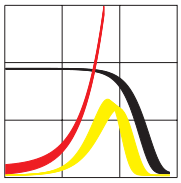

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Fertility differences by housing type: an effect of housing conditions or of selective moves?

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Abstract

This study examines fertility variation across housing types and childbearing patterns after housing changes. While the effect of family changes on housing choices has been studied in detail, little is known about childbearing patterns within various housing types, despite the fact that many studies suggest housing as an important determinant of fertility. We use longitudinal register data from Finland and apply hazard regression. Firstly, we observe a significant variation in the fertility levels across housing types – fertility is highest among couples in single-family houses and lowest among those in apartments, with the variation remaining significant even after controlling for the demographic and socio-economic characteristics of women. Secondly, our results show elevated fertility levels after couples have changed their housing, suggesting that much of the fertility variation across housing types could be attributed to selective moves. Thirdly, the study also reveals relatively a high risk of third birth for couples in single-family houses several years after the move, suggesting that living in spacious housing and in a family-friendly environment for a longer time may lead to higher fertility.

Keywords: fertility, housing, residential mobility, migration, event-history analysis, Finland

Introduction

There is a long research tradition looking at the effects of family changes on spatial mobility and housing choices in Europe and North America. Previous studies have shown that an increase in family size leads to a reduction in the desire and chances to make long-distance moves, particularly to urban destinations (Sandefur and Scott 1981; Courgeau 1989; White et al. 1995; Kulu 2005; Kulu 2007), whereas the birth of a child significantly increases couples' propensity of moving short-distances, because couples wish to adjust their dwelling size to their family size (Clark et al. 1984; Courgeau 1985; Deurloo et al. 1994; Davies Withers 1998; Clark and Huang 2003). Recent studies on the timing of moves with respect to childbearing reveal that many couples actually move when waiting for their child to be born (Mulder and Wagner 1998; Michielin and Mulder 2005; Kulu 2007), and some researchers argue that couples increasingly move in anticipation of childbearing, particularly those that move to home-ownership and to single-family houses (Feijten and Mulder 2002).

While the fact that family events are important triggers of housing transitions is not surprising, it is less clear to what extent a change of housing or housing conditions shapes the childbearing patterns of couples. The question is not new, of course, and it already challenged researchers in the 1930s when below-replacement fertility emerged in several European countries (Chesnais 1992). For example, Goodsell (1937) examined the causes of low fertility in Sweden and argued that home overcrowding might partly be responsible for low fertility in the urban areas of Sweden. Swedish architects and builders, in their zeal to re-house urban workers in modern flats, produced a standardised tenement of one room and kitchen, which might have forced couples to consider limiting their family size, particularly as more spacious, convenient and inexpensive housing remained unattainable for many couples (Goodsell 1937, 855).

Thompson (1938) suggested that rather similar conditions might exist in the U.S., arguing that the availability of adequate housing at a desired standard was an important factor in determining the number of children reared in many families:

> "There can be little doubt that housing which costs so much that a family cannot afford the space it considers proper for its position, if it has several children, will tend to discourage the rearing of more than one or two children, or, indeed, any children at all. Under present conditions, where many families must live in one or two or three rooms in order to keep their housing expenditures within bounds, it is not surprising that they feel they can afford at most only one or two children." (Thompson 1938, 363.)

Several studies can be found from a later period that examine whether and to what extent crowded living influences fertility. Felson and Solauns (1975) studied the effect of housing configurations on childbearing patterns in Bogotá, Colombia, and found that apartment living significantly reduced fertility among lower-middle-class and upper-working-class couples in a tight housing market of the city. They attributed the fertility reduction largely to psychological factors, arguing that apartments create a feeling of subjective crowding for reasons which go beyond the degree of objective density: the lack of yards, the sharing of noise and odours and the knowledge that room expansion is impossible (Felson and Solauns 1975, 1425).

A few years later, Curry and Scriven (1978) carried out a similar study among a sample of the mid-West urban population in the United States and, contrary to the study by Felson and Solauns, found that apartment living did not decrease fertility. They argued that apartment living does not lead to a lower fertility when an open housing market exists where couples can increase their living space through residential mobility. However, their study also revealed higher fertility for couples living in dwellings with more rooms (Curry and Scriven 1978, 483). Paydarfar (1995) re-examined the effect of housing type on fertility among a sample of residents of four Iranian cities. The study supported the view that, in a tight housing market, married couples living in single-family housing had significantly higher actual and desired fertility than couples living in multi-family housing units, regardless of their major socio-economic and demographic variables. Furthermore, the analysis revealed that housing type had greater effect on fertility than wife's and husband's level of education.

Recent research has also paid attention to the effects of housing tenure on childbearing, with mixed findings. Murphy and Sullivan (1985) examined

fertility in post-war Britain and found that home-owners had their first child later and their overall family size remained smaller than that of renters. They attributed the differences to the fact that couples who wished to become home-owners would often delay family formation until they had saved sufficient funds for a deposit and had a large enough income for mortgage payments. The postponement of childbearing might itself lead to lower fertility; also significant housing costs foreseen for a longer period might lead couples to consider having fewer children. Interestingly, however, the study also revealed that housing type had an effect on childbearing independent of housing tenure: couples who lived in single-family dwellings had higher fertility than those in apartments (Murphy and Sullivan 1985, 231).

Krishnan (1988) examined completed fertility of home-owners and renters for Canadian married women. He agreed that couples who wish to become home-owners might postpone childbearing, but argued that once they own a house of their own, couples might expect to increase their family size. The study supported the latter hypothesis: couples who owned a home had an average of 0.82 more children than those who lived in rented apartments (2.20 versus 1.38). Further analysis revealed that the net effect of home-ownership was 0.42 children, indicating that compositional differences explained half of the fertility differences between home-owners and tenants. Krishnan's (1995) subsequent study on parity progression ratios by housing tenure showed that, compared to renters, home-owners had higher parity progression ratios, particularly from parity two to three.

Several recent studies have examined the timing of family formation in respect to housing-related moves, particularly moves to home-ownership. In their comparative research on West Germany and Netherlands, Mulder and Wagner (2001) examined the interconnections between first childbirth and first-time home-ownership. The analysis showed an elevated risk of first birth a year after moving to owner-occupied housing. They argued that elevated fertility levels after becoming a home-owner might indicate that couples bought their homes because of an aspiration to have children (Mulder and Wagner 1998, 158). The subsequent study by Michielin and Mulder (2005) supported increasing fertility levels for the Dutch couples after short-distance moves, which the authors attributed to housing changes in anticipation of childbearing.

In her two recent essays on the interconnections between housing and population, Mulder (2006a; 2006b) seems to take a more "structuralist" view,

arguing that an elevated fertility for couples after moving to owner-occupied housing is not so strongly related to moves in order to have children, but rather that childbearing is postponed until home-ownership becomes possible since couples prefer to secure housing of a certain quality before they have children. She also establishes a link from the housing market to childbearing, suggesting that the best opportunities for having children are in countries where housing quality is high or diverse and access to housing is easy, while a high quality of housing stock in combination with difficult access to young people might offer the worst opportunities for having children (Mulder 2006b, 408–409).

This study aims to contribute to the research tradition on the effect of housing on childbearing. While the results of most previous studies are based on the analysis of cross-sectional data, we use longitudinal data, which is necessary to explore the direction of causality in the housing-fertility relationship. We examine fertility variation across housing types and study childbearing patterns after housing changes. We focus on fertility levels by housing type instead of tenure as we are particularly interested in the effects of housing conditions. We expect couples living in single-family houses to have higher fertility levels than couples in apartments. First, the differences in size, layout and location may matter. Single-family houses are generally larger than apartments. They have a garden, which is extremely important for the families with small children. They are also situated in attractive, safe and child-friendly neighbourhoods where there are many children, partly because of selective residential moves of families with small children (cf. Mulder 2006a, 283). The smaller size of apartments and their location in less family-friendly environments should thus lead to lower fertility there. Furthermore, apartments may create a feeling of "subjective crowding" even when the size is not different from the size of single-family houses (Felson and Solauns 1975).

Second, fertility among couples who have changed their housing, particularly among movers to single-family houses is expected to be higher because of selective residential moves. Previous research has shown that many couples change their housing when waiting for their child to be born (Mulder and Wagner 1998; Michielin and Mulder 2005; Kulu 2007). Furthermore, some couples may move with an intention of having a child – they decide to change their housing in order to provide better conditions for their planned child (Michielin and Mulder 2005). We may expect couples moving with an intention of having a child to be over-represented among movers to single-

family houses, particularly if couples plan to have their second or third child. We may observe higher fertility in single-family houses also because some couples postpone childbearing or a further child until an opportunity to move to single-family houses opens up (Mulder 2006a; 2006b). The major question of this study is to figure out the extent to which fertility variation across housing types results from selective residential moves, and the extent to which housing conditions play a role.

Data, method and variables

The data come from the Finnish Longitudinal Fertility Register. This is a database developed by Statistics Finland, which contains linked individual-level information from different administrative registers (for details, see Vikat 2004). The extract we used in the analysis included women's full birth and educational histories. Partnership, residential and housing histories and annually measured characteristics about women's activity and income were for the period from 1987 to 2000. The extract used is a ten-percent random sample stratified by single-year birth cohort, drawn from records of all women who had ever received a personal identification number in Finland and were in the age range 16 to 49 for at least some of the time between 1988 and 2000 (cohorts born between 1938 and 1983). We focused on the childbearing of women in union and included in the analysis all co-residential unions that were formed between 1988 and 2000. Foreign-born women (three percent) were excluded from the analysis.

We studied the impact of housing type on first, second and third birth using hazard regression (Hoem 1987; 1993; Blossfeld and Rohwer 1995). We modelled the time to conception (leading to birth) in order to measure the effect of housing conditions on childbearing decisions as precisely as possible. We distinguished between the housing categories as follows: *single-family house*, *terraced house* and *apartment*. A dwelling for one or two families was defined as *single-family house* (or 'detached house'). *Terraced house* (or 'rowhouse') was a dwelling with three or more houses in a row sharing a wall with its adjacent neighbour. *Apartments* ('flats') were housing units in a dwelling with three or more residential units where at least one unit was on top of the other. Residential episodes of couples in all other housing units (and also abroad)

were excluded as they formed a negligible share (about five percent) of all couple-years.

Table 1 presents the distribution of person-years (exposures) and events (occurrences) across various housing types. We see that the largest housing category for the first two births was apartment, followed by single-family house and terraced house. The share of person-years spent in apartments decreased when looking at the data on third birth; this shows the effect of selective migration and obviously also different fertility levels by housing type. There were 14,258 first births for 35,391 women, 12,097 second births for 23,154 women and 4,120 third births for 17,246 women in the data. The data-set for second and third birth included also women who had their first or second conception (leading to birth) in 1988 or later, but before union formation, and women who had their first or second conception (leading to birth) before 1988, but formed another union in 1988 or later.

We controlled for a set of demographic and socioeconomic variables when examining the effect of housing on childbearing. First, we included in the analysis *union duration* and a variable showing whether it was *marital union or not*. Second, we controlled for *the woman's age* and the *age of the youngest child* (if any). We also included in the analysis *calendar time*, *language* (Finnish- or Swedish-speaker) and *settlement of residence*. Finally, we controlled for *educational enrolment* and *educational level* of the woman and her *annual earnings*.

Results

Table 2 presents the models on first birth. In the first model, we only controlled for union duration and the woman's age. We see that couples who lived in terraced houses had 36% and those in single-family houses had 53% higher risk of first conception compared to couples in apartments. In the second model, we distinguished between the first residential episode of a couple (*non-movers*) and the second and subsequent episodes (*movers*), and also included in the analysis other moving-related variables. There were thus categories for non-movers and movers in various housing types, and for the movers there were additional variables showing whether this was the couple's first move or a subsequent one and whether the (last) move was over a short (*residential*) or long distance (*migration*). First, as in the previous model, couples in single-

family houses had the highest risk of first conception, while couples in apartments had the lowest risk. Second, couples who had moved had a significantly higher risk in all three housing categories. We also tested if previous housing had an effect on fertility levels for movers in various housing types, but did not find any effect.

In the third model, we controlled for the marital status, socioeconomic characteristics of women and their settlement of residence. The differences between the various groups decreased considerably, but remained significant. A closer inspection showed that much of the decrease could be attributed to the marital status: married couples were over-represented among movers and in single-family houses (and also in terraced houses). Our analysis also showed that couples in the capital city region had a lower risk of first conception than couples in other settlements. The fertility variation by housing and moving categories, however, was rather similar in the different settlements.

The models on second birth are presented in Table 3. In the first model, we controlled for age of the first child, union duration and age of the mother. We see that couples who lived in terraced houses had 18% and those in single-family houses had 34% higher risk of second conception than couples in apartments. The variation here was thus smaller than it was for the first birth. In the second model, again, we distinguished between the first residential episode of a couple and the second and subsequent episodes, and also included in the analysis other moving-related variables such as whether a couple moved after the first birth or not. We see that, firstly, couples in single-family houses had the highest risk of second conception while couples in apartments had the lowest risk, as could be expected. Secondly, couples who moved (before or after first birth) had a significantly higher risk in all three housing types. Thirdly, the couples who moved after the first birth did not show a higher risk of second conception compared to those who moved before first birth, as we might expect.

In the third model, we controlled for the marital status and socioeconomic characteristics of the women and their settlement of residence. We see that the fertility differences between couples in various housing categories only slightly decreased, and were then similar to what was observed for first birth. Again, our further analysis revealed that the variation in the second conception levels by housing and moving categories was similar in various settlements.

Finally, Table 4 presents the models on third birth. Couples in single-family houses had 34% higher risk of third conception than couples in apartments, while the risk of couples in terraced houses did not differ from that of couples in apartments. Couples who had moved together (before or after second birth) had a significantly higher risk of third birth in all three housing types, particularly when the move was over a long distance. Couples who had moved after second birth, however, did not show a higher risk of third conception compared to couples who had moved to their current housing before the birth of their second child. Again, the fertility differences between couples in various housing types and between movers and non-movers only slightly decreased after we controlled for the marital status, socioeconomic characteristics of women and their settlement of residence. Our further analysis showed that the variation in the risk of third conception by housing and moving categories was similar in various settlements, but the risk levels were significantly higher in rural areas.

The analysis thus showed that the risk of conception (leading to birth) significantly varied across housing types, even after we controlled for the demographic and socioeconomic characteristics of the women. It also revealed that the risk was high when couples had changed their housing compared to when they lived in their first shared housing. Can we conclude from the analysis that moving to new housing, particularly to a single-family house, increased fertility levels? The answer is: probably not or probably not yet – we should address the issue of selective residential moves by looking at the timing of childbearing after the change of housing.

There are several possible shapes for the conception risk after the move suggesting different directions of causality in the housing-fertility relationship. Firstly, we may observe elevated conception levels right after the move and decreasing risk levels thereafter. This pattern would suggest that many moves were made by couples with an intention of having a child – the couples who moved are mainly those who planned to have a child soon. Secondly, we may observe gradually increasing fertility levels over time, rather than an elevated fertility right after the move. This pattern would suggest that a new (and better) housing led to increasing fertility – there was thus a real effect of the housing conditions. Thirdly, we may simultaneously observe an elevated fertility immediately after the move and gradually increasing fertility levels later, suggesting a mixture of the two effects.

Figure 1a presents the results on first conception (leading to birth). We see that, firstly, the risk of first conception increased significantly during the first three months after moving regardless of housing at destination. In the following months, the risk further increased and reached its peak about a year after the move and only then began to decrease, gradually. Secondly, couples in single-family houses had the highest risk over the entire duration, while couples in apartments had the lowest. What do these patterns tell us? Clearly, that there was a desire to have a child and that the move to new housing, particularly to a single-family home, was made to fulfil this desire. Moving with an intention of having a child, rather than housing conditions *per se* were thus responsible for higher fertility levels for movers, particularly in single-family houses. Other interpretations of the patterns would be that the desire to have a child was realised only when an opportunity to have a better (or proper) housing opened up, or that childbearing was postponed until these housing opportunities opened up. This would suggest an effect due to the availability of proper housing.

The patterns of second conception were not very different. Again, the risk of conception significantly increased during the first months after moving to new housing, although only couples in single-family houses also showed a relatively high fertility during the second part of the first year (Figure 1b). Couples who moved after the birth of their first child with an intention of having another child were responsible for elevated fertility levels after moving to new housing. The couples thus moved with the aim to adjust their dwelling size to their family size, partly in anticipation of a further increase in the size of their family.

Figure 1c presents the patterns of third conception. The risk of conception increased during the first months after the move, and the increase was particularly large for couples who had moved to single-family houses. Thereafter the risk decreased significantly and became stable about a year after the move. Again, the differences between the movers in various housing types were significant over the entire duration. At first there seems to be not much new compared to what was already observed and interpreted previously. Firstly, elevated fertility levels were related to the couples who moved after the birth of their second child with an intention of having another child. Secondly, couples with intentions of having a third child were obviously more likely to move to single-family houses.

However, we see that couples in single-family houses still had relatively high fertility two, three and four years after the move to new housing. Couples who had moved to the current housing before their second or first child had been born were over-represented here, because they could not contribute to very short durations in our hazard model; while many (or at least a significant part of those) who had moved after second birth, in turn, had the third conception right after the move and had thus left the risk population. There were thus two subpopulations acting differently in respect to childbearing. A high fertility of couples in single family houses seems to suggest that some couples who had a desire to live in single-family housing (many couples had this) and who could fulfil this desire then decided to have another (or third) child after they had lived for some time in the new spacious housing and family-friendly environment with many families in the neighbourhood.

Conclusions and discussion

In this study, we examined fertility variation across housing types and childbearing patterns after housing changes. As opposed to previous studies we used longitudinal data, which allowed a detailed examination of the direction of causality in the housing fertility relationships. Firstly, we observed a significant variation in the fertility levels across housing types – fertility was the highest among couples in single-family houses and the lowest among those in apartments. The fertility variation decreased, but remained significant, after we controlled for demographic and socio-economic characteristics of women. Secondly, our analysis showed elevated fertility levels after couples had changed their housing, suggesting that much of the fertility variation we observed across housing types could be attributed to selective moves. Thirdly, the study also revealed relatively high risks of third birth for couples in single-family houses several years after the move to new housing, suggesting that living in spacious housing and in a family-friendly environment for a longer time might lead some couples to consider having a third child.

Our study thus showed that much of the initial fertility variation across housing types could be attributed to selective moves, although housing conditions might also play a role, particularly for the transition from second to third child. Several issues still remain and need further discussion. Firstly, the study showed that fertility levels varied by housing type even for couples who

had not changed their housing, although the variation here was smaller than for couples who had moved. At first we might interpret this as evidence supporting the view that housing conditions indeed shaped childbearing patterns. However, it is likely that the higher fertility levels for the first births for non-movers in single-family and terraced houses can also be attributed to selective moves: women whose union was formed as a clear step to family formation were more likely to start their co-residence in single-family or terraced houses, whereas women who did not have any childbearing plans were more likely to move into apartments with their partner.

Secondly, the higher risk of third birth for couples in single-family houses might also result from characteristics of couples rather than from housing conditions. We controlled for wife's educational level and income in the analysis, but did not include husband's education or income, which might explain higher third birth risks for couples in single-family houses. Nonetheless, we believe that the patterns would not change much, since the effect of husband's education and income on fertility was partly captured by wife's education and income. Also, the inclusion of woman's education and income in the models explained some fertility variation across housing types, but not as much as one might have expected had the effect of income been decisive in explaining the fertility variation by housing type. Furthermore, other unobserved factors might be responsible for the high risk of third birth for couples in single-family houses. For example, couples who were likely to have three children might simply move to single-family houses at some stage in their life because of their desires, indicating an unobserved selection of family-oriented couples into single family houses.

Further research should explicitly examine the extent partner's characteristics can explain fertility variation across housing types and also test whether family-oriented couples were over-represented in single-family houses by simultaneously modelling fertility and housing choices of couples. If it turns out that the characteristics of couples does not explain the relatively high third birth levels in single-family houses, then we should proceed to examine the essence of the housing effect in more detail – whether high third birth risks in single-family houses could be attributed to socio-spatial environment (e.g. suburban context for the cities and towns) or whether the housing characteristics do indeed play a decisive role?

Comparative studies, no doubt, would provide further insights into the interplay between housing and fertility. This study was carried out in a Northern European country where various housing options exist for young couples, and access to single-family houses is relatively easy because of the wide availability of mortgages (Mulder 2006a). The context explains our interpretation that elevated fertility levels after couples had changed their housing largely related to the moves made by couples with an intention of having a child. Obviously, similar elevated fertility patterns exist also in other European countries (cf. Michielin and Mulder 2005; Kulu 2007). The mechanism behind the patterns, however, may be different if housing options are very limited – couples may delay their childbearing (or wait before having another child) until proper housing becomes attainable, rather than simply move to proper housing when they decide to have a child. Whether there is more "choice" or rather more "structure" in the agency-structure interplay may thus depend on the prevailing housing regime in a country.

This study supported the view that the relationships between housing and childbearing are complex and that the direction of causality is not easy to clarify. Using longitudinal register data from Finland we showed that fertility levels significantly varied across housing types, but a part of this variation could be attributed to selective moves.

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Table 1. Person-years and births by housing type.

	Person-years		Births	
	Number	Percent	Number	Percent
First birth				
Single-family house	17695.15	18	3328	23
Terraced house	16973.11	17	2956	21
Apartment	63273.29	65	7974	56
Total	97941.56	100	14258	100
Second birth				
Single-family house	15497.59	31	4149	34
Terraced house	10860.39	22	2866	24
Apartment	23941.04	48	5082	42
Total	50299.02	100	12097	100
Third birth				
Single-family house	23106.45	46	2064	50
Terraced house	10308.85	20	812	20
Apartment	17270.40	34	1244	30
Total	50685.70	100	4120	100

Table 2. Relative risks of conception leading to first birth.

	Model 1		Model 2		Model 3	
Current housing						
Single-family house	1.53	***				
Terraced house	1.36	***				
Apartment	1					
Non-movers in single-family house			1.57	***	1.25	***
Movers in single-family house			1.83	***	1.46	***
Non-movers in terraced house			1.36	***	1.20	***
Movers in terraced house			1.66	***	1.34	***
Non-movers in apartment			1		1	
Movers in apartment			1.29	***	1.17	***
Type of last move						
Residential move			1		1	
Migration			0.97		0.91	*
Number of moves						
One move			1		1	
Two or more moves			1.09	**	1.05	

Significance: '*'=5%; '**'=1%; '***'=0.1%.

Models 1 and 2: controlled for union duration and the woman's age.
Model 3: additionally controlled for marital status, calendar time, language, settlement of residence, educational level and enrolment, and earnings.

Table 3. Relative risks of conception leading to second birth.

	Model 1		Model 2		Model 3	
Current housing						
Single-family house	1.34	***				
Terraced house	1.18	***				
Apartment	1					
Non-movers in single-family house			1.34	***	1.24	***
Movers in single-family house			1.53	***	1.43	***
Non-movers in terraced house			1.18	***	1.11	**
Movers in terraced house			1.32	***	1.24	***
Non-movers in apartment			1		1	
Movers in apartment			1.14	***	1.12	**
Type of last move						
Residential move			1		1	
Migration			1.07		1.03	
Number of moves						
One move			1		1	
Two or more moves			1.02		1.01	
Moves after first birth						
No moves			1		1	
One or more moves			1.02		1.03	

Significance: '*'=5%; '**'=1%; '***'=0.1%.

Models 1 and 2: controlled for union duration, the woman's age and the age of the first child.
Model 3: additionally controlled for marital status, calendar time, language, settlement of residence, educational level and enrolment, and earnings.

Table 4. Relative risks of conception leading to third birth.

	Model 1		Model 2		Model 3	
Current housing						
Single-family house	1.34	***				
Terraced house	1.06					
Apartment	1					
Non-movers in single-family house			1.27	***	1.14	*
Movers in single-family house			1.60	***	1.48	***
Non-movers in terraced house			0.96		0.91	
Movers in terraced house			1.26	**	1.20	*
Non-movers in apartment			1		1	
Movers in apartment			1.13		1.13	
Type of last move						
Residential move			1		1	
Migration			1.21	***	1.14	*
Number of moves						
One move			1		1	
Two or more moves			1.05		1.05	
Moves after second birth						
No moves			1		1	
One or more moves			1.05		1.06	

Significance: '*'=5%; '**'=1%; '***'=0.1%.

Models 1 and 2: controlled for union duration, the woman's age and the age of the second child.
Model 3: additionally controlled for marital status, calendar time, language, settlement of residence, educational level and enrolment, and earnings.

Figure 1a. Relative risks of conception leading to first birth (Model 4).

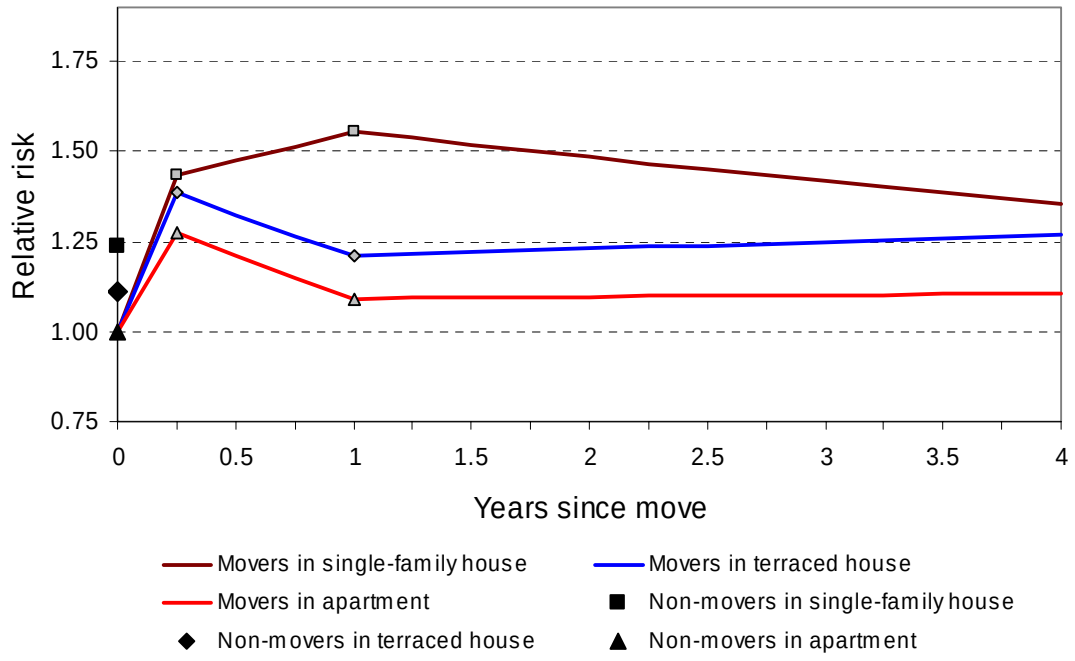

Figure 1b. Relative risks of conception leading to second birth (Model 4).

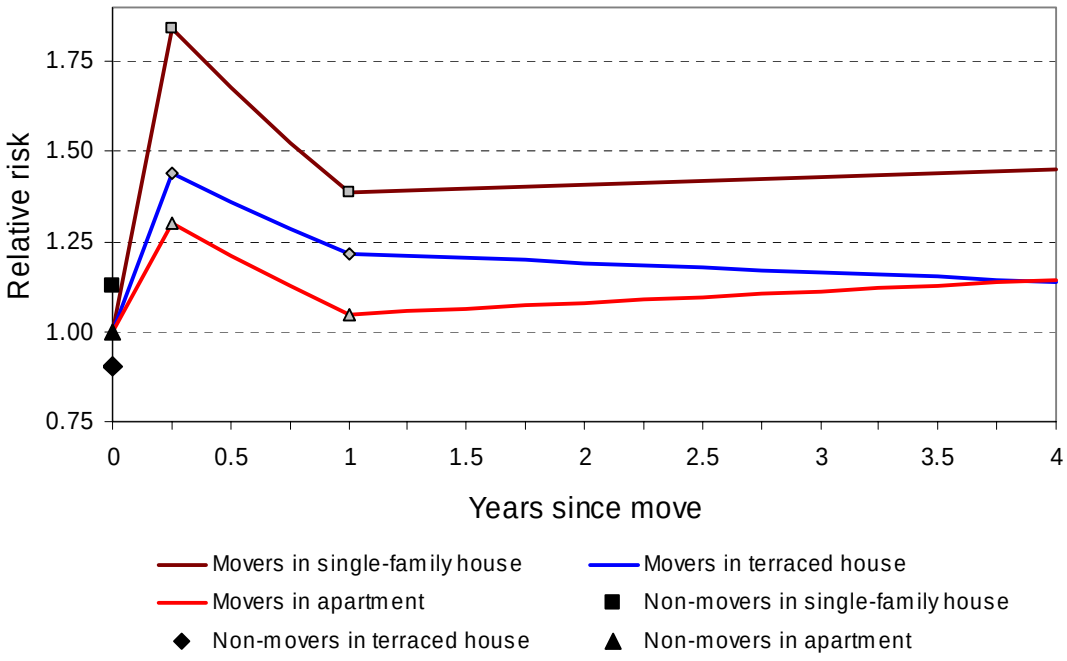

Figure 1c. Relative risks of conception leading to third birth (Model 4).