.
	Surroundings of the dwelling	Condition, facilities, supply, infrastructure, etc.
	City-regional location/accessibility	
	Functions of household characteristics like income, size, activities and the three characteristics above	Dwelling costs per income, square meter per person, distance to work, etc.
Subjective factors	Social and psychical relations to present location	Social ties, remembrance, etc.
	Household specific assessment regarding all aspects above, partially determined by observable household-characteristics	Weights, values, preferences, expectations
	Adjustment of expectations according to the regional housing or land-market	

So far, the utility of the dwelling and its determinants have been explained. The next question is what determines the position of the mentioned threshold under which the utility of the current dwelling has to fall so that a household makes serious plans to move? In order to answer this question it is useful to distinguish thoroughly between a general *willingness to move* of households and *trigger events*. In the literature they are often summed up by the descriptive variable 'phase in life-cycle'. Theoretically, it can be assumed that the overall willingness to move is determined by factors like monetary or psychical means for bearing transaction costs, flexibility, open-mindedness or willingness to give up current social ties in the neighborhood.

They might be related to observable characteristics like age, income, education, marital status or duration of living in the current dwelling. Trigger events rather explain the certain point in time when a move takes place. In words of the outlined process of decision-making, events often cause an abrupt change of household characteristics and are therefore directly linked with the household specific utility of the current dwelling. For example, the birth of a child diminishes the area allocated per person in the dwelling or the income per person immediately. The aspiration of finding a new, more appropriate dwelling will be correspondingly high.

The following analysis will not try to illuminate the trade-off between old and new dwelling itself as the database does not contain information about alternatives of stayers. The aim is rather to name the importance and direction of influence regarding factors that impact the *probability* that the described situation occurs (a household's place utility drops under a certain threshold and a suitable new dwelling is found). This means the research question has to be specified:

What are the factors influencing the probability to move in the course of time and compared to the development in the ring?

3. USED DATA

This chapter describes the dataset used. Starting from a very short description of the basis, the three restrictions which have been put onto the dataset to obtain the finally analyzed sample are described.

3.1. The SOEP as database

The German Socio-Economic Panel Study (SOEP) is a longitudinal study which is conducted since 1984 at the German Institute for Economic Research (DIW Berlin). The panel contains yearly collected data at household- and person level. Altogether nearly 20,000 sampled households have been interviewed at least once (DIW-a), the dataset contains more than 250,000 household-year-observations and more than 16,000 relocations that have been recorded within the last 25 years. The panel claims to be representative for the population of the Federal Republic of Germany (DIW-b).

The advantages of using the SOEP as database regarding the decision to move is that it contains information about the households and their dwellings before and after the relocation. The problem of panel data in general is that the representativeness decays over time due to selective panel mortality and household foundations (cf. RENDTEL 1997). If the panel is regarded as great cross-sectional sample there are additional problems concerning the independence of observations. These problems will be faced when selecting the method of analysis.

Altogether, the documentations and methodical literature of the SOEP give the impression that the methodological challenges regarding the maintenance and development of the dataset are faced and tried to be solved in a reliable way.

3.2. Spatial restrictions

The SOEP offers several different spatial variables. The most precise ones are available only for use at the DIW in Berlin. This analysis uses only the spatial variables that are available outside the DIW.

The research question concerns an analysis of different spatial types within city-regions. As the project as a whole is embedded in a transport-research context, the definition of the range of spatial types between the core-city and the rings is oriented at types of settlement structure which impact on daily travel behavior (cf. MATTHES 2010: 3). This implies besides others that each distinguished spatial type has to be as homogenous as possible regarding its density, built structure and supply of infrastructure and facilities. The subject reurbanization determines a concentration on city-regions. The examination of the spatial variables led to the following design:

Firstly, all city-regions were distinguished from the periphery. The optimal delimitations regarding the treated subject would have been the so called "housing-market-regions".[1] As variable close to these, the SOEP contains BIK-Regions. BIK-Regions define city-regions using indicators like population-size of communities, density, functional entanglements or the commuter-belt (cf. *BIK Regionen*). To exclude the periphery of the big city-regions, all observations outside the BIK-Regions 7-10 were dropped. The dataset contains thus, only observations in functional city-regions of over 100,000 inhabitants.

Secondly, the space within the city-regions had to be split-up. Here the BBSR[2]-repartition of 17 different community types was used. Four relevant types were selected in order to differentiate the delimited city-regions:

1. Big cities (> 500,000 inhabitants)
2. Smaller cities (100,000 – 500,000 inhabitants)
3. Middle-order centers
4. Other communities

Thirdly, observations in the cities were divided after what the respondents had stated regarding the question about their residential area. Those who live in areas of mixed land-use were

[1] „Wohnungsmarktregionen" SCHÜRT 2007.

[2] Federal Institute for Research on Building (BBSR).

separated from the others. The basic idea is to be able to distinguish the structural core-city from the more transport-inducing residential parts of the city.

Finally, the eastern part of Germany (ex-GDR) was excluded. Descriptive statistics confirmed that the intertemporal comparability concerning the research question of this paper is not given due to unique but considerable structural changes in the 1990s.

Although several combinations of the named spatial categories were tested, the analysis documented in this paper refers to a dataset that contains only the two most contrasting types: The structural core of big cities in contrast to those communities of the rings which are not functional centers.

3.3. Temporal restrictions

As the sample is treated like a cross-sectional sample in the analysis, a temporal comparison based on time periods is used. Here several definitions of periods were tested regarding the criteria 'number of kept observations' and 'findings of other empirical studies'. Two definitions were then followed in detail: 1991-1999 compared to 2001-2009 and 1985-1993 compared to 2001-2009. The latter is presented in this paper.

3.4. Restrictions due to the definition of "move"

A move is usually defined as change of residence. Anyway, for the analysis it is necessary to specify this further, as there are unconditional and conditional or "forced" moves (cf. ROSSI 1980). Without discussing this problem in detail, forced moves are excluded in this analysis as they follow other rules than 'free' decisions to move (see above). The excluded moves are split-offs of single household-members (e.g. adult children, ex-partner), moves due to a notice of the landlord and long distance migrations[3].

4. ANALYSIS

In this chapter, special emphasis is put on describing the results of the model, as only common methods are used. After a discussion of the included and not included variables, the outcome of the model regarding the research question is interpreted.

4.1. Method used

For analyzing the probability to move and its change over time and difference in space, a logistic regression on the binominal variable *move* is run. The units of analysis are household-years. In order to ensure the control of dependence of observations within one household, the

[3] For a description of the distinction of long-distance-movers please contact the author.

data were clustered. For disentangling the spatial and temporal influences, interactions are calculated for the spatial and temporal variables *ring* (*ring*=1: ring; *ring*=0: core) and *period* (*period*=1: 2001-2009; *period*=0: 1985-1993).

4.2. Selection, preparation and examination of variables

The literature gives an idea of potentially influencing factors on the decision to move, although surveys normally focus on the location choice (the second part of the relocation decision) and are usually conducted among persons who have already moved. The factors found in literature have been listed and completed by theoretical reasoning about the mechanisms of the decisions described in chapter 2. Finally factors regarding six topics were included into the analysis:

1. Characteristics of households which influence the sample-probability and panel mortality
2. Characteristics of households
3. Characteristics of household in relation to characteristics of the dwelling
4. Characteristics of the current dwelling
5. Events occurring within households
6. Characteristics of the residential area of the current dwelling / Characteristics of the city-regional location

The variables have been extracted from the SOEP-database with help of PanelWhiz (Haisken-DeNew 2010). Monetary values are deflated to prices of 2005. For all variables concerning household, dwelling and location characteristics (topics 2-4, 6), the values are generally taken from the year before the respective household-year observation. This ensures that the characteristics are related to the time when a household lived in the old dwelling in case of a move.

If there was an option to choose between different codings or substantially related variables, several alternatives have been tested. Those that gave the best goodness of fit and variable-significance were included. After all, the variables summarized in table 1 and listed in the description of the model in table 2 were included. Those which were tested but found to be insignificant or contained irregularities are excluded. The most important decisions regarding the final set of variables are briefly summarized in the following paragraphs. The numbers refer to the six topics above:

1. Several of the factors which are documented to influence the sample-probability and representativeness of the dataset (DTC 2005: 20, 170; SPIESS/KROH 2008: 23) are the household-characteristics, which are included in the analysis anyway.[4] The indicator of having a migration background and having lived in the GDR in 1989 are included uniquely as control variables. As expected, they were found to be insignificant in the end.

[4] For the reason why not using weights in regressions cf. ARZHEIMER 2009.

2. Some variables indicating household-characteristics were excluded:
   - An education variable was found to be insignificant.
   - Status variables which specify the status ‘not employed’ are insignificant as events and ‘number of employed household-members’ are included.
   - Equivalent income
3. Regarding the characteristics of the dwelling which were expected to be more relevant in relation with household-characteristics like area or rooms per person or dwelling costs per income were found to be far less significant than the absolute values – no matter if tested as dummy or continuous variable.
4. Several of the characteristics of the dwelling were excluded because they were found to be insignificant or optional regarding others:
   - Area of the dwelling (number of rooms was included)
   - Period of construction of the building
   - Serious lack of dwelling-facilities (e.g. no kitchen, no bathroom)
   - The house type (e.g. detached single-family house, building with x units) surprisingly remained insignificant even if the variable “owner” was excluded.
5. Nearly all theoretically assumed biographic events have been included – after a thorough check of collinearity. Regarding events there has been an adjustment, which has to be explained: It has to be assumed, that reactions as a reaction on personal events are delayed in time; a new dwelling has to be found, periods of notice have to be kept and renovations might be undertaken. For including all events which are temporally and probably causally related with the documented relocation, it is not sufficient to include only the events which are reported in the same interview as the relocation. An event might have occurred one month before the interview and the relocation is planned for three months after the interview and is therefore reported in the next wave. Therefore events reported in the interview preceding the relocation-interview are related with the relocation in the analysis. Thus, a time-lag of 24 months at most between event and relocation is tolerated.
6. There was a problem concerning variables indicating the city-regional location, the characteristics of infrastructural supply and residential surroundings. Unfortunately, they are only asked every five years. Even if values are imputed, the model drops a large number of observations due to missing values. Almost the same is true for the variable *distance to work*. Additionally, this variable showed a considerable collinearity with the spatial indicator *ring*. As the collinearity is theoretically consistent and the *ring* could not be excluded as it is essential for the research question, the *distance to work* was excluded. Other spatial indi-

cators like type of residential area and housing-market characteristics[5] were found to be insignificant.

4.3. Findings

After all restrictions (chapter 3) 21,758 observations were left to be included into the model. The observations are not equally distributed over the time-space categories, as the sample has been restocked several times, considerably in 2000 (DTC 2005: 24). Anyway each of the four categories contains at least 3000 observations. This seems to be sufficient for the analysis. The goodness of fit of the final model with a Pseudo R^2 (Mc Fadden) of 0.246 is satisfying (cf. HENSHER et al: 228).

Altogether, the theory-based selected variables were nearly all found to be significant and of the expected sign. Especially the legal status of being owner or tenant explains a lot of the variablity of the probability to move, but also events – especially the birth of a child – are found to be of the expected importance. The model was tested with a slightly different model-type (complementary logistic regression), with differnt definitions of core and ring and different definitions of periods. Although the findings of the alternatives were sometimes less clear, they looked basically the same.

Table 2 shows the results of several runs of the model, adding subsequently relevant blocks of variables. In the first three rows the variables which indicate the remaining unspecified spatial and temporal influence are marked in bold. The models are discussed and interpreted one after the other.

In model [I] (first column table 2) only household characteristics are included as independent variables. As the coefficients indicate to what extent a certain variable influences the probability to move (P_{MOVE}) in which direction, the model shows, that a household that lives in the ring is less probable to move than a household in the core – assuming an equal householdstructure. The variable *period* indicates that there has been an overall change of P_{MOVE}: It has become more probable to move since 1985-1993.

Model [II] includes an interaction between the temporal and spatial variable. This is necessary because the research question does not only focus on a global reflection of temporal change but on the question how different the change is in the two spatial types (chapter 2). These developments can be disentangled by interactions. Anyway, the interpretation of the interaction-coefficients is not as self-explaining as of the 'pure' coefficients (cf. NORTON et al. 2004). This is why the results will be presented by exemplary predictions of P_{MOVE}. The post-estimation is carried out for a certain 'ordinary' household. Although the level of the values

[5] For relating the observations to the type of housing-market-region a quite elaborated procedure was conducted. Nevertheless in the end the relations were not exactly correct. This inconsistency might be one reason for not finding influence.

Table 2: **Logistic regression on "move"**

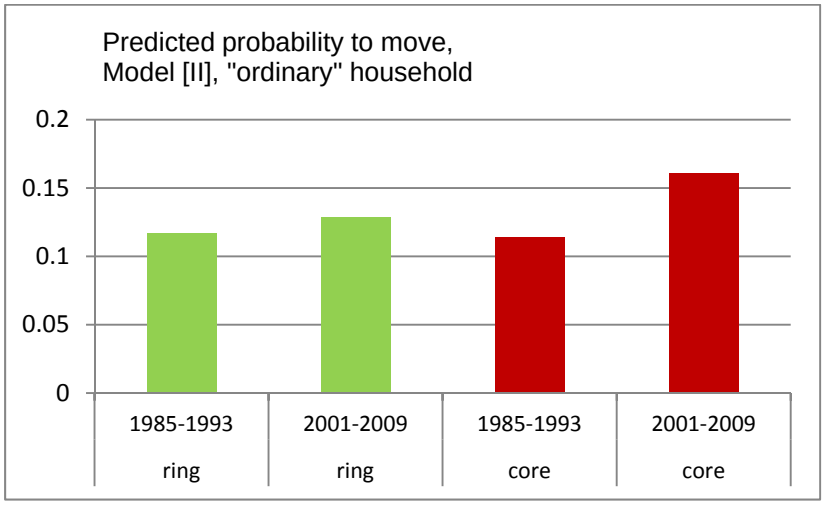
Model nb.:	I	II	III	IV	V	VI
Observations	22,287	22,287	22,286	21,758	21,758	21,758
Pseudo R-squared	0.0989	0.0994	0.129	0.244	0.246	0.246
Constant	-0.543	-0.666*	-0.447	-0.479	-0.249	-0.263
ring (1); core (0)	**-0.168*** **	***0.0318***	***0.239****	***0.300****	***0.365*****	***0.407*****
period 1985 f.(0); 2001 f. (1)	**0.234*** **	***0.402*****	***0.448*****	***0.501*****	***0.165***	***0.165***
ring X period		***-0.292****	***-0.237****	***-0.127***	***-0.212***	***-0.219***
migration background	0.244**	0.252**	0.126	0.100	0.103	0.104
eastgerman sample	0.187	0.172	0.117	0.0118	0.00216	0.00726
moved in 0-3 years ago	1.009***	1.012***	0.692***	0.634***	0.642***	0.637***
moved in 4-6 years ago	0.951***	0.954***	0.682***	0.536***	0.539***	0.533***
moved in 7-9 years ago	0.698***	0.704***	0.465***	0.381**	0.391***	0.390***
moved in 10-12 years ago	0.696***	0.702***	0.494***	0.455***	0.474***	0.468***
moved in 13-15 years ago	0.349**	0.350**	0.142	0.0246	0.0517	0.0468
moved in 15-18 years ago	0.0529	0.0499	-0.103	-0.168	-0.152	-0.150
moved in 19-102 years ago						
age (eldest hh-member)	*-0.0983****	*-0.0979****	*-0.0846****	*-0.0572****	*-0.0571****	*-0.0575****
age squared	0.000556***	0.000553***	0.000506***	0.000354**	0.000360**	0.000364**
hh-income 0-1500€	0.289**	0.283**	-0.155	-0.395***	-0.392***	-0.389***
hh-income 1501-2500€	0.202**	0.195**	-0.183*	-0.289**	-0.276**	-0.272**
hh-income 2501-3500€	0.00475	0.00405	-0.212**	-0.185*	-0.175	-0.171
hh-income 3501-* €						
1-person-hh (1), 1+ (0)	*-0.751****	*-0.749****	*-0.448***	*-0.735****	*-0.695****	*-0.685****
1-person-hhXage	*0.0192****	*0.0191****	*0.0118****	*0.0160****	*0.0153****	*0.0152****
child < 14 years (1)	-0.0918	-0.0950	-0.00628	0.168*	0.173*	0.175*
0 persons employed						
1 person employed	0.220**	0.221**	0.205**	*0.118*	*-0.0932*	*-0.0960*
1 p empl.Xperiod					*0.279*	*0.284*
2 or more p. employed	0.0947	0.0932	0.0833	*-0.0777*	*-0.475***	*-0.472***
2 or more p empl.Xperiod					*0.560***	*0.556***
owner (1); renter (0)			-1.503***	-1.283***	-1.303***	-1.301***
birth (lag)				*2.166****	*1.740****	*2.088****
birth (lag)Xring						*-0.501**
birth (lag)Xperiod					*0.679***	*0.684***
addition child lag (no birth)				2.528***	2.564***	2.525***
addition partner (lag)				2.571***	2.576***	2.577***
other addition (lag)				0.923***	0.924***	0.920***
formation begin (lag)				0.860***	0.869***	0.873***
formation end (lag)				0.842***	0.820***	0.836***
lost job or work begin (lag)				0.480**	0.486**	0.487**
change workplace (lag)				1.009***	1.015***	1.019***
death of partner (lag)				1.779***	1.752***	1.751***
partner left (lag)				1.921***	1.939***	1.940***
child left (lag)				1.378***	1.381***	1.380***
other reduction (lag)				1.518***	1.530***	1.534***
dwelling costs (rent/repaym.)				0.000230*	0.000216*	0.000219*
1 room						
2 rooms				-0.303**	-0.304**	-0.311**
3 rooms				-0.664***	-0.659***	-0.667***
4 / 5 rooms				-0.841***	-0.836***	-0.846***
6 or more rooms				-1.209***	-1.202***	-1.211***
balcony				-0.0445	-0.0552	-0.0485
basement				-0.256**	-0.252**	-0.253**
garden				-0.187**	-0.187**	-0.187**
condition building (good)				-0.576***	-0.585***	-0.587***
cond. building (partial renov.)				-0.435***	-0.446***	-0.445***
condition building (bad)						
***** p<0.01, ** p<0.05, * p<0.1**	**(0) (1)** specification of binominal variables				***italic*** involved in interaction	
core: "big cities" (BBSR) & mixed area (SOEP); **ring:** rest of BIK 7-10, without cities and central places						
Gesa Matthes, Data: SOEP, Programms: STATA, OUTREG2, PanelWhiz						

might change if certain characteristics of the household would change, the basic tendencies are in general the same – depending on the influence of the chosen characteristic on the dependent variable.

The 'ordinary' household to which the estimation-figures refer to, has the following characteristics (if not indicated differently in the figure): two or more persons, neither migration-background nor GDR-citizenship in 1989, living in respective dwelling for 4-6 years, eldest member is 32 years old, the household net income is 3000 €, there are no kids under 14 years. Regarding models IV-VI, the characteristics are completed as follows: tenant, no biographical events, dwelling costs of € 460, balcony and basement belong to dwelling, house in good condition.

Figure 1 illustrates the spatial and temporal differences without controlling any factors but household characteristics. It shows that the observed temporal increase of P_{MOVE} observed in model [I] is largely due to an increase of P_{MOVE} in the core while P_{MOVE} was equal in both spatial types in the eighties.

Figure 1: **Model II: Probability to move of the exemplary household, only sample control**
(Source: GM, based on models from table 2)



This picture changes slightly, if the variable of legal status *owner* is included (figure 2). It is true that the use of the legal status as explaining variable has to be treated carefully as it might be strongly influenced by other independent variables itself. For a first approach its treatment as normal independent variable should be sufficient. As a result of its inclusion the expected difference of P_{MOVE} between owners and tenants becomes evident (figure 2). Regarding the research question, its effects on the spatial and temporal differences are interesting: Compared to model [II] P_{MOVE} increases still more in the core than in the rings, only the increase of P_{MOVE} in the ring regarding tenants is now about half of the increase in the core. As the renting-market is less developed in German rings than in the cores, this shows that the owning-structure is an important reason of the temporal invariability of P_{MOVE} in the rings which was observed in the first model. This means model [III] shows a structural reason why there are

more moves in the core. Interestingly, in the eighties P_{MOVE} of the core was considerably lower than in the rings for tenants.

When the remaining variables concerning events and characteristics of the dwelling are included (model [IV]), the different extent of increase of P_{MOVE} in the core compared to the ring vanishes almost completely. Figure 3 shows this for households which are tenants and have none and two or more employed members. In model [IV] the same is shown by the interaction variable *ringXperiod* becoming insignificant. This means the difference in the development regarding ring and core represented by the interaction variable in model [II] and [III] are caused by the frequency of events and the characteristics of the dwelling-stock that are controlled in model [IV] (figure 3) but not in model [II].

Figure 2: **Model III: Probability to move of the exemplary household depending on legal status**
(Source: GM, based on models from table 2)

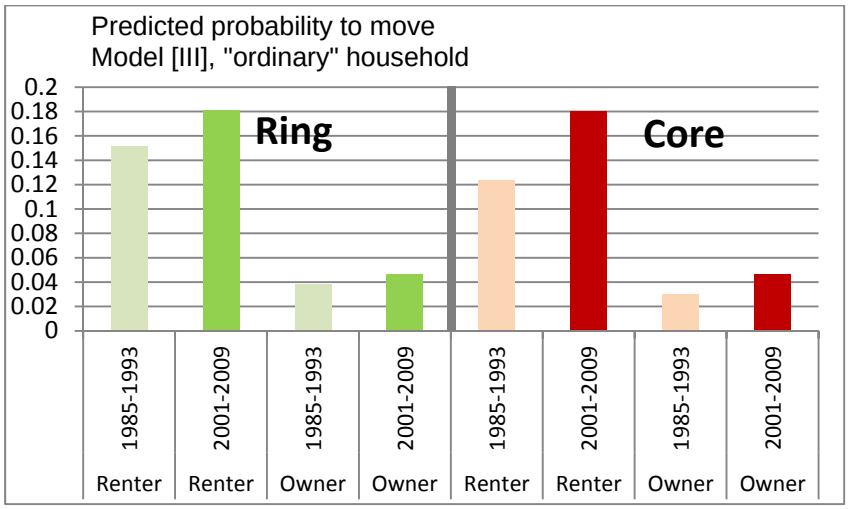
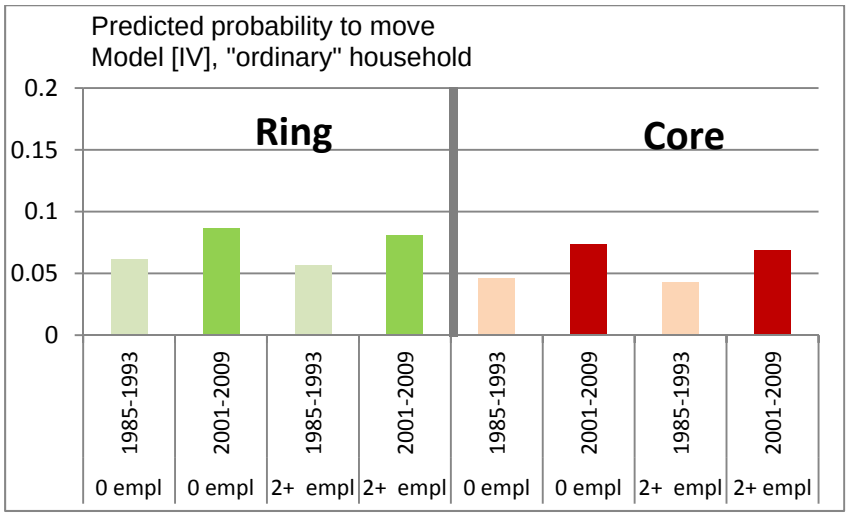


Figure 3: **Model IV: Probability to move depending on the number of employed persons in the household, control of other characteristics without interactions of characteristics**
(Source: GM, based on models from table 2)



Having included all variables in model [IV], the question of the next steps (models [V] & [VI]) is to find influences which are able to explain the spatial or temporal difference further.

Again, this is tested with interactions of the temporal or spatial variable. This procedure implies, that the three variables *ring*, *period* and *ringXperiod* represent the remaining, unexplainable differences.

Several theoretically assumed temporal and spatial interactions were checked, but only three have been found to be significant: *birthXperiod birthXring* and *x_persons_employedXperiod*. Anyway, they are important as their inclusion provokes the temporal change (*period*) becoming insignificant (cf. models [V]&[IV], table 2). Figures 4 and 5 show the effects of these interactions: The change of P_{MOVE} in time is mainly due to a rising P_{MOVE} related to the birth of a child (figure 5) and an increasing residential mobility of households with 2 or more more employed persons (figure 4). The first is even more true for the core (figure 5).

Figure 4: **Probability to move depending on the number of employed persons in the household, including the temporal interaction of employed persons and birth**
(Source: GM, based on models from table 2)

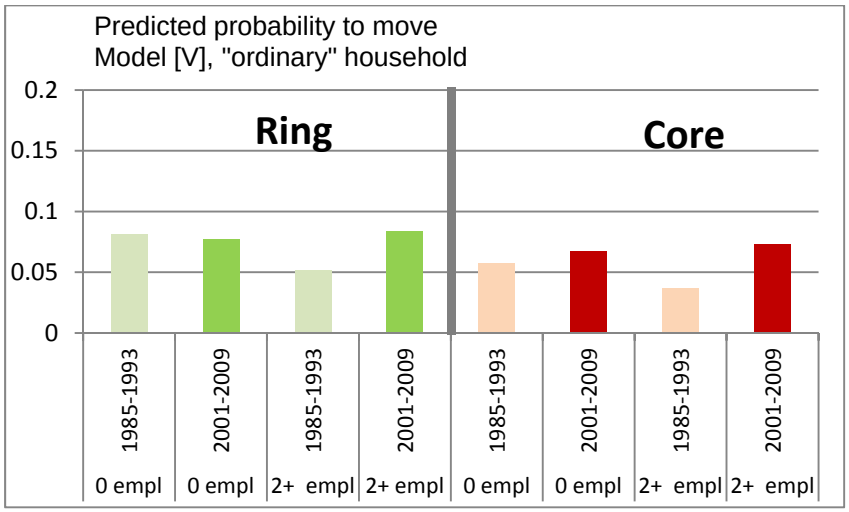
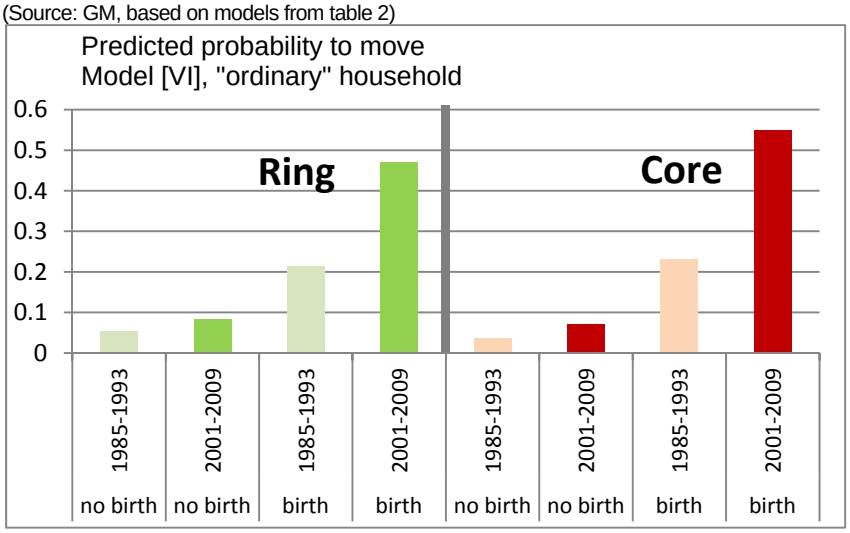


Figure 5: **Probability to move depending on the event "birth", including the spatial and temporal interaction of the respective variable**
(Source: GM, based on models from table 2)



5. CONCLUSION

What answer do these findings provide in regard to the research question? First of all, the assumed absolute or relative decrease of the probability to move in the core is not observable in any of the models run. There is no difference if observable determinants are controlled or not.

This means that, if there is a reurbanization due to stayers, other hypotheses have to be tested: Are many households living in the core because of a tendency to move less due to factors such as ‘less employed persons’ or ‘lower incomes’? Or have there been changes in the structure of the dwelling-stock: more big dwellings in better condition, more purchaseable dwellings?

Additionally, the findings lead to the thesis that the ‚pure‘ willingness to move is quite constant over time – apart from changes due the event “birth” and households with two and more employed persons. This is good news for modelers of integrated land-use and transport models, as their forecasts become easier. For the question of reurbanization this means that it is probable that stayers at the core-level (not at the dwelling-level as analysed here) will be numerous. As their staying is not due to a new ‚idleness to leave the dwelling‘, their choice can be assumed to be an active choice in favour of the city – an observation which is consistent with the observed renaissance of the cores as places to live (e.g. RAUTERBERG 2005).

For the future work there are several tasks left. First of all, the presented analysis will be elaborated. The inclusion of more interactions regarding events will be tested in order to better explain the consistent difference between ring and core. There will be another attempt to include the surrounding characteristics. Other methodical elaborations of logit models will be tested, especially to differentiate the present findings regarding socio-economic groups and other spatial types than the extremes analyzed here. The second step will then be to examine stayers at the core-city level.

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