Income, housing and the arrival of the first child

Adjustment by households in The Netherlands

Master Thesis

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1 Introduction

1.1 Outline

Studies into the process of family formation have provided a wealth of knowledge regarding the factors associated with tempo and quantum of fertility at the micro or household level. The topic has been subject to multidisciplinary study. Using Becker's New Home Economics as a starting point, economists have studied decision making processes within the household. This has shed light on the constraints facing the household, in trying to realize its desired number of children. Through the years the focus has shifted from this 'completed family' approach to models and theories that describe the respective decisions on first and higher order parity children, recognizing the varying factors associated with those phases in family formation.

Demographers have noted the gradual tendency to postpone the first child in various societies. This trend is part of what is referred to as the Second Demographic Transition, and is the result of emancipation and individualisation among women. Increasing levels of education, increased labour market participation by women, widespread use of contraceptives and changing norms serve to explain the substantial diversity in paths taken during family formation. Researchers' attention has thus shifted to the interrelations between these various components of the individual life course.

Recently, a number of studies have addressed a number of issues with respect to family formation itself and its situation in the life course in The Netherlands. More specific, the Social and Cultural Planningbureau (SCP), Statistics Netherlands and the Gezinsraad have identified the so-called 'gezinsdal' (family low) with which these institutions refer to the drop-off in financial welfare families with (young) children seem to experience (SCP (2003)). Young parents are faced with a multitude of claims on a limited amount of time. Frequently, they allocate time between taking care of children, elderly family, labour supply, and other activities. On the other hand, the households' costs increase with the arrival of children, resulting in an unfavourable ratio between income and expenditure. Compared to childless families, households with children have been up to 30% worse off[1] in the last decade.

Policy makers have recognized the strains put on young families and are devising arrangements to alleviate some of them. An example of such an arrangement is what is referred to as the 'Levensloopregeling' which enables individuals to shift income across time, in order to be able to take time off, among others during the childbearing ages. As the arrangement has only come into effect per January 2006, it remains to be seen whether it will be effective in achieving that. Some have already

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[1] Own computations, using Statistics Netherlands income data

pointed out that young households simply do not have enough time to accumulate the savings needed to take some time off.

Households make the transition to single family homes around the time of union formation and the birth of the first child. Apart from the apparent relation with these demographic events, housing consumption is another claim on limited resources in this stage in the life cycle. Next to asset accumulation home ownership is thought beneficial on a societal level as well, leading to increased participation in communities. Meanwhile, the housing market in The Netherlands is known to be stressed: supply does not meet demands, both in terms of quantity, as well as quality. As a result , housing prices have soared in the nineties, but at the same time so has ownership among especially younger cohorts.

In this study we take a closer look at the financial situation of households at the time of birth of the first child. The research question is: what is the effect of first birth on income and housing arrangements of households in The Netherlands? Our objective is to establish how parents facilitate the arrival of children. What impact has the arrival of the first child on both the short term as well as the longer term financial situation of the household, as compared to similar childless households from the same cohorts? How does household income develop in child raising households? How do these households evaluate their own financial position, during those years? What is the relationship between child bearing and housing tenure? Do unfavourable developments in the household's financial situation, if any, affect access to the housing market? How do intermediating factors such as employment status and education level affect the opportunities and constraints the household is facing?

We start our study with the introduction of a simple conceptual model in section 1.2. We introduce a number of determinants of fertility, and their relative position in the framework found in recent contributions in the literature in chapter 2. Knowledge of determinants of fertility may shed light on response patterns after the first child has been born. In chapters 3 and 4 we turn to a more in depth discussion of recent results regarding the relationship between income, work and housing, and the arrival of the first child. Secondly, we aim to identify the household attributes that will help us explain the effects of the first birth on household income and housing. In chapter 5 we discuss a number of methodological issues as well as our dataset[2]. In chapter 6 we present a quantitative analysis of Dutch household behaviour surrounding the first birth. Chapter 7 summarizes and concludes.

1.2 Conceptual model

Central to recent contributions are the observed interrelations between fertility and a number of its determinants. The endogeneity issues that arise from this have lead authors to adopt a variety of

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[2] DNB Household Survey, waves 1993 – 2005.

theoretical, and statistical, perspectives to the topic at hand. A well known example is female employment, generally thought to lead to postponement of the first child. Conversely, the arrival of children in itself serves to lower employment rates among especially lower educated women (see for example Kalwij (2000)). Employment in itself is related to a number of factors, such as macro economic development, schooling and wages. We will turn to these approaches later, first we introduce a simple conceptual model that serves to link these varying approaches in a coherent framework.

The conceptual model is presented in figure 1.1 below. Fertility outcomes, in the context of this study defined to be solely the birth of the first child, are influenced by a set of determinants, both at the macro / societal level as well as the micro, household or individual level. Between these two levels, various intermediating or meso level factors may be present, these factors are deemed beyond the scope of this study. We refer to Banerjee (2006) for a discussion of a number of these factors. We define macro level determinants to be those factors that are not under the direct control of the members of the household, ranging from governmental support arrangements to regional employment rates. Micro level determinants are either the result of earlier (individual) decisions, or are subject to change by the individuals in the household in the present or the foreseeable future. These definitions do not prevent grey areas. Values and norms serve as an example: it could be argued these are based on societal level value systems, but at the same time it is the individual level at which these values become apparent through attitudes and behaviours. As the distinction between macro and micro only serves to illustrate matters, we will not elaborate on overlap issues here, but address them as they arise. We introduce those determinants of fertility that are relevant in the context of this study in chapter 2.

	Fertility outcomes	>	Facilitating behaviour by parents			
			Income		Housing	
Macro level or societal determinants	Section 2.1		Chapter 3		Chapter 4	
Micro or household level determinants	Section 2.2		Chapter 3		Chapter 4	

Figure 1.1: Conceptual model

The birth of the first child in itself leads to facilitating behaviour by the parents. We define this to be all actions taken by the parents, timed sufficiently close to the birth, aimed at facilitating the care of the child. These actions may for example include the purchase of professional child care, reduction in hours worked by one or both parents, provision of a sufficient amount of income or the arrangement of suitable housing. Although we understand the relationship between fertility outcomes and facilitating behaviour to be a causal one, this relationship need not necessarily be chronological in time (see for example Henretta (1987)). We assume anticipative behaviour, in the sense that couples are sufficiently

forward looking to make arrangements ahead of time. Especially in the case of housing, it is not often easy to find a suitable dwelling, parents may anticipate and move into a single family home if and when one comes available (Feijten et al (2002)). In the literature, 'sufficiently close' is often operationalised as one or two years prior to or after the birth of the child (cf Hartog (1986)) or more (three years, Feijten et al (2002)), we will return to this specific issue in chapter 5.

In chapter 3 we will study more closely the effects of first birth on household income, before turning to housing in chapter 4. Central to the model above is the thought that, especially in the Dutch context of wide availability of contraceptives, the arrival of the first child is in effect a scheduled event in the lives of young parents. Households, or women in particular, are assumed to form some predefined strategy involving decisions on timing and number of children, on continued labour market participation and on other important domains in life. However, fertility outcomes are still uncertain, both in the most direct sense, i.e. timing and quantum, but in a broader sense as well: i.e. incorporation in the life course. Conceptually, this setup aims to solve the endogeneity issues discussed above by assuming a two stage decision process: parents aim to time fertility, and once first birth, or first conception, has occurred, they adjust their plans accordingly.

2 Determinants of fertility in The Netherlands

In this chapter we discuss earlier literature with respect to fertility and its relation with a variety of other domains of life. Before turning to our main focus for this chapter, micro level determinants, in section 2.2, we briefly touch upon macro level factors in section 2.1. Section 2.3 contains a short discussion of our findings.

2.1 Macro level or societal factors

Macro level factors serve to stimulate as well as restrict fertility. An illustration is provided by Van Peer (2002) who notes that "… raising children in some countries is more compatible with a 'modern' life style than in others" (translation; ibid, p. 114), aiming at the apparent differences between various European countries in terms of the economic position of women. Van Peer mentions governmental support for mothers as a possible explanation of these differences. Especially in southern European countries such Spain and Italy, women in part time jobs appear to be in a weak position. This leads to an apparent paradox: countries with higher fertility rates (for example Sweden) exhibit higher female labour participation rates, whereas on the micro level, employment serves to reduce the probability of bearing a child as we will see.

Uncertainty as well as opportunities manifest at the household level in a great variety of ways. Job insecurity in a given region may lead to either risk avoiding behaviour by individuals (i.e. postponement) aiming to hang to their current job, or induce migration. Household or individual fertility behaviour that is deemed incompatible with generally upheld values may lead to conflicts or sanctioning. Governments may aim to influence the fertility related household decision process by providing financial support, affordable professional child care or forms of legal protection to young parents. Real estate price levels in some regions may lead to postponement of purchase of suitable family homes by households. De Bruijn (1999) discusses in detail the cognitive processes at the individual level that are associated with dealing with these contextual factors.

2.2 Micro or household level factors

In this section we will give an overview of micro level determinants of fertility. Factors associated with labour market and household formation behaviour will be discussed in sections 2.2.1 and 2.2.2 respectively. In section 2.2.3 we touch upon a number of other factors.

2.2.1 The labour market

In micro economic theory, the individual labour supply decision is often modelled as a trade off between consumption and leisure time, or equivalently, home production. An individual is assumed to have private information on her earning capacity, i.e. her own productivity which should earn her a certain wage rate W*. This wage rate W* is referred to as the reservation wage, or shadow wage, and must be attained for this individual on the labour market to induce her to supply hours. If this wage

rate is not met, she will supply zero hours of labour. This is referred to as a corner solution and is deemed sub-optimal. Earning capacity is positively related to education and work experience, but the reservation wage also depends positively on the market price for child care.

Similar to earning capacity, an individual has private information on the value per hour of her home production. Lacking a market price for home production, an individual may collect price information on products such as professional child care and compare that to her own shadow price of home production.

Our individual now faces a number of options: does she allocate hours to home production of child care, and if so, how many? Or does she allocate time to the labour market and consequently has to purchase child care on the market? From our simple model, it follows that the higher the earning capacity W* of a woman, the higher the probability that her wage rate is sufficient to both substitute home production with professional child care, as well as financing other consumption. Hence, female labour supply depends positively on education and previous working experience and depends negatively on the price of child care.

Usually, a partner is present as well. His income serves to relax the constraints facing our individual. She is now able to reach higher levels of consumption at any level of home production (income effect). When his wage rate increases, the partner may decide to allocate time away from the labour market as well and spend time in home production (income effect) or conversely, spend more time on the labour market (substitution effect). Similar to females, male input to childcare involves opportunity costs, equal to his hourly wage rate. The woman is faced with a new set of constraints and adjusts her labour supply accordingly. The exact effects on female labour supply depend on the net effect of male income and substitution effects, which may even cancel out.

We must now make one extra step and link these concepts to fertility. A sufficiently forward looking individual will take expected future earnings trajectories into account, as well as current household income. She will want to make sure the care for the child can be sustained financially, including possible reallocation of time away from the labour market. A woman may wish to continue working until her earning capacity has reached a certain point (through the increase in working experience) beyond which a possible set back or stagnation because of time away from work has limited effects on her future earnings trajectory. Through this mechanism, a high market wage leads to postponement of fertility. Conversely, both her own wage rate as well as that of her husband generates income effects that serve to facilitate the extra expenditure needed to raise children. It would seem then that the various ways in which components of household income enter in our model leads to different effects on fertility, the net effect of which is difficult to predict beforehand, both in terms of timing as well as completed fertility. In the context of this model, education as well as working experience serve to

postpone fertility through their effect on earning capacity and the probability to be employed. The effect on completed fertility is not clear.

There is a substantial body of literature available that aims to asses the effects of one or more of the factors mentioned above on both the timing as well as quantity of children. Most authors recognize that fertility and labour supply may very well be the result of a single, predetermined strategy by the household, and are thus simultaneously dependent on a number of background variables. Bloemen et al (2001) as well as Blau et al (1989) decide to incorporate this thought into their methodology by using a multistate framework with both employment and fertility states part of the outcome space. States or spells are defined by both employment as well as the woman's parity. Kalwij (2000) elects a hurdle count data model, which amounts to a two-stage approach: the first being the decisions with respect to the first child and employment (the 'hurdle') and the second stage pertaining to the period afterwards, modelling fertility conditional on employment.

Evidence on the effects of some of the factors mentioned earlier appears to be mixed however. Using data from the Stichting Sociale Culturele Wetenschappen, from 1992, with retrospective data on both the women's fertility career as well as their labour market career, Bloemen et al (2001) estimate a competing risks model, with parity specific transition probabilities. They note that the most frequent pathway in their data is for working[3] women to have their first birth, then stop working to give birth to an additional child. The state 'not working – parity 2' is the most frequently right censored state. Their multivariate analysis shows that years of schooling increases a woman's probability to find work if currently unemployed, but the authors also point to an indirect effect of education: the slightly negative effect on fertility through higher opportunity costs is a positive effect on labour supply in its own right. They find that women's education has no significant direct effect on fertility however. The level of education of the partner has a negative effect on the transition to parity 1 for all women, employed or unemployed, which is an interesting result given the fact that income was not included in the model. We expect education to act as a proxy and enter positively (i.e. capture the income effect). On the other hand, this result could reflect the netting out between income and substitution effects: higher educated families postpone fertility in order to maximize earning capacity. Simulation shows that extra years of education have no effect on completed fertility although it does reduce fertility rates for women at younger ages slightly. Apparently highly educated women catch up later on. After the birth of the first child, women were not likely to return to employment.

Blau et al (1989), using 1980's data from the Opportunity Pilot Project, do include wages in their model: the woman's wage rate as well as that of her husband, next to non-labour household income are present. Non wage household income enters positively for transitions into parity 1 as well as

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[3] 'Working' is meant to include part time work and maternity leave, next to full time work.

transitions into unemployment for working women. This could be expected as this measure captures child benefits, among others. Female wage rates surprisingly do not have any effect on the transition into parity 1 for working women, whereas they enter highly significant for all other transitions. Conversely, the husband's wage rate is predominantly insignificant, except for a negative effect on the transition into parity 1 for unemployed women. This result confirms the results by Bloemen et al (2001) reported above. Education is entered as well, and again serves merely to increase the likelihood of working for unemployed women. Blau et al (1989) aim to assess the effects on labour supply as well as fertility of the costs of professional child care: they find negative effects on both employment as well as fertility for unemployed women, this is in line with our expectations.

In contrast to the studies discussed above, Burgess et al (1998), in a large study on poverty dynamics, find negative effects on fertility from a high female wage rate, as well as positive effects from the male wage rate for married couples. Groot et al (1992) find negative effects on transition rates into parity 1 for both male as well as female wage rates using the Dutch OSA data, 1980 – 1985. They include income in levels as well, which enters positively.

In general the literature provides us with mixed results with respect to education, income and their effects on fertility. This is not unexpected, but requires careful further analysis. Differences could for example reflect period effects, or result from differences in specification and measurement.

2.2.2 Household formation

Life course research has revealed a number of interesting trends regarding household formation in the Netherlands. Mulder et al (2001) among others note that both marriage as well as the first child have been postponed by Dutch households. Also, marriage has lost its significance as a form of first union for couples in The Netherlands. Another important trend appears to be that home ownership occurs much earlier in the life course for younger cohorts: older cohorts usually went into ownership after the birth of the first child whereas for the younger cohorts both events more or less coincide.

Unions, home ownership and fertility are linked through what can best be referred to as relationship commitment, as well as both demographic and economic factors operating on micro and macro levels. The level of investment required in a new home, as well as the quality of family life in which many aspire to bring up their children require a certain baseline of stability in the relationship between husband and wife, next to variables of a more economic nature, such as a stable income. As figure 2.1 below reveals, young men and women do not move into couples straight out of the parental home to same extent as they used to. On the face of it, this trend appears to contrast with the earlier moves into ownership as noted above. Economic factors could be at play here.
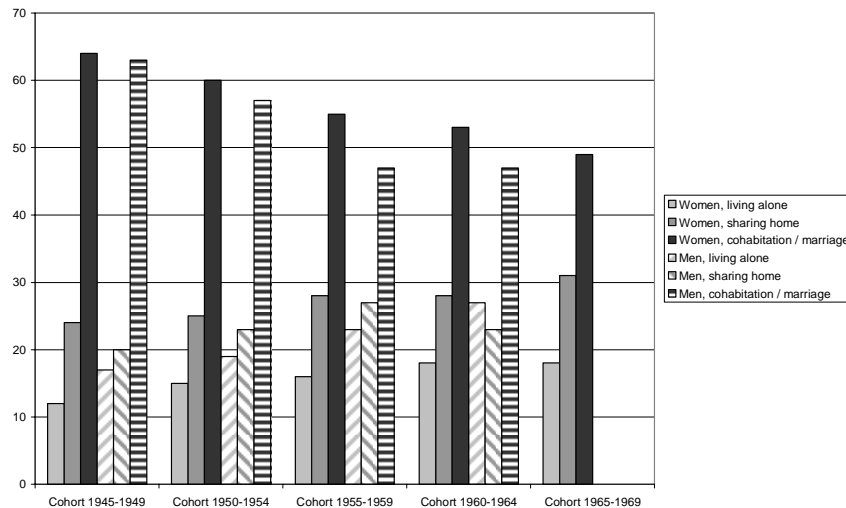
Figure 2.1: Leaving the parental home, time trends, destinations.
Data: Statistics Netherlands; Cohort 1965-1969 (males) excluded: incomplete cohort history through right censoring

The evidence on housing as a determinant of fertility is limited however: households may postpone fertility in order to become owners first, anticipating the increased costs of living once one or more children have arrived (Myers (1999); Henretta (1987)), but only to some extent. Mulder et al (2001) argue that the formation of partnerships and even more so giving birth can only be postponed to a limited degree, whereas this does not hold for owner occupied housing: there is an alternative in the form of rented single family dwellings. Acquiring a house in itself does not prompt the wish for children, although it could be argued that this does not hold for marriage, for legal reasons.

Running a multivariate model on Dutch[4] data Mulder et al (2001) find no effect on fertility from recent transitions into owner-occupied housing, controlling for a number of demographic and economic variables. They do however find a positive effect from longer term owned-occupied housing on fertility, which could be interpreted as, at least in part, picking up on the 'stability' factor discussed above[5]. Next to this, the parameter could be picking up an income effect, as the model did not control for that. From the trends discussed earlier, and the multivariate analysis, Mulder et al (2001) conclude that in the Dutch context, if possible, the transition into owner-occupied housing is made before first birth. Dutch couples remain without child relatively long, and the Dutch tax system favours home ownership, which both serve to explain these patters.

Next to considerations of demographic nature, home ownership is considered from an investment point of view by households, mainly associated with both the micro household financial situation as well as the macro economic context. The timing of home ownership relative to the timing of fertility in

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[4] ESR (1992); Netherlands Family Survey (1995).
[5] The data used in this particular analysis consisted of (married) couples in their first union alone. Mulder et al (2001) point out that given the financial demands involved, home ownership is rare among singles. The reference category was 'not owning'.

particular could convey information on the objective (i.e. consumption or investment) to purchase within the household. Occupancy of rented single family homes, could be associated with economic considerations as well, for example the employment career of one or more household members.

2.2.3 Other determinants: preferences and expectations

In the above, we implicitly assumed the wish for one or more children was present in the household. Clearly preferences are the subject of influence by the household's surroundings. They may serve to influence the desired combination between work and children beyond the effect of relative prices of consumption and leisure time. Preferences are inherently difficult to measure. Traditionally researchers include 'religion' as an explanatory term, but a number of recent contributions (for example Bloemen et al (2001)) did however include individual effects in their models to pick up any unobserved effects at this level. Results seem to indicate that these effects are very important, affecting both timing and number of children, as opposed to education. A shift in preferences may lead to changes in completed fertility, shifts that manifest in the behaviour of especially the younger cohorts. Identification of these shifts thus places strict demands on the type of data: ideally panel data are used to separately identify period (drops in the period total fertility rate as a result of postponement) and cohort (drops in the cohort total fertility as a result of a shift in preferences of work over children) effects.

Das et al (1999) report that households are risk-averse and pessimistic with respect to their expectations for the future. Pessimism is negatively related to income and is positively related to earlier adverse circumstances in the life course. Conversely, positive events serve to increase optimism. They go on to note that "…future expectations play a central role. Decisions on consumption, savings, portfolio choice, labour supply, etc., not only depend on current variables, but also on the subjective distribution of future income, prices, etc." This line of reasoning may serve to explain postponement above the reasons mentioned in section 2.2.1: women with optimistic expectations with respect to their own income trajectory may chose to postpone birth in order to first achieve that expected increase.

2.3 Summary and discussion

In this chapter we have discussed a variety of determinants of fertility in The Netherlands. In line with the scope of this study, we have focussed on micro or household level determinants.

From the literature as well as the framework we sketched out in section 2.2.1 it emerges that there exist complex interrelations between a number of demographic events and labour market related characteristics of both the female and her partner. A woman's education level and previous working experience serve to increase the probability she is, and remains employed before and after the arrival of children. Key factors in her decision making process are her earning capacity, the availability of

affordable alternatives with respect to child care and the income of her partner. Women are assumed to adjust both timing as well as quantum of fertility in the light of these economic factors. Researchers have generally opted to specifically model the simultaneity in this decision making process, for example using hurdle models.

Education has an indirect negative effect on fertility through the increased probability of being employed, next to the direct effect of postponement. Highly educated women do appear to catch up: there is no significant effect of education on completed fertility. Bloemen et al (2001) report a negative effect of male education on the transition into parity one. Income appears to have mixed effects on fertility. Blau et al (1989) report no effect from female wages on the transition to parity one, whereas wages enter significantly for other fertility and labour market transitions in their model. Conversely the husband's income enters negatively and significant for the transition to parity one, but for unemployed women. Burgress (1998) finds a negative effect of female wages and a positive effect of male wages.

Housing events are close to first birth in terms of timing in the life course, as well as union formation. Literature however does not provide compelling arguments as to why housing per se should have an effect on fertility. There is an aspect of facilitation of fertility, and other life events, but this implies a reverse causality: i.e. life events causing housing events. Mulder et al (2001) do find a positive effect from longer term owner occupied housing, but this thought to either pick up a 'stability' factor in the relationship of both partners or an income effect. In general, Mulder et al (2001) conclude that if possible the transition to ownership is made before the first child is born. Home ownership in itself is favoured by the Dutch tax system, whereas fertility is postponed. This could account for the weak relationship. At any rate, there appears to be a strong relationship between demographic events, economic circumstances and housing decisions.

Both in the case of labour market as well as housing decisions various effects appear to be at play. It is difficult to ascertain beforehand which effects are especially relevant in the case of a particular household. Income and substitution effects from changes in male and / or female wage rate tend to work against each other, and may even cancel out; specific circumstances may either lead to pre-, or postponement of moves to long term housing. We require knowledge of household level decision making processes, opportunities and constraints. These processes are nearly impossible to measure, but the importance of individual effects eminent from recent literature seems to stress this point.

3 Facilitating behaviour: work, income and the birth of the first child

In this chapter we will take a detailed look at the effects of children on household income, using a number of different approaches. In section 3.1, we will introduce the concept of Needs Based Income as used by Statistics Netherlands. We present a number of statistics pertaining to the drop in household purchase power, or 'family low', in section 3.2. In section 3.3 we turn to studies using income in levels, and discuss our findings in section 3.4.

3.1 Needs Based Income

Before turning to the evidence on the family low we first discuss the concept of Needs Based Income as used by Statistics Netherlands. Income data is derived from the IPO (Inkomens Panel Onderzoek) which contains information from individual tax reports and additional sources. Data is collected directly from the tax offices on randomly selected individuals and members of their respective households. This way, information is gathered on 220.000 individuals in 75.000 Dutch households. Income contains both wages as well as government transfers. Disposable household income is computed by summing up the respective incomes of all individuals that are considered a member of the household.

Statistics Netherlands corrects disposable household income using equivalence scales[6], in order to make welfare comparisons between households of varying composition possible. These equivalence scales are derived from data on spending patterns of households and serve to rescale any given household's disposable income to that of a single-person household and thus make them comparable. Conversely, when a person is added to the household, equivalence scales give the factor with which disposable household income needs to increase in order to return to similar levels of welfare. Equivalence scales depend on the number of (earning) adults in the household as well as the number of children aged 17 or younger. Next to this, the scales depend on the level of income: for higher incomes, the addition of new members is relatively less 'costly'. Third, the scales are U-shaped with respect to the age of the oldest child. Newborns are relatively expensive, as are adolescents. The middle age groups are less costly. Fourth, equivalence scales are higher for dual earner households, reflecting higher costs of both the earning adults as well as children. These costs are caused by, for example, the need to replace household production of care with care purchased on the market.

Elsewhere, more elaborate measures have been proposed. It is argued that household welfare should include more than just income. For example, Homan et al (1991) argue that household production should be included as well, and go on to discuss various ways in which the value of household production should be measured. These include market price (if available) and the (woman's) wage rate. Next to that, SCP (2003) mention the emotional value of children and the utility derived from leisure time, or household production in itself. Hunter et al (2003) show that the inappropriate

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[6] Refer to CBS (2004a) for a detailed discussion.

selection of equivalence scales may lead to adverse conclusions. Jenkins (2000) argues that needs adjusted income could be measured in consumption terms as well, including the borrowing and lending used to smooth out consumption over time. For interpretational purposes, we will restrict ourselves to the more straightforward measure as used by Statistics Netherlands.

3.2 Household purchase power and the arrival of the first child

SCP (2003) report a decline in Needs Based Income in almost two thirds of the Dutch households in which a child is born. For children of parity one, this fraction is almost 80%. The drop in Needs Based Income on arrival of children is caused not only by the increase in household size, but also through the reduced contribution to household income by the mother. This is illustrated in figure 3.1 below. It depicts the development of purchasing power (defined as the percentage change of equivalence income between two years) as a result of changes in the composition of the household, for the years 1992 - 2000. Households in which a child had arrived in year 2 of observation are between 14 and 18% worse off in the period under study.
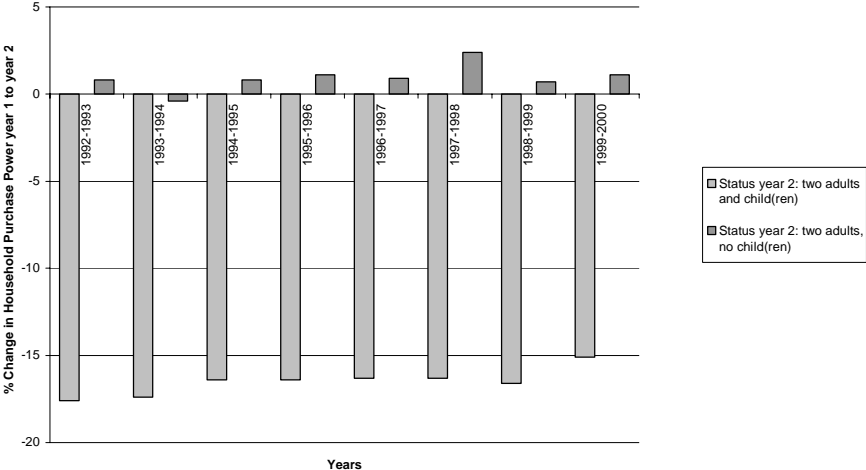

Figure 3.1: Comparison of changes in Needs Based Income, Dutch Households, 1992 – 2000.
Data: Statistics Netherlands, own computations.

The data depicted above exhibits a slight positive trend for those households with children present in the second year. Within the equivalence framework as sketched out above a two person family in which a child arrives needs about 18% extra income to reach the level of economic wellbeing of a two person household without a child. Any in- or decrease in needs adjusted income above or below that figure of 18% should thus be attributed to changes in the level of household income. This is an important notion. Since the 'cost' of children is assumed to be equal for all experiencing the same demographic event, significant differences in Needs Based Income across groups of households experiencing this event, thus reflect differences in response patterns or opportunities for these groups, not captured in the equivalence scales.

CBS (2004b) provides us with some detail on this matter. The IPO is used to track households through time. The results pertain to the period 1989-2000, and to Dutch households. CBS (2004b) report that over 50% of the couples that had a child experienced a decline in needs based income between 10% and 30%. In contrast, about 10% experienced an increase. Parents adjust the amount of time spent on the labour market according to their needs and wishes.

Ex-ante, dual earner households that are to remain childless do not differ significantly from those that are to have children in terms of their income distribution according to SCP (2003). Households that start out as dual-earners not seldom continue as a one-earner family after the arrival of the first child. This usually amounts to the mother either reducing her hours, or stop working altogether. Households from the top-two deciles in the income distribution largely remain dual-earner however. Of the dual earner households with larger incomes, 35% reduce their hours worked. CBS (2004b) however report that there is a distinct group that in fact cannot afford to cut back on hours worked: 22% of the single income households continue as a dual earner family after the first child is born. Households tend to respond to the arrival of the first child in a wide variety of ways, reflecting their respective opportunities and constraints.

Decomposition of the data through the age of the head of household provides us with another view. According to Human Capital theory, due to changes in working experience, productivity and such, for most the age-income profile first increases, then flattens out, only to decrease when approaching retirement. An interesting pattern emerges in figure 3.2[7] in this respect, which depicts Needs Based Income by age of the main bread winner.

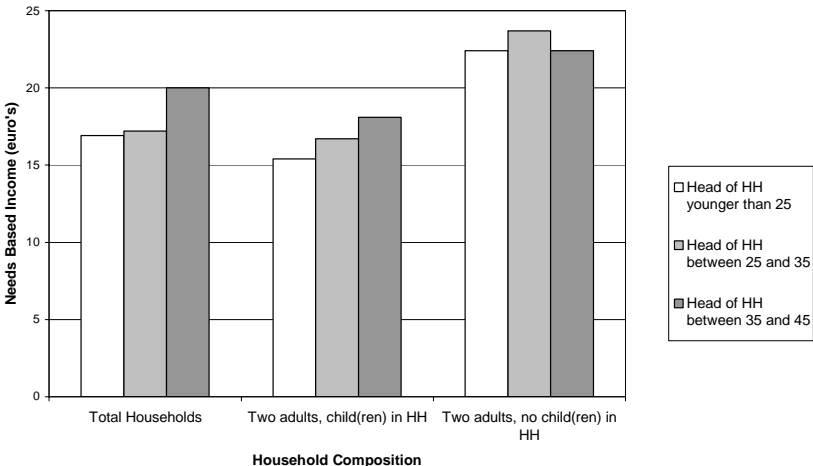*Figure 3.2: Needs Based Income for Dutch Households, 2000, by age group of the main bread winner.*
Data: Statistics Netherlands; own computations.

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[7] We have elected to use data for 2000 alone, to provide a more insightful illustration. The pattern emerging from the data does not vary substantially with other choices of years. This can also be concluded from the limited time trend in figure 3.1.

We observe the expected increase for parents with children in the household, but not for households without children, oldest age group. A number of explanations come to mind, one of which being the cross sectional nature of the data used: differences could be the result of cohort differences in pay with older cohorts at a disadvantage relative to younger ones. The difference could also reflect a gap resulting from the earlier care of children no longer present in the household, with the negative income effect (due to a lack of continuous accumulation of working experience) offsetting the decrease in the needs component for this oldest age group.

The discussion above highlights both strengths and weaknesses of the Needs Based Income measure. It facilitates comparison between groups of households of varying composition, and serves to pinpoint possible groups having trouble making ends meet. For example, we have seen the varying responses to arrival of children in the group 'dual earner households' and across age groups. But at the same time, it is very difficult ascertaining the exact cause of the patterns found in the data, because of the composite nature of the measure. Bane et al (1986) propose a hierarchical framework, that serves to distinguish between 'income events' (numerator) and 'demographic events' (denominator) which may promote structured decision making in this respect, but does not help to mend the underlying problem. We therefore turn to the discussion of a number of previous studies on the effects of children on income, using income both in levels as well as in terms of composition.

3.3 Income: levels and composition

Bane et al (1986), in their study on poverty dynamics, note that identifying the exact causes of changes in income is crucial: using the U.S.A. panel Study of Income Dynamics (1970 – 1980) they show that frequencies and durations of poverty spells vary considerably from one cause to the next. A limited amount of poverty spells is linked to demographic factors, mostly either a change in the number of adults in the household, or a change in the number of children[8]. Next to that, (labour market) behaviour of secondary family members (i.e. other than head of household) is deemed an important factor determining whether household income falls below the poverty threshold. They conclude that 'the poor' are a very heterogeneous group. Todd et al (2002) present a cross European Union comparison on household income composition, before and after the birth of the first child. They find that, among others in the Netherlands, government transfers generally form a substantial proportion of household income in those households were children are present. Government transfers, such as child benefits, serve to cushion some of the adverse income effects associated with (in)voluntary declines in working hours. It is likely however that not all households stand to profit from these transfers to the same extent. Certainly in relative terms to other sources of household income such as that generated by one or more working adults.

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[8] An illustration for the Dutch case: SCP (2003) reports that about 1% of the households in their study experienced a first birth.

As is with the timing of fertility, in the trajectory following the first birth education also plays an important role in identifying response patterns of households. Kalwij (2000) shows, using the Dutch Socio Economic panel (1986 – 1994), that higher educated women exhibit higher employment rates after the first child is born. Figure 3.3 depicts period trends for this phenomenon, for women having first children in the late 1980's, and the 1990's. Especially middle and high educated women do not appear to differ substantially in terms of their participation rates before first birth. However, they do respond to this event differently. Through time, these differences appear to decrease, with low educated women continuing to lag behind however. From this it can be concluded that highly educated women, and middle educated women to an increasing extent, are more likely to continue working after the first child has been born. This reflects their earning capacity, i.e. their ability to match their reservation wage.
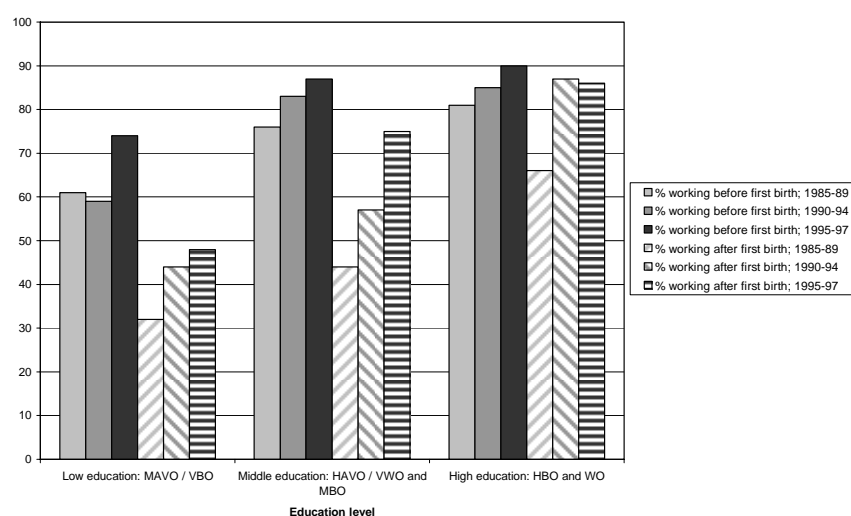

Figure 3.3: Labour force participation, Dutch Women, before and after first birth, 1985 – 1997.
Data: Statistics Netherlands

In an earlier contribution Hartog et al (1986) show that female reservation wage is positively related to the presence of children aged 0 – 5 years and to a lesser extent the presence of children aged 6 – 11. This reflects a relationship between the age of the children on one hand, and the preference for work over caring on the other hand. With younger children at home, a woman requires higher levels of compensation to be induced to supply hours to the labour market, than she would have in other instances.

Another approach is offered by Joshi et al (1999). Using two British datasets[9] they investigate what is referred to as the 'family gap': the phenomenon mothers seem to earn less than similar women without children in the British context. They start out with pointing to broad evidence on wage differences between full- and part time workers, between women of different marital status and between women

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[9] Medical Research Council's National Survey of Health and Development, March 1946 birth cohort; National Child Development Study, March 1958 birth cohort.

with and without children[10]. Next to that, the researchers point to the relatively weak position mothers are in: they often need the part time jobs because of competing claims on their time, leading to a low elasticity of supply and hence a stronger position for employers. However, Joshi et al do not find evidence for within part time or within full time penalties from motherhood as such after controlling for other (socio-) economic factors. Controls for Human Capital appear important however: it explains to a large extent differences in pay between full time and part time workers, with the gap increasing with duration. Part time workers apparently fail to keep up with the accumulation rates of Human Capital of full time workers. With mothers predominantly working part time, it is in fact a penalty to (lack of) Human Capital accumulation rather than motherhood as such these women are picking up. The penalty seems especially low for mothers who are able to keep their breaks away from work as short as possible: mothers that return to work within a year are not significantly worse off than childless women. Especially highly educated women appear to succeed in that respect. Vice versa, their higher earning capacity provides them with an incentive to keep their breaks as short as possible to avoid the Human Capital penalty. It is interesting to return to Hartog et al (1986) in this respect, as they find a negative effect on market wage rates for mothers with children in the age range 12 – 15 years. They note that these women are often returning to the labour market after a prolonged absence and hence provide some evidence for a 'Human Capital penalty' for the Dutch case.

3.4 Summary and discussion

In this chapter we have used the Needs Based Income measure to explore changes in purchase power as a result of the arrival of children in a household. We have reported that on average, households experience a drop of around 18% in purchase power when the first child is born. This drop is attributed to the decline in labour market participation by women, as well as the increase in costs the household is faced with. Not only does the child require (costly) care, households not seldom decide to move to more fitting but often also more expensive housing, as we will see in chapter 4.

However, there is considerable variability among households. Parents are faced with varying opportunities and constraints, and moreover exhibit differing views on the optimal distribution between care and work. A number of these factors are discussed in section 3.3, where we have reported evidence on both the varying composition of income, as well as the differing response in terms of labour market supply by women. Eligibility to forms of government support serve to cushion the adverse financial effects of withdrawing from the labour market. At the same time, evidence suggests that, on the longer term, women face a so-called 'human capital penalty' upon re-entry into the labour market after a prolonged child care related absence. Especially higher educated women appear to make an effort to minimise this human capital penalty by returning to employment as soon

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[10] Differences by marital status do not remain after controlling for the presence of children.

as possible. It is this group that stands to gain most by minimising the penalty, through their higher earning capacity.

Comparing welfare levels across households of varying composition is no straightforward task as over a century worth of economic literature on utility will serve to testify. The Needs Based Income measure as applied in section 3.2 does not aim to be complete in capturing the total effects on household welfare of children: it merely sketches out the financial consequences of the change in household composition. And these consequences can be quite significant as we have seen. But in the measure's simplicity lies its weakness: households adjust, they are faced with opportunities and constraints, now and in the future. The level income of some households may be such that members can cut back on hours without serious consequences, others may have to increase earnings to make ends meet, women may be faced with lower wage rates upon re-entry. Households respond in many different ways to these challenges. Information on the household level is required to try and explain these response patterns, however they are likely to be associated with levels of education, earning capacity and welfare levels at the onset of the fertility career. Reservation wages can be thought to reflect more general preferences between care giving and work as well.

4 Facilitating behaviour: housing arrangements and the birth of the first child

In this chapter, we investigate the relationship between children and housing arrangements by Dutch households. In section 4.1 we present a bivariate analysis of financial and demographic household characteristics and the tenure decision. In section 4.2, we compare our results to multivariate models from the literature. A short summary and discussion are to be found in section 4.3.

4.1 Dutch housing market and household characteristics

Earlier we have seen that housing, especially in the case of first birth, may serve to facilitate life events, rather than cause them (cf Mulder et al (2001), Henretta (1987)). The cost of housing however may constitute an effect on other careers in the life course in its own right. Recent literature stresses these links to demographic events, but at the same time acknowledges economic and contextual factors that exert their influence on household decision making. Clark et al (1997) point to a number of differences in terms of stock and government policies between a number of European countries. In the United Kingdom, ownership is relatively more important, compared to among others The Netherlands with its large stock of rented single family homes.

In table 4.1 below it can be seen that renting and owing are about equally important in The Netherlands, with renting on the decline relative to owning. This may be attributed to the favourable economic circumstances, or the tax system. Furthermore, Clark et al (1994) find that housing consumption is relatively wealth and income inelastic. However, Clark et al (1997) note that households with higher incomes are more likely to be owners. Next to that, there is a positive relationship between the number of earners in a household, and ownership. These relationships hold especially for childless couples; demand appears to be income inelastic especially for households with children.

	Dutch Housing Stock		Owners			Renters		
				Total Housing Expenses			Total Housing Expenses	
	Owner Occupied (%)	Rented (%)	Average Income (euros)	As a % of income	1990 = 100	Average Income (euros)	As a % of income	1990 = 100
1990	45,3	54,7	20425	20,5	100,0	13617	28,3	100,0
1994	47,6	52,4	24465	22,9	111,7	16022	30,1	106,4
1998	50,8	49,2	27532	24,5	119,5	16950	33,2	117,3
1999	51,9	48,1	27897	25,9	126,3	17094	33,3	117,7
2000	52,2	47,8	28836	25,5	124,4	17984	33,7	119,1

Table 4.1: Housing Stock; Cost of Housing, Time trends. Dutch households, 1990 – 2000.
Data: Statistics Netherlands (Woning Behoefte Onderzoek 1990 – 1998; POLS 1999 – 2000); own computations.

Table 4.1 confirms that, on average, those households already owning homes, have higher incomes than renting households. Total housing expenses refer to net (after tax) mortgage payments, or rent payments (after subsidies) respectively, and all other costs associated with the occupancy of homes

such as insurance, utility costs and local taxes. With many of the costs associated with housing being fixed, owners spend a lower proportion (but a higher absolute amount) of their income on housing. Those that can afford to move into ownership have a strong financial incentive to do so. Both owners and renters appear to be subject to an increase in costs through time, renters slightly less than owners.

Henretta (1987) argues that tenure type in itself is not so much decided upon, but is determined after the household has decided to move: the search for more space in itself does not lead to a change in tenure. Clark et al (1994) point to a number of important aspects associated with tenure such as a low probability of moving and increased stability. Society in general profits in terms of higher affiliation with the place of residence, for example through political participation.

Private accumulation of assets is another important factor. Table 4.2 below shows the development of WOZ[11] value for four Dutch regions separate. Houses serve as a tax base in The Netherlands and are re-valued every four years. From the table it is evident that capital gains may be substantial, with prices developing at similar rates across the regions. Absolute levels differ substantially however, notably between the three southern provinces and the south, for the year 2005. Along with the lower relative cost of owning for higher income households, these capital gains may very well serve to fuel investment motives to home ownership.

Region	Period	Average WOZ-value	
		1000 euro	1997 = 100
All	1997	79	100,0
	2001	131	165,8
	2005*	202	255,7
North	1997	62	100,0
	2001	100	161,3
	2005*	159	256,5
East	1997	80	100,0
	2001	134	167,5
	2005*	206	257,5
West	1997	80	100,0
	2001	133	166,3
	2005*	206	257,5
South	1997	84	100,0
	2001	141	167,9
	2005*	213	253,6

Table 4.2: Development of average WOZ value, Dutch Homes.
Data: Statistics Netherlands; own computations.
* = data for 2005 are preliminary

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[11] Wet Onroerende Zaken.

Feijten et al (2002)[12] associate three demographic events (leaving home, going into union, birth of first child) with rates of occupancy of both rented single family homes, as well as owner occupancy. This state based approach yields some interesting results. They distinguish between 'short stay' and the higher quality 'long stay' housing. The latter may be of 'renting' and 'owning' type. Singles have low rates of entering both rented single family homes as well as moving into owner occupancy. The starting point of a union is associated with a sharp increase in transition rates into both types of dwelling. The birth of the first child however is termed 'anticipative', in the sense that, one year before birth, transition rates into long term dwelling peak. It would seem households are making sure they live in a suitable dwelling before the first born arrives. Transition rates after the birth remain relatively high for rented single family homes, compared to transition rates into owned dwellings. In the latter case, the cost associated with children / decrease in income could serve as an explanation. Clark et al (1994) find for the USA that little over one third of the childless couples had children within two years of becoming an owner.

Inspection of table 4.3 illustrates the matter further, using tenure data on Dutch households for the year 2002. It appears that couples, be it with or without children, have by far the highest tendency to own: two-thirds to three-quarters of these households are owners. Single person households are the most important (33,8% of all households) and the most diverse (among others, young singles, older widows) sub group: they predominantly rent. From this, it would seem that the relationship between tenure and union formation is stronger than the relationship between tenure and the arrival of children.

	Renting	Owner Occupied	Total	Renting	Owner Occupied	Total
Total	47,8	52,2	100,0	47,8	52,2	
Single person household	72,4	27,6	100,0	24,5	9,3	33,8
Couples, no child	37,3	62,7	100,0	10,7	18,1	28,8
Couples, with child	24,3	75,7	100,0	7,3	22,7	29,9
Single parent family	71,5	28,5	100,0	4,4	1,8	6,2
Other	67,8	32,2	100,0	0,9	0,4	1,3
				47,8	52,2	100,0

Table 4.3: Tenure and household composition, Dutch Households, 2002.
Data: Statistics Netherlands, own computations.

This apparent strong relationship with union formation is countered somewhat with the macro trends found over longer periods of time, published by Feijten et al (2002) and reported in section 2.2.2: younger cohorts move into single family dwellings and owner occupancy earlier compared to the cohorts before them. Henretta (1987), Mulder et al (2001) find similar trends. This it seems, is at odds with the recent trend of postponement of 'high commitment' relationships. The more favourable

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[12] Data: Stichting Sociale Culturele Wetenschappen, 1992; Onderzoek Gezinsvorming, Statistics Netherlands.

economic circumstances of younger cohorts may serve to explain this apparent paradox: possibly they prefer long term housing from an investment point of view.

4.2 Previous multivariate analyses

We turn to the discussion of multivariate models. Authors use a variety of specifications and models, pertaining to various countries, which makes direct comparison of results difficult. We have therefore elected to restrict ourselves to a more general discussion of sign and significance of coefficients, in the presence of controls. We aim to ascertain which of the patterns found in the bivariate analysis above is upheld. In table 4.4 the generalised results for four models can be found. Table 4.5 contains background information on periods, datasets and risk sets, among others, needed for correct interpretation of the results.

As can be seen, models A through D differ substantially among each other in terms of covariates. Differences are due to data limitations as well as methodological issues, such as endogeneity[13]. Model D (Dieleman et al (1994)) differs somewhat from models A through C in the sense that it is more a macro level analysis of the effects of the housing market on the propensity to own, as opposed to models B and C which are aimed at assessing household level risks of transition, and pertain to first time home ownership. Model A aims to map out some general characteristics of (existing) home owners, relative to renters for the Dutch case.

According to model A, households of higher education, higher income and with children present are likely to be owners. Single men and women do not differ significantly from couples without children, after correcting for a variety of socio economic variables, in contrast with model B, which does not control for income. The coefficients in the macro level model D all have the expected coefficients, with income (included in real terms as to reflect purchase power), low mortgage intrest rates, new construction and low housing prices stimulating ownership. High rent levels serve as a push-factor out of rented homes.

Similar housing market variables are also included in model C. Longitudinal home value was included but did not reach significance, indicating irresponsiveness of households to longer term price developments. Housing is acquired for other reasons than long term capital gains. The coefficient for 'change in cross sectional value' is a surprising positive. Henretta (1987) interprets this as hedging by the household against future inflation: an increase in the value of an owned house acts to compensate. Another interesting result is the insignificant coefficient for education: in model B this comes up a significant positive. We suspect the inclusion of income in model C is the cause of this difference, with education picking up on the (probable) increased standard of living in model B, next to 'social

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[13] Mulder et al (2001) elect to leave out income, as they assume that income is the result of the same underlying decision process that drives employment, fertility and housing outcomes.

economic status'. The propensity to become an owner is shaped as an inverse U with respect to age, and positively related with belonging to younger cohorts, according to model B. This reflects the patterns of household formation discussed earlier.

Model	SCP (2006) A	Mulder et al (2001) B	Henretta (1987) C	Dieleman et al (1994) D
Household composition (married, no children = 0)				
Unmarried	o	-		
With children / number of children	+	-	+	
Marrying, not expecting child		+		
Marrying, expecting child		+		
Add child in two years time			o	
Duration of marriage / still married in future			o	
Other Demographics				
High education	+	+	o	
Female Head of Household		o		
Age	+	+		
Age Squared	-	-		
Younger cohorts		+		
Bad health	-			
Immigrant	-			
Labour Market (Employed = 0)				
In education		-		
Other non working		-		
Self employed		o		
Miscellaneous				
Social Economic Status		+		
Community size		-		
Parents also own home			o	
Household Income				
(Female / other) income	+		+	+
Housing Market				
Cross sectional value owned home	-		-	-
Change in cross sectional value			+	
Average rent level				+
Proportion owners in region			+	
Change in proportion owners			o	
Longitudinal home value			o	
Owned homes new Construction				+
Mortage intrest				-

Table 4.4: Summary of multivariate models
Legend: +/ -: positive / negative effect, significant at at least 5%; o: insignificant.

A	Authors	**SCP (2006)**
	Data	Woning Behoefte Onderzoek (2002)
	Country	NL
	Dependent	Being a home owner
	Method	Probit
	Risk Set	Dutch Households
B	Authors	**Mulder et al (2001)**
	Data	ESR (1992)
		Netherlands Family Survey (1995)
	Country	NL
	Dependent	Transition to home ownership
	Method	Logistic Regression
	Risk Set	Renting Couples
C	Authors	**Henretta (1987)**
	Data	Panel Study of Income Dynamics (1981)
	Country	USA
	Dependent	Transition to home ownership
	Method	Logistic Regression
	Risk Set	Renting Couples
D	Authors	**Dieleman et al (1994)**
	Data	Woning Behoeften Onderzoek (1978 – 1989)
	Country	NL
	Dependent	Renting to owning (% of movers)
	Method	Linear Regression
	Risk Set	Renting Couples

Table 4.5: Background information on summarized multivariate models in table 4.4

We return to our main topic: the effect of children on housing. From model A, we gather that in the Netherlands, home owners are generally households with children present. For transition models B and C, the coefficients for children appear with different signs. Henretta (1987) includes the number of children in his model and finds a significant positive effect, whereas this same variable came up insignificant in a bivariate analysis in the same study. Only after correcting for income, marital status and other factors, does the number of children increase the propensity to buy a home. This appears to be confirmed by model A. Next to the number of children, he includes a dummy for households that were to give birth to an additional child within two years time, which came up insignificant. Mulder et al (2001) include children in a slightly different fashion: apart from a dummy indicating the presence of children in the household ('with children', significantly negative effect) they include two dummies pertaining to the household formation process: 'marrying, not expecting child' and 'marrying, expecting child'. The latter two enter as significant positives, with large coefficients.

Children may affect the decision to buy a home in two ways. The first is the need for the household to arrange for proper housing, the second is not only the additional cost of this housing, but also the cost of raising children in general. Whereas the former serves to increase the propensity to buy (as most

suitable homes are of owner occupied type), the latter serves to lower ownership rates. It appears that the exact combination of covariates included in the model determines sign, if not significance of the effect of children on home purchase. In the case of model B, the positive effect of arranging suitable housing is most likely picked up by both 'marrying' dummies, leaving the negative cost factor to be picked up by the 'with children' dummy. For model C, the 'additional child' dummy does not pick up anticipation effects, as the dummy pertains to 'extra' children in general, not to the first child in particular. The positive for 'number of children' indicates that for this dataset, and this period, the arrangement effect outweighs the cost effect of children. The same outweighing of effects could explain the insignificance of children in the bivariate analysis by Henretta (1987).

4.3 Summary and discussion

Studies of home ownership by household often center around both economic as well as demographic explanatory variables. Through macro economic factors such as the availability suitable houses, tax regimes and development of housing costs, households are constrained in their options. At the same time, developments in the demographic life course may fuel the need for a change in housing arrangements.

In the Dutch case, we have seen that the number of owners is roughly equal to the number of renters. Time trends however seem to suggest renting is on the decline relative to owning. Home ownership is more frequent among those with a higher income. For these households, the higher absolute expense is actually lower in relative terms, compared to total housing costs for renters. Also, mortgages in the Netherlands are available only to those with a stable income. The potential positive external effects from home ownership, for example increased levels of social participation and capital accumulation by households, are reflected in the favourable tax treatment of home ownership.

In this context, it comes as no surprise that those in a union exhibit higher rates of home ownership than singles. From multivariate analysis it appears that indeed this difference is caused by the higher purchase power of couples: after correcting for income and other socio economic variables, singles do not differ significantly from childless couples in terms of existing home ownership (SCP (2006)). Mulder et al (2001) do find lower entry rates into ownership for singles however. Next to this more economic significance of unions, Feijten et al (2002) point to the level of commitment required to sustain a long term dwelling. Interestingly though, they report higher entry rates into ownership for younger relative to older cohorts, against a backdrop of postponement of first union. This would point to an investment motive for home purchase for these cohorts.

Results for children appear somewhat mixed at first sight. In our bivariate analysis, home ownership was higher for couples both with and without children. Children enter both positively as well as negatively in the multivariate models we have discussed, depending on the exact specification. Feijten

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et al (2002) label the arrival of the first child as an 'anticipated event': households will move to provide sufficient living arrangements for the newborn. This is illustrated by high rates of entry into both ownership as well as rented single family homes for households with a newborn. Entry rates for rented single family homes remain high after birth as well, stressing a second important effect of children: the increase in cost for households in addition to the higher housing costs. These two confounding factors, i.e. the facilitation effect and the cost effect, serve to explain the mixed results we find in the multivariate context: as the anticipation effect is picked up by marital status covariates, children enter negatively in the model by Mulder et al (2001), whereas they enter positively in models by SCP (2006) and Henretta (1987).

We observe that the distinction made by Feijten et al (2002), i.e. between rented and owned single family homes, reveals some interesting, varying, patterns of household behaviour. The cost effect of the arrival of children could explain the higher entry rates for rented single family homes. In chapter 3, we have seen that the arrival of children may have adverse effects on household income. For some groups, the combination of these effects may prevent them from attaining home ownership.

5 Data and methodology

In section 5.2 we provide a short introduction of our dataset, as well as an overview of statistics from our sample. But before this we discuss our approach to timing in section 5.1, as our selection of variables and sample has been influenced to a large extent by methodological choices with respect to timing issues.

5.1 Timing

A classic distinction made in demography is the division between age, period and cohort effects. De Bruijn (1999) discusses a number of conceptualizations of time, such as historical, social and institutional time; each operating at distinctive levels in his conceptual framework, and each aimed at capturing distinct aspects of the dynamic context in which an individual operates. Next to a description of context, time can be used to characterize the individual, which is the approach taken in this study.

Our panel dataset allows us to study change in the individual life course along a variety of dimensions, of which age and cohort are straightforward exponents. To this we add time to first birth, and age at first birth. In order to avoid difficulties with respect to seperability of effects associated with all of these dimensions, we have elected to restrict our analysis to a very distinct sample of households from the DHS. Statistics Netherlands reports that for the year 1999, 50% of the women at risk of giving first birth, had done so by the age of approximately 29. The 25% threshold lies at the age of 26, the 75% threshold lies at the age of 35. In order to follow women through time, before and after first birth, we have extended our observation window with three years on both sides, thus arriving at a sample of households with a wife present aged 23 to 38 years. Approximately 75% of all first births in the year 1999 took place between these ages, according to Statistics Netherlands.

Across recent contributions, observation windows have been operationalised in varying ways. Feijten et al (2002) elect to include events occurring at least 3 years before and at a maximum of 5 years after the event under study. Bane et al (1986) select a maximum of 2 years. From Appendix 2, it can be gathered that the average number of participations for any individual in the DHS is 3,1. From this, the use of very long retro- and prospective time lags could result in a large number of missing values, on top of the usual incomplete questionnaires. Therefore, we have decided to limit ourselves to maximum of 2 years prior, and 2 years after the birth of the first child, when tracking specific households through time. The general observation window was fixed at the three years before and after, as mentioned above.

We turn to a discussion of the timing dimensions used in this study. Bloemen et al (2001) use the approximate date of conception as the transition moment to parity 1 for women. Mainly to correctly capture, for example, labour market status at the time of birth: women may quit their job in the later stages of pregnancy and may thus be listed 'not working' at the time of birth, whereas in effect they

were working. This may lead to an underestimation of participation rates for women. In the context of our dataset, most information is available per year (i.e. at the time of interview, or pertaining to the complete past year). As such, timing in this study is measured in years. Age in completed years, as well as cohort membership, is inferred from the year of birth and the date of interview, and as such is not precise at a monthly level either. Age at the time of birth is computed using the year of birth of both mother and first child; time to first birth is computed using year of observation, and the year of birth of the first child.

The focus of our analysis will be on the time to first birth dimension, with age and cohort effects included in the models for correction purposes. From our earlier discussion it appears likely that there exist both anticipation effects prior to the arrival of the first child, as well as facilitation effects afterwards, with respect to the variables under study. We know for each observation on each household, either what the time to first birth for this observation is, or whether this household is observed not to give birth during observation in the DHS (i.e. is right censored)[14].

Time to first birth has been recoded into a six category variable: one category for the period before first birth, one for the time of first birth and four remaining categories for the years until the child has attained the school going ages. The last category of these four is 'observed 7 years or more after first birth', which, given the fact that we observe households up to 23 years after first birth has taken place, is a rather mixed category. Given the selections with respect to age we have made, we can however say that generally, this category consists of women who have given birth at relatively young ages. Figure 5.1 below illustrates the matter further.
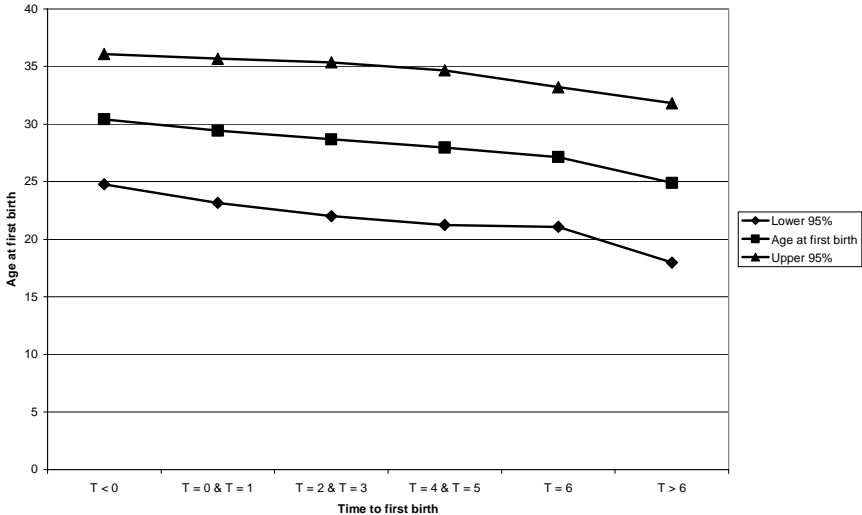

Figure 5.1: Relationship between time of observation and age at first birth.
Source: DHS 1993 - 2005

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[14] We established 'time to first birth' / censored before sampling the data by age of the present wife in the household. This way, an observation on a woman experiencing first birth at the age of 39, when she is 37 years of age, will still be flagged 'two years before first birth' instead of merely 'right censored'.

On average, a woman observed over 6 six years after her first birth, became a first time mother at the age of approximately 25, with 95% confidence intervals putting her between 18 and just under 32 years of age. This is important as the time to first birth variable as such will not only pick up the effects from moving along the life course, but as well some selection effects of being an 'early mover'. We will correct for those in the multivariate models in chapter 6, by entering sets of dummies that pick up on age at first birth.

5.2 The DNB Household Survey: data and sample statistics

Since 1993, CentERdata has been collecting data on Dutch households. Its objective is to facilitate the study of economic and psychological determinants of saving behaviour. Until 2002 the DNB Household Survey was known as the CentER Savings Survey. It is conducted in annual waves, using the CentER panel. The survey consists of six separate questionnaires, answered by all persons of 16 years and older in the household. Questions that pertain to the household as a whole, are answered by a single member. Information is collected on household composition, including children living outside the household. Next to this information is collected on a range of socio-economic variables, assets and liabilities, aspects of accommodation and mortgages, health and psychological variables. Throughout the waves, new households were added to maintain representativity. The amount of individuals in the DHS has decreased from roughly 7500 in 1994 to approximately 5000 in recent waves. Appendix 1 provides the interested reader with an overview of attrition throughout the waves. In appendix 2 we have sketched out the process of generating our analysis files from the DHS data.

As described in section 5.1, our sample consists of Dutch households, with a wife present aged between 23 and 38 years. As such, the unit of analysis in this study is the household. This decision stems from the earlier results discussed in chapters 2 thru 4, reporting evidence for coordinated behaviour between the spouses. Duncan et al (1985) point to a number of potential hazards with respect to such a choice, such as household dissolution. From DHS documentation, it is not clear what happens to separate members of the household, should this event occur. Most likely, the respondents that remain in the same address are treated as the continuation of said household; members moving out either disappear from analysis, or enter as their own separate household. However, there is no variable linking this new household to the old. In general, we do not expect to encounter this problem on a large scale in our sample from the dataset. What remains of the household is not excluded a priori. Second, the limited average span an individual spends in observation reduces the chance that the event of dissolution is observed. Third, dissolution is not frequent in the specific group of households we are studying[15].

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[15] In our sample of households, surrounding the time of birth dissolution and / or divorce took place in less than 1% of the cases.

We now turn to the two main variables of interest in this study: household income and housing arrangements. We are interested in the micro level variations in income, surrounding the time of first birth. In the previous chapters we have seen that there exists considerable variation in the way households respond to the arrival of the first child, in terms of labour supply of both partners, across levels of education and across levels of income before birth.

All income values have been converted in euros if needed, and corrected for inflation in order to facilitate intertemporal comparison. We study income in levels, and refrain from applying standardized corrections such as with 'Needs Based Income' as discussed in chapter 3. Instead, we introduce a subjective measure of the financial situation of the household, based on the notion that the household itself is best equipped to judge this parameter. It is questioned and coded in the following way:

> How is the financial situation of your household at the moment? (FINSITU)
> -2 I am/we are in debt
> -1 I am/we are drawing upon our savings
> 0 I can/we can just about manage
> 1 I can/we can save some
> 2 I can/we can save a lot of money

In general, subjective measures should be applied with caution, as respondents are prone to 'socially desirable answering', or can in fact be conditioned to answer more positively or negatively, depending on, for example the exact routing of the questionnaire. From the subjective measures available in the DHS, we have elected the one that in our opinion refers most closely to objectively ascertainable quantities, such as the amount of savings and debts.

In line with Feijten et al (2002) we characterise housing across two dimensions: tenure (i.e. renting or owning) and type of residence (i.e. single family home versus other types). Recent literature seems to suggest interesting differences in moving patters for households across these dimensions. In the context of this study, a housing event is defined to be a change from being a renter to being an owner, or renting a single family home.

With respect to ownership, we expect strong relationships with socio economic variables, such as education and income. Ownership requires financial stability, and institutions such as banks limit the access to mortgages if doubt arises with respect to this. Next to this, we expect to see positive anticipation effects, i.e. high rates sufficiently close to the first birth, with lower rates after birth as by then the cost of living may become prohibitive. As opposed to this, we expect to see renting more frequently among households of lower socio economic status, with transition rates being higher throughout the years surrounding first birth.

The selections described above leave us with 3278 households observed once or more during 1993 – 2005. Of these households 1902 are eventually right censored, leaving 1376 households in which a first child arrived. Of these 1376 households, first birth occurred whilst the household was in observation in 399 cases, with first birth occurring before the onset of observation for the remaining 977 households.

Table 5.1 below provides us with sample statistics on a number of key variables, by level of education of the present wife, for 3084 households[16]. As reported earlier, the average number of appearances for any individual in the entire DHS is 3,1; for our sample of households this figure is slightly lower as a consequence of our rather restrictive age limits.

Higher educated women are slightly older at the time of first birth compared to the low / middle category. The age at first birth dummies are set at the quartiles, each containing approximately 25% of the observations. Clearly the patterns are different across educational categories, with the low / middle educated women giving birth at younger ages, as reported in the literature.

The age structure of both sub-samples is rather equal. We have set the year 1969 as the cut off value for our cohort dummy variable. This has no specific meaning other than that it is approximately the average year of birth for women in our sample. As described above, the variable is used to correct our results for possible cohort effects, such as shifts in preferences between work and care. A slightly higher proportion of the women with lower / middle education has been born before 1969.

The employment dummies appear to confirm the general pattern seen in the literature, with higher educated women exhibiting higher employment rates and lower rates for working in the own household. The latter rates are negligible for the husbands in our sample. Higher educated women work more hours on average, and have a higher income. Males are rather more equal. At the same time however, the number of children in these households is lower, and less higher educated households have children present.

With respect to home ownership the differences are small. Renting of single family homes is not widespread, but is more important among households of lower / middle education. Renting is present among higher educated households as well, but these households more frequently rent apartments (not reported in the table).

To conclude, the time to first birth dummies reflect the proportion of observations on households in which we did observe a first birth (including the left censored cases). These proportions and the

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[16] Completed education is missing for 194 wives.

proportions reported under 'right censored' sum to 1. As such, the category 'right censored' acts as a salient reference category for the regression models discussed in chapter 6. This category consists of households of similar age and education level as the ones observed to give birth.

Female education level	Low / Middle education			High education		
	N	Mean	Std. Deviation	N	Mean	Std. Deviation
Count of appearances	2110	2,49	1,80	974	2,65	1,74
Female age at first birth	1323	26,13	3,85	411	28,78	3,39
Age at first birth dummies						
<= 23 years	1323	0,25	0,43	411	0,08	0,26
24 – 26 years	1323	0,28	0,45	411	0,14	0,35
27 – 29 years	1323	0,28	0,45	411	0,35	0,48
30 years =>	1323	0,20	0,40	411	0,44	0,50
Female age	2110	31,59	4,25	974	31,23	4,01
Male age	1837	34,71	5,45	781	33,87	5,28
Female year of birth	2110	1967,04	6,03	974	1968,02	6,27
Male year of birth	1829	1963,68	6,92	776	1965,22	7,26
Born before 1969	2110	0,60	0,49	974	0,51	0,50
Female is employed	2110	0,53	0,49	974	0,76	0,41
Female is looking for work	2110	0,12	0,31	974	0,12	0,30
Female works in own household	2110	0,35	0,47	974	0,13	0,32
Male is employed	2110	0,80	0,39	974	0,69	0,45
Male is looking for work	2110	0,06	0,23	974	0,09	0,27
Male is working in own household	2110	0,00	0,05	974	0,01	0,08
Financial situation of the HH	1467	0,37	0,98	722	0,69	0,99
Female total real net income / 1000	1303	9,84	9,64	638	18,08	11,22
Male total real net income / 1000	1145	26,12	12,52	484	28,97	14,23
HH total real net income / 1000	1582	24,97	16,34	764	31,61	18,32
Female hours worked per week on average	1739	12,89	16,27	748	23,76	17,93
Male hours worked per week on average	1338	38,04	15,14	552	35,89	18,13
HH is a home owner	1520	0,62	0,48	732	0,58	0,48
HH is renting a single family home	1520	0,19	0,38	732	0,10	0,28
HH lives in a single family home	1525	0,72	0,44	735	0,58	0,48
Child present in the HH	2097	0,61	0,48	966	0,39	0,47
Number of children in the HH	2097	1,20	1,16	966	0,70	0,99
HH is right censored	2110	0,37	0,48	974	0,58	0,49
Gap between observation and first birth	1328	6,78	4,62	413	4,38	4,13
Time to first birth dummies						
T < 0	2110	0,02	0,08	974	0,03	0,12
T = 0 & T = 1	2110	0,06	0,21	974	0,09	0,23
T = 2 & T = 3	2110	0,09	0,24	974	0,09	0,23
T = 4 & T = 5	2110	0,11	0,26	974	0,07	0,20
T = 6	2110	0,05	0,16	974	0,03	0,11
T > 6	2110	0,30	0,44	974	0,12	0,30

Table 5.1: Sample statistics, Dutch households with a wife present aged 23 – 38 years.
Source: DHS 1993 - 2005

6 The effect of children on income and housing

In section 6.2 we study the relationship between household income and the first child, before turning to housing in section 6.3. In section 6.4 we present a case study of a particularly striking sub group in our sample; section 6.5 summarizes and concludes. However, we start our analysis with a discussion of labour market behaviour by both partners in section 6.1, as this lies at the root of patterns we observe in the subsequent sections. Our earlier discussion indicates that labour market behaviour surrounding the time of first birth is distinctly different for categories of education. Therefore, throughout this chapter, we will distinguish between low / middle educated women, and high education women. The multivariate models will feature two blocks: the baseline or 'restricted[17]' model includes basic demographic variables; the extended or 'unrestricted' model includes a set of variables pertaining to the presence and timing of the first child. To assess the effect of presence and timing of children on the dependent variable, for each model, we test whether the unrestricted model should be rejected against the baseline restricted model, by applying a Wald test.

6.1 First birth and household labour market behaviour

In this section, we will focus on female labour market behaviour: as can be seen in tables 6.1 and 6.2 below, labour market behaviour by men does not change notably in the age group under study. Hours worked by men do not differ significantly across educational categories (not shown) and relative to the time of birth (table 6.1). Male income increases surrounding the time of first birth, stabilizes thereafter. This is most likely related to development of human capital for this age group.

	Change in hours worked on average per week, by male				
	2 years before first birth	*1 year before first birth*	*year of first birth*	*1 year after first birth*	*2 years after first birth*
Paired Differences	1,07	0,27	-0,78	-0,56	
t	1,33	0,90	-0,92	-0,43	
df	91	101	129	112	
Sig. (2-tailed)	0,19	0,37	0,36	0,67	

Table 6.1: Development of hours worked by men surrounding the time of first birth. Paired samples T-tests. Source: DHS, 1993 – 2005

	Male real net income				
	2 years before first birth	*1 year before first birth*	*year of first birth*	*1 year after first birth*	*2 years after first birth*
Paired Differences	-854,92	1915,11	4477,64	583,40	
t	-0,35	2,20	2,02	0,37	
df	93	104	114	100	
Sig. (2-tailed)	0,73	0,03	0,05	0,72	

Table 6.2: Development of male real net income surrounding the time of first birth. Paired samples T-tests. Source: DHS, 1993 – 2005

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[17] Restricted in the sense that the coefficients with respect to presence and timing of the first child are assumed to be equal to zero.

Generally, as we have seen in chapter 5, we expect the high educated group to be more active on the labour market. At the same time, relative to the reference category of right censored women, we expect mothers of both educational categories to supply less labour. In tables 6.3 and 6.4 we present the results for an OLS regression on hours worked by the female, and female total income respectively.

Dependent	Hours worked by female			
Female education level	Low / Middle educated		High educated	
	B	*Sig.*	*B*	*Sig.*
Female age	0,66	0,03	7,47	0,01
Female age squared / 1000	-5,42	0,49	-110,18	0,01
Male age			-5,00	0,05
Male age squared / 1000	3,34	0,06	68,67	0,04
Male real net HH income / 1000	-0,04	0,24	-0,25	0,00
Financial situation of the HH	1,16	0,03	2,83	0,01
Female born before 1969	-0,61	0,63	2,73	0,33
Child present in the HH	-14,31	0,00	-17,11	0,00
Time to first birth[18]				
T < 0	11,90	0,03		
T = 0 & T = 1	13,66	0,00		
T = 2 & T = 3	5,95	0,02	5,97	0,13
T = 4 & T = 5	-0,30	0,89	1,12	0,78
T = 6	3,83	0,23	-0,44	0,94
T > 6				
Age at first birth				
<= 23 years			1,98	0,61
24 – 26 years	-1,11	0,40	-10,94	0,00
27 – 29 years	-1,83	0,25		
30 years =>	-2,81	0,21		
	Restricted model rejected $P(F(9;614)>14,821) = 0,00$[19]		*Restricted model rejected* $P(F(6;193)>6,802) = 0,00$	
	Adj. R^2: 0,412 *N = 629*		*Adj. R^2: 0,660* *N = 206*	

Table 6.3: OLS regression: hours worked by women, for educational categories.
Source: DHS, 1993 – 2005.

For both educational categories, the restricted model has been rejected. The general demographic variables have the expected signs. Female labour supply is inverse U-shaped in age, with a maximum

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[18] With respect to the size of the coefficients, the reader should be aware that the 'time to first birth' dummies, as well as the dummy 'child present in the household', take values e [0,1], as a consequence of the data generating process. For the dummies spanning more than one year, a household observed in only 1 of these years will have a value between '0' and '1'; households spending the full period in observation, will have a '1'. The other dummies in the multivariate models in this chapter take either '0' or '1'.

[19] The Wald test is used to ascertain whether a subset of q coefficients in a k-coefficient regression equation are jointly equal to zero. Use is made of the Error Sum of Squares of both the unrestricted k-coefficient model and the restricted (k-q) model. The resulting test statistic has a F-distribution with q and N-k degrees of freedom, and is computed as $((ESS_R – ESS_{UR})/q) / (ESS_{UR}/(N-k))$.

at age 34 for our sample of young women. Female labour supply for higher educated women is negatively related to her husband's income, given satisfaction with the household's general financial position.

The models confirm that in general, the presence of children is associated with negative effects on female labour supply. There are interesting differences between the educational categories. There is evidence for the existence of a time trajectory in labour supply for the low / middle group with surprising positive coefficients for the years surrounding first birth. These serve to compensate the negative baseline effect found for the 'presence of children' dummy. For the high group we find a sole baseline effect with an added disadvantage from giving birth at the ages 24 – 26. For this group of women, these ages mark the end of education and the onset of the labour market career. An interruption could prove costly in terms of life cycle income, for this we turn to table 6.4.

Dependent	Female real net income / 1000			
Female education level	**Low / Middle educated**		**High educated**	
	B	*Sig.*	*B*	*Sig.*
Female age	0,36	0,16	7,05	0,00
Female age squared / 1000	-1,95	0,76	-109,50	0,00
Male age			-4,84	0,01
Male age squared / 1000	0,79	0,60	63,12	0,01
Male real net HH income / 1000	0,05	0,12	-0,14	0,00
Financial situation of the HH	0,77	0,08	0,77	0,34
Female born before 1969	-3,74	0,00	-1,10	0,61
Child present in the HH	-5,29	0,04		
Time to first birth				
T < 0	-0,27	0,95		
T = 0 & T = 1	10,12	0,00		
T = 2 & T = 3	1,67	0,41	2,95	0,31
T = 4 & T = 5	-0,57	0,75	-1,69	0,56
T = 6	1,39	0,60	-6,64	0,16
T > 6				
Age at first birth				
<= 23 years				
24 – 26 years	0,36	0,74	-8,70	0,00
27 – 29 years	1,78	0,17		
30 years =>	2,59	0,17		
	Restricted model rejected *P(F(9;541)>8,284) = 0,00*		*Restricted model rejected* *P(F(4;175)>5,652) = 0,00*	
	Adj. R^2: 0,456 *N = 556*		*Adj. R^2: 0,714* *N = 186*	

Table 6.4: OLS regression: female real net income, for educational categories.
Source: DHS, 1993 – 2005.

The coefficients of the income models reported in table 6.4 exhibit a similar pattern as those for the labour supply model in table 6.3. High educated women in our sample reach their maximum income at

age 32. For the low / middle group we find a negative effect of being born before 1969, which given the life course development of human capital, is a surprising result. The effect of children on income seems less pronounced: this could be the effect of government transfers which act to cushion some of the adverse income effects of children. Apart from a negative 'early mover' effect, we find no negative effects on female income for the high education group, relative to the reference category, and given the baseline demographic variables included in the model.

We turn to time trends in female labour supply and income. Figure 6.1 depicts the average number of hours worked, by young mothers in our sample, surrounding the time of birth. Figure 6.2 depicts female income. From the graphs, it is clear that higher educated women supply more hours to the labour market, and earn more. These differences remain significant[20] starting from a year before birth, until the oldest child has reached the school going ages.

From one year to the next[21], both educational groups exhibit significant drops in hours worked and income around the time of birth. For the low / middle educated women there is also a significant increase in hours and income between six and seven years after first birth. Our multivariate models do pick up some of these timing effects, most notably the model for low / middle education households. For higher educated women, the patterns for income are not robust to demographic and other controls.
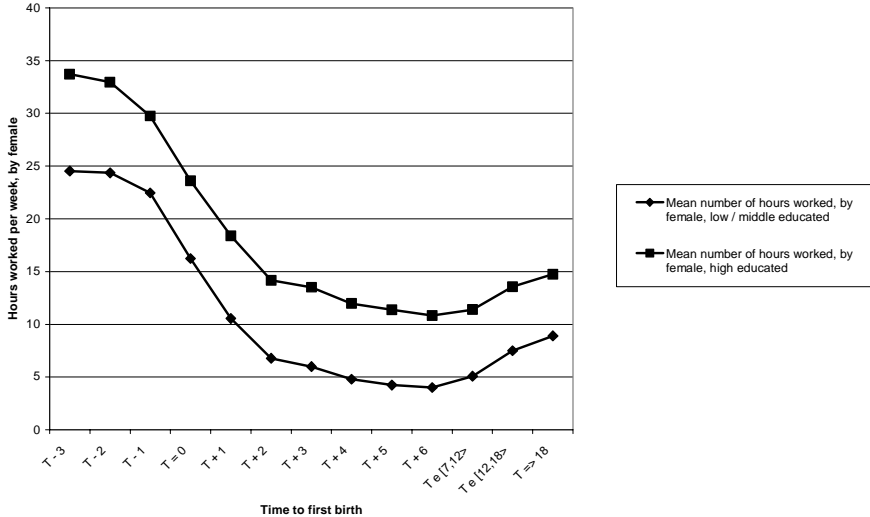

Figure 6.1: Development of hours worked by women surrounding the time of first birth, by levels of education, three year moving average.
Source: DHS, 1993 – 2005

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[20] Differences are tested using independent samples T-tests for each respective point in time; all $p < 0,05$.
[21] Year to year differences are tested using paired samples T-tests. As this procedure results in N(T-1) tests, for T timing points and N sub samples, we will only report specific results for pairs that are of special interest, and are significant at the 5% confidence level.
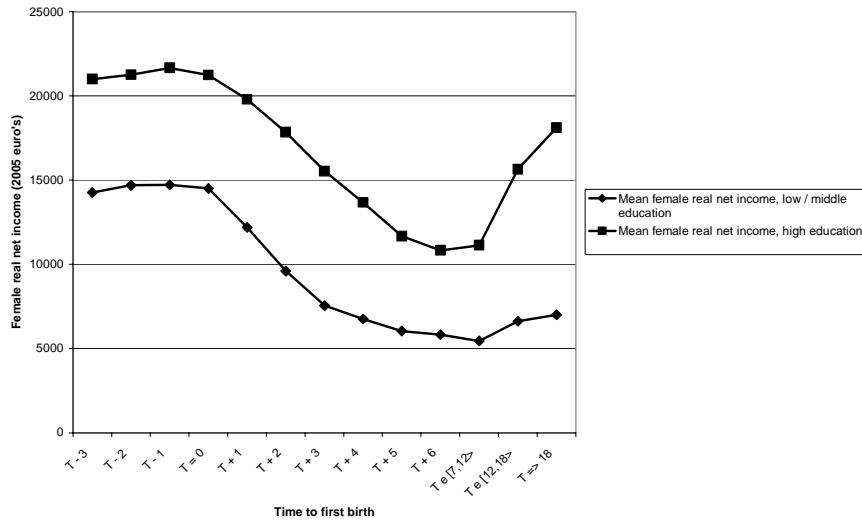
Figure 6.2: Development of female total income surrounding the time of first birth, by levels of education, three year moving average.
Source: DHS, 1993 – 2005

We conclude with a closer inspection of the apparent negative effects associated with giving birth early, found for the higher educated group. Figure 6.3 below illustrates the matter for the case of hours worked by women. As similar patterns arise for income, we do not report these further. Women giving birth at younger ages, defined to be at the age of 26, or before, work significantly less hours until the first child has reached school going ages, compared to women giving birth at later ages. These early movers are predominantly women of the low / middle age category (88%, N = 786) and member of the older cohorts (66,7%, N = 860), which explains part of the patterns found. However, the results from our models seem to suggest that especially the relatively small group of high educated early movers suffers a penalty relative to the reference category.
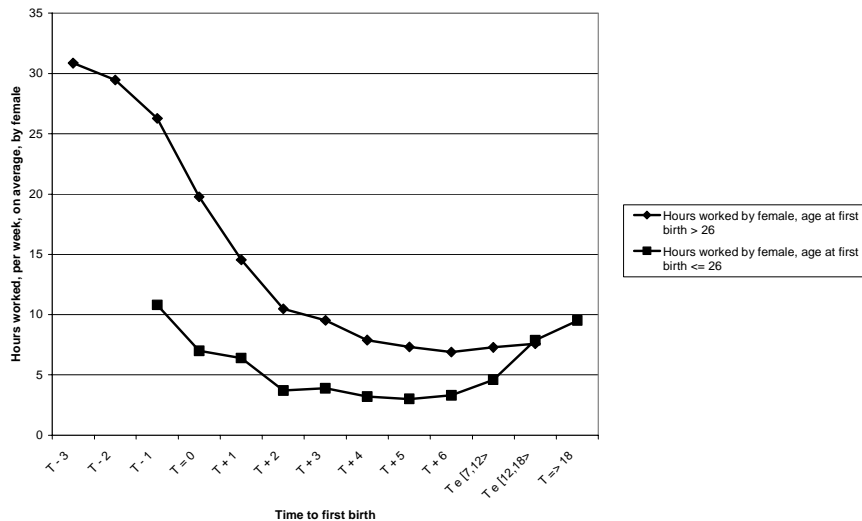

Figure 6.3: Development of hours worked by women surrounding the time of first birth, by age at first birth, three year moving average.
Source: DHS, 1993 – 2005

6.2 The household's financial position

In this section and the following we turn to our main topic. We approach household financial wealth from two perspectives: the development in total household income in section 6.2.1, and the subjective evaluation of the household's financial position by its members in section 6.2.2.

6.2.1 Total household real net income

We start our discussion with the presentation of a model of total household income in table 6.5 below, again for two educational categories. In both cases, the restricted model was rejected, be it at the 10% significance level for the high education group. The coefficients in this model generally have the expected sign, and the model has a sizeable R^2, therefore we elect the unrestricted version of the model, despite the reported significance level for the Wald test.

Dependent	Total real net household income / 1000			
Female education level	Low / Middle educated		High educated	
	B	*Sig.*	*B*	*Sig.*
Female age			6,61	0,01
Female age squared / 1000	1,82	0,70	-115,82	0,01
Male age	2,68	0,05		
Male age squared / 1000	-34,35	0,06	7,42	0,05
Female born before 1969	2,77	0,05	6,09	0,03
Child present in the HH	-7,67	0,05	7,54	0,26
Time to first birth				
T < 0	-1,70	0,81	-53,91	0,14
T = 0 & T = 1	3,37	0,32	-79,92	0,03
T = 2 & T = 3	-0,41	0,88	-73,72	0,04
T = 4 & T = 5	-0,85	0,72	-77,08	0,03
T = 6	-6,17	0,07	-74,72	0,04
T > 6			-70,31	0,05
Age at first birth				
<= 23 years	-27,10	0,29	-6,23	0,31
24 – 26 years	-22,54	0,38	-12,30	0,01
27 – 29 years	-22,00	0,40	-5,27	0,10
30 years =>	-18,72	0,48		
	Restricted model rejected		*Restricted model rejected*	
	P(F(10;996)>5,998) = 0,00		*P(F(10;325)>2,553) = 0,06*	
	Adj. R^2: 0,708		*Adj. R^2: 0,783*	
	N = 1010		*N = 339*	

Table 6.5: OLS regression; total real net household income, for categories of education
Source: DHS, 1993 – 2005

Household income reaches a maximum at age 39 of the husband for the low / middle education group, and a maximum at age 28 for the high educated group in our sample. Both models exhibit positive effects from being in an older cohort. At the time of observation, these households usually are further in their development of human capital and thus exhibit higher incomes. Different patterns with respect to the presence and timing of children arise for both educational categories. For the low / middle category we find a negative base line effect with respect to the presence of children, and no timing

effects. Conversely, we find timing effects for the high educated group, but no significant baseline effect. For the low / middle group, this result is in conjunction with the results we found for female labour supply and income. For the high education group, especially the results with respect to 'time to first birth' are more clear cut: household income for those with a recent first birth is significantly lower compared to that of the reference category, starting from the year of birth. Again, we find an additional negative effect from having given birth relatively early for this educational category.

We take a closer look at timing patterns, as well as the 'early-mover' penalty in figures 6.4 and 6.5 below. Figure 6.4 depicts total household income across educational categories, for the period surrounding first birth. We are following those households through time that are to experience first birth. Household income is significantly higher for the high education group (p = 0,05), except for the year of birth, and the year thereafter. The difference is insignificant for those years. The patterns appear remarkably flat, compared to the profiles we have seen in section 6.1 for female income. In the years before birth, the low / middle educated group reports significant increases in income from one year to the next (P(t(59) > 2,024) = 0,05), followed by a significant decrease in the second year after first birth (P(t(70) > 2,264) = 0,03). Mutations in either direction are insignificant in the years that follow. These dynamics are in contrast to the simple baseline effect we found in our multivariate model. It would appear that these intra-group dynamics are picked up by other covariates, or are of little contrast with the salient reference category of right censored households.
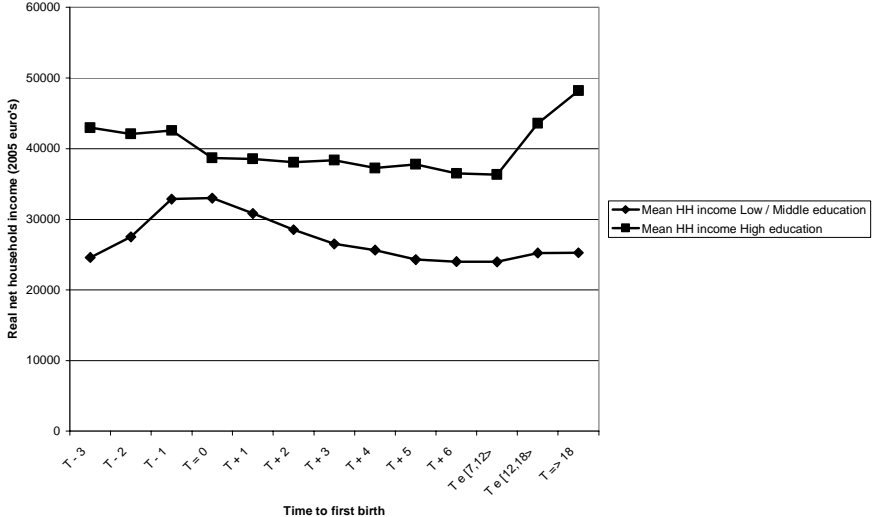

Figure 6.4: Development of total household income, surrounding the time of first birth, by levels of education, 3-year moving average.
Source: DHS, 1993 – 2005

For the high education group we find neither significant increases, nor decreases in real household income using the year-to-year paired samples t-tests. In contrast with the low / middle education group, the multivariate analysis for the high education group did reveal a timing pattern. Closer inspection of the coefficients reveals a fairly stable pattern as well. There are however some

underlying dynamics, associated with the 'early movers', causing the simple base line dummy 'presence of children' to turn insignificant and the respective timing dummies to pick up the trend for this educational category. In chapter 5 we noted that observations further away from first birth predominantly consist of households which were characterised as 'early movers'. Correcting for the income or human resource penalty associated with giving birth early, introduces a sufficient amount of non-linearity in the time trend, rendering the 'child present' dummy insignificant. At the same time, the correction was rather subtle, since the unrestricted model describing it was on the verge of insignificance. The penalty to 'early moving', in terms of total household income, is depicted in figure 6.5 below.
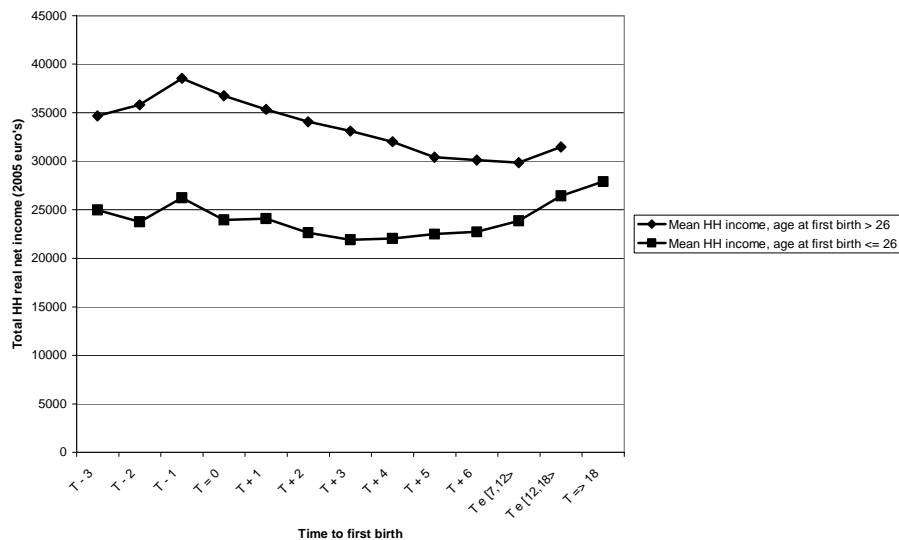

Figure 6.5: Development of total household income, surrounding the time of first birth, by age at time of first birth, 3-year moving average.
Source: DHS, 1993 – 2005

In general, early moving households are significantly worse off compared to who give birth at higher ages except for the period three to two years prior to birth. Pairwise t-tests reveal that there are no significant in- or decreases in real household income for both groups, apart from a significant increase seven years after first birth for the early movers $(P(t(84) > 3,550) = 0,01)$. It takes until the school going years of the oldest child, before the early movers start to catch up on some of the deficit, it seems. Also, the pattern is similar to that of the low / middle educated women we found in section 6.1, which reflects of the composition of the early mover group.

6.2.2 Household finances: subjective assessment

In this section we study the household's financial situation from the perspective of the members. Figure 6.6 below depicts reported proportions for the period surrounding first birth. There appears to be a shift in the evaluation by members of the household following the arrival of the first child. Predominantly, change appears to occur at the extremes of the distribution.
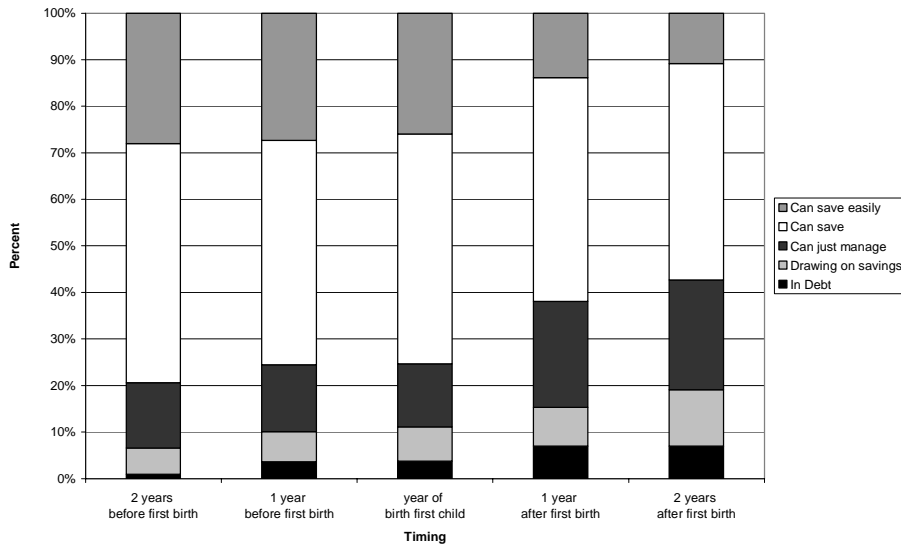
Figure 6.6: Evaluation of the household's financial position.
Source: DHS, 1993 – 2005

Figure 6.7 below shows the development of the average rating across time, for categories of education. The difference between levels of evaluation is insignificant across levels of education, bar at the time of birth (p < 0,10; df = 111). Paired samples t-tests show that the rating does not change significantly for low / middle educated women for the entire period, a surprising result as the mean level for the evaluation appears to drop off considerably. There is however a considerable spread, with many reporting improvements as well. The improvement reported at the 18th birthday of the oldest child is significant (P(t(15) > 2,977) = 0,01). For the high education group we find a significant decrease at the time of birth of the first child (P(t(46) < -2,486) = 0,02), but no other significant shifts.
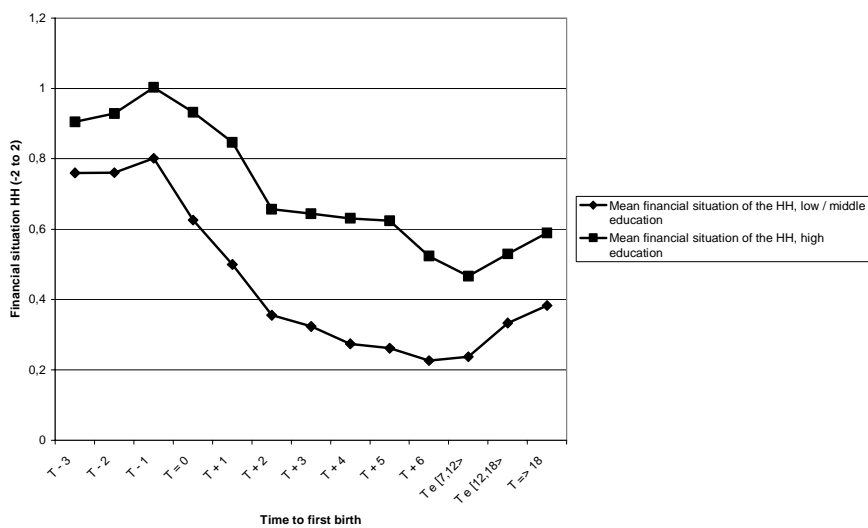

Figure 6.7: Development of financial evaluation, surrounding the time of first birth, by level of education, three year moving average.
Source: DHS, 1993 – 2005

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Table 6.6 presents the results for a multivariate analysis of financial situation of the household, for groups of education. For the high education group, the unrestricted model is rejected and thus only the covariates included in the restricted model are presented. This result indicates that the presence and timing of children has no effect on the evaluation of the financial situation of the household, next to the effect of the other included covariates, for this educational category. Especially male income appears to yield explanatory power. For low / middle educated women, the restricted model was rejected.

Dependent	Financial situation of the household			
Female education level	Low / Middle educated		High educated	
	B	*Sig.*	*B*	*Sig.*
Female age	-0,01	0,73		
Female age squared / 1000	0,66	0,29	-0,27	0,55
Male age			0,03	0,15
Male age squared / 1000	-0,13	0,36	-0,78	0,06
Female real net HH income / 1000	0,01	0,08	0,01	0,23
Male real net HH income / 1000	0,02	0,00	0,02	0,00
Female born before 1969	0,51	0,00	0,16	0,42
Child present in the HH	-0,91	0,00		
Time to first birth				
T < 0	-0,10	0,82		
T = 0 & T = 1	0,60	0,01		
T = 2 & T = 3	0,44	0,02		
T = 4 & T = 5	0,11	0,52		
T = 6	0,33	0,20		
T > 6				
Age at first birth				
<= 23 years				
24 – 26 years	-0,03	0,76		
27 – 29 years	0,02	0,88		
30 years =>	-0,16	0,37		
	Restricted model rejected $P(F(9;541)>4,225) = 0,00$		*Unrestricted model rejected* $P(F(10;170)>0,775) = 0,672$	
	Adj. R^2: 0,322		*Adj. R^2: 0,422*	
	N = 556		*N = 186*	

Table 6.6: OLS regression; financial situation of the household, for categories of education
Source: DHS, 1993 – 2005

In general, the evaluation appears to be unrelated to age, apart from a significant positive effect from belonging to the older cohorts for the low / middle educated group. Also, male income appears instrumental in the determining the household's financial position as opposed to female income. This is expected as our sample consists primarily of households in their child bearing ages, with a sizeable proportion of women in the process of reducing their labour supply. For the low / middle educated women, there is a sizeable negative baseline effect from the presence of children. In the first years

after giving birth however, this effect is countered by the positive coefficients for the time to first birth dummies. As female income is only just significant at the 10% level, we could prudently conclude that given a suitable contribution to household financial welfare, there is room for optimism surrounding the arrival of the first born. In the multivariate income model in section 6.2.1 we found no negative timing effects for income, apart from the baseline negative effect, for this educational category. Combining these results, it takes two to three years for the negative baseline effects of children on the financial situation of the household to be recognised as such by the members. There is no added negative effect from giving birth early for this group.

6.3 The household's housing arrangements

In this section we will present our findings with respect to the housing arrangements surrounding the birth of the first child. The topic of section 6.3.1 will be home ownership. In section 6.3.2 we turn to renting single family homes. The reference category for 'renting a single family home' is 'owning' or 'renting a different type of house'. As such, the two dependent variables are not perfect opposites. As we have seen in chapter 5, the 'renting a single family home' is a relatively small category in our dataset. Nevertheless we will attempt describing the group, firstly because the move to a single family home in general can be viewed as move both driven by, and leading to a more stable household situation. Second, the tenure choice is associated with the household's financial situation, and as such forms a link to the results we have presented above.

By means of introduction we first present data with respect to marital status, and recent moves by the household. From our earlier discussion, it is clear that during the period in which the first child arrives, households progressively move to more stable, and higher commitment housing situations. Figure 6.8 presents data on marital status.
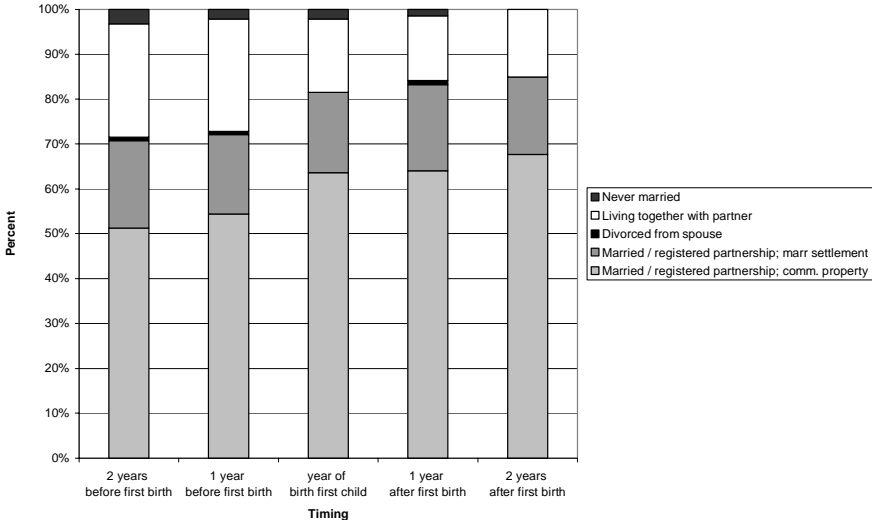

Figure 6.8: Marital status, surrounding the arrival of the first child
Source: DHS, 1993 – 2005

As becomes clear in figure 6.8, marital status exhibits the same pattern. There appears to be slight breach in trend just before the arrival of the first child, only to flatten out after the child has been born. Divorce rates at this stage are almost negligible.

Figure 6.9 depicts cumulative hazard functions with respect to the duration between first birth and the most recent move of a household. The left hand panel presents the results for those households who experienced first birth after their most recent move had taken place; the right hand side does so for those households experiencing first birth before their most recent move. The hazard functions appear relatively straight, for both educational categories. This would indicate that, before as well as after birth, there is little acceleration or deceleration of transitions into new homes, contrary to what one would expect in the case of anticipation or cost effects. From table 6.7, we gather that survival times are significantly different across education levels, only for those households experiencing first birth earlier than the most recent move. High education households exhibit slightly higher rates and such a shorter mean survival time; these households are prone to move somewhat earlier after first birth has taken place.
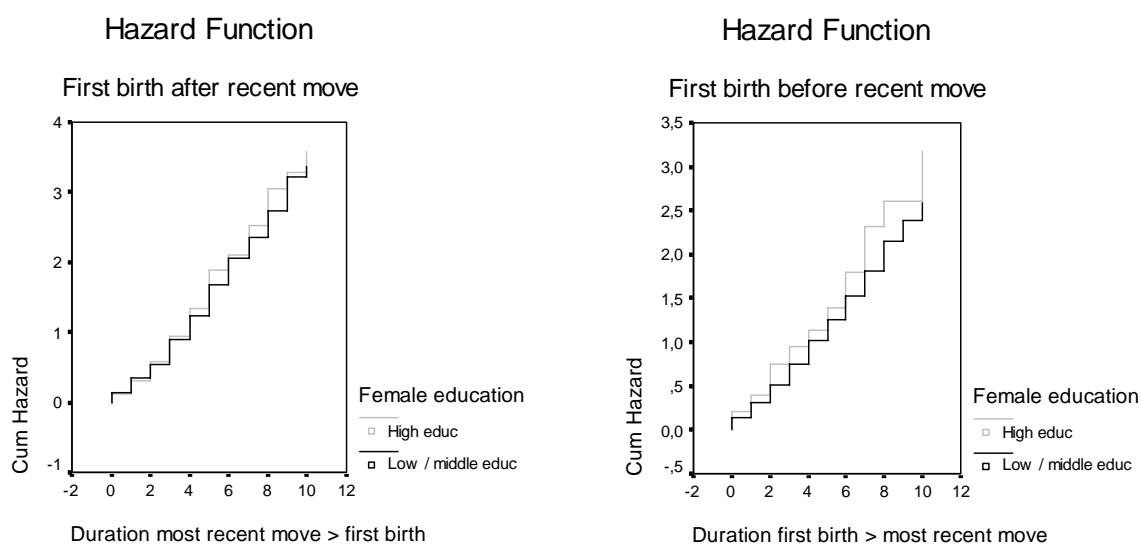

Figure 6.9: Duration between most recent move, and arrival of the first child. Kaplan-Meier estimates of hazard rates, by levels of education.
Source: DHS, 1993 – 2005.

	Waiting times: move before first birth			Waiting times: first birth before move	
Education	*Low / Middle*	*High*		*Low / Middle*	*High*
Mean survival time	3,40	3,30		3,98	3,36
Standard deviation	0,12	0,18		0,14	0,28
N	521	213		522	121
Log Rank test statistic		0,37			3,84
Significance		0,54			0,05

Table 6.7: Duration between most recent move, and arrival of the first child. Kaplan-Meier estimates of hazard rates, by levels of education.
Source: DHS, 1993 – 2005.

6.3.1 Home ownership

Table 6.8 provides the results from an OLS regression on 'Being a home owner'. For the low / middle education group, the unrestricted model is rejected. For this group the presence or timing of children does not add to the explanation of existing home ownership. Among high education households, the relationship is not very strong either, although early movers appear to be at a disadvantage. The model for high educated households appears to suffer from a low number of valid cases in addition. Male income however still is a significant positive for both educational categories, which is in line with expectations. Earlier we have noted the trend for younger cohorts to move earlier into owned occupied housing, we cannot confirm this for our sample, with cohort membership entering insignificant in our models.

Dependent	Home ownership			
Female education level	**Low / Middle educated**		**High educated**	
	B	*Sig.*	*B*	*Sig.*
Female age	0,02	0,00	-0,02	0,77
Female age squared / 1000	-0,21	0,26	0,37	0,66
Male age			0,06	0,28
Male age squared / 1000	-0,07	0,34	-0,81	0,23
Female real net HH income / 1000	0,00	0,95	0,00	0,10
Male real net HH income / 1000	0,01	0,00	0,00	0,01
Financial situation of the HH	0,08	0,00	-0,01	0,59
Female born before 1969	0,03	0,64	-0,03	0,61
Child present in the HH				
Time to first birth				
T < 0				
T = 0 & T = 1				
T = 2 & T = 3				
T = 4 & T = 5			0,05	0,60
T = 6			0,12	0,34
T > 6				
Female age at first birth				
<= 23 years			-0,29	0,00
24 – 26 years				
27 – 29 years			-0,03	0,43
30 years =>				
	Unrestricted model rejected $P(F(9;451)>1,604) = 0,111$		*Restricted model rejected* $P(F(4;155)>4,136) = 0,03$	
	Adj. R^2: 0,804 *N = 556*		*Adj. R^2: 0,931* *N = 186*	

Table 6.8: OLS regression; home ownership, for categories of education.
Source: DHS, 1993 – 2005

In chapter 4, we have seen that children have a confounding effect on the probability to own a home. One the one hand there is the 'facilitation motive', i.e. the household wishes to provide stable and suitable surroundings for the upbringing of the child. On the other hand, children are costly, and their arrival is often associated with a drop in disposable household income, which may limit households in

their wish to purchase if it has not already done so. Figure 6.10 provides us with insight in year to year changes in home ownership, for levels of education. The increase in proportion owning before first birth is significant for both the low / middle education group ($P(t(26) > 1,803) = 0,08$), as well as the high education group ($P(t(28) > 2,117) = 0,04$). This is evidence for an anticipation motive as discussed in chapter 4. In addition to this, we note that the proportions owning for these child bearing households are higher than those reported in table 5.1 for the general sample, for both educational categories, which points to a facilitation effect.
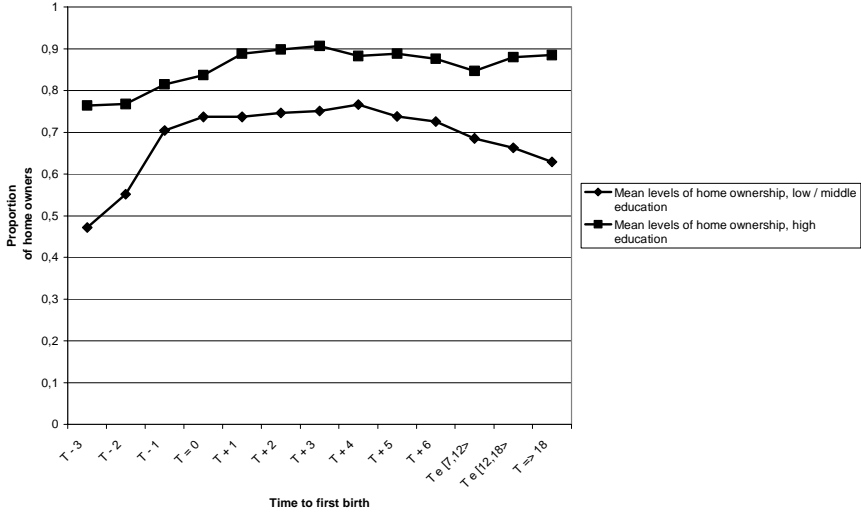

Figure 6.10: Development of home ownership, surrounding the time of first birth, by level of education, three year moving average.
Source: DHS, 1993 – 2005

But as we have seen in the model above, these anticipation effects do not survive controls for socio-economic variables. Starting from a year after first birth, the proportion of high educated households owning a home is significantly higher than the proportion owning among low / middle education households. This possibly reflects the more favourable economic position of the high educated households.

6.3.2 Renting a single family home

In table 6.9 we report the results for a multivariate analysis on 'renting a single family home'. For both educational categories, the restricted model is rejected. Socio economic and demographic variables do not reach significance for the high education group; in fact the model joint significance seems to hinge on the strong positive effect of being an early mover household. This group is very likely to rent single family homes.

For the low / middle education group, socio economic and demographic variables show some interesting patterns. Female income is insignificant, male income has a negative effect on renting single family homes. This effect is robust to corrections for the household's overall evaluation of its

financial situation. According to the multivariate model there are no specific timing effects associated with the first birth, other than strong negative effects from having given birth between 24 and 29 years. This is an interesting result, as these ages capture the second and third or middle two quartiles of births in our dataset. Apparently, there is not only an effect from being an early mover, but as well from being relatively late, for this educational category.

Dependent	Renting a single family home			
Female education level	**Low / Middle educated**		**High educated**	
	B	**Sig.**	**B**	**Sig.**
Female age	0,03	0,01	-0,04	0,30
Female age squared / 1000	-0,49	0,09	0,67	0,29
Male age			0,04	0,28
Male age squared / 1000	0,07	0,30	-0,53	0,30
Female real net HH income / 1000	0,00	0,76	0,00	0,37
Male real net HH income / 1000	-0,01	0,00	0,00	0,09
Financial situation of the HH	-0,09	0,00	0,01	0,71
Female born before 1969	-0,06	0,24	0,00	0,96
Child present in the HH	0,00	0,99		
Time to first birth				
T < 0	-0,32	0,15		
T = 0 & T = 1	0,10	0,42		
T = 2 & T = 3	0,04	0,72		
T = 4 & T = 5	-0,05	0,60	-0,01	0,85
T = 6	0,22	0,08	-0,05	0,61
T > 6				
Age at first birth				
<= 23 years			0,26	0,00
24 – 26 years	-0,15	0,00		
27 – 29 years	-0,13	0,03	0,00	0,90
30 years =>	-0,07	0,41		
	Restricted model rejected		*Restricted model rejected*	
	P(F(9;451)>2,176) = 0,02		*P(F(4;155)>5,249) = 0,01*	
	Adj. R^2: 0,308		*Adj. R^2: 0,133*	
	N = 467		*N = 167*	

Table 6.9: OLS regression; renting a single family home, for categories of education.
Source: DHS, 1993 – 2005

The lack of time trend indicated appears to be confirmed by figure 6.11: even after smoothing a rather erratic pattern remains; all year-to-year mutations in renting a single family home are insignificant. For the first four years after first birth has taken place, we do find significant differences in levels of occupancy across levels of education, as well as for the school going ages of the oldest child. Higher educated households are significantly less likely to rent a single family home for these periods. Given the negative effects of income, this difference is presumably related to the higher purchase power of these households.
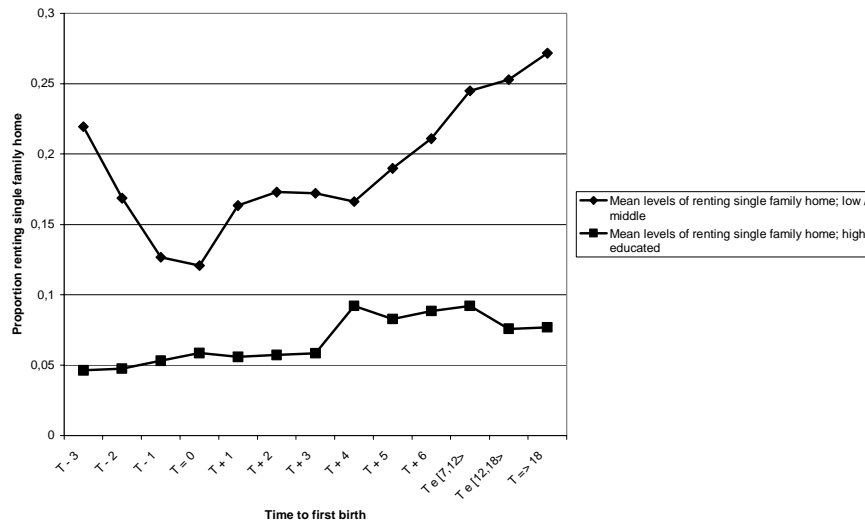
Figure 6.11: Development of renting a single family home, surrounding the time of first birth, by level of education, three year moving average.
Source: DHS, 1993 – 2005

In our multivariate model we have identified a positive effect of being an early mover on renting a single family home, for the high education group. Clearly from figure 6.12, we see that especially during the years following first birth, the early mover group is more likely to rent. This difference is significant for the year of birth, until two years afterwards. The difference then does not reach significance again until the first child reaches the school going ages. There are no significant year-to-year trends for these subgroups.

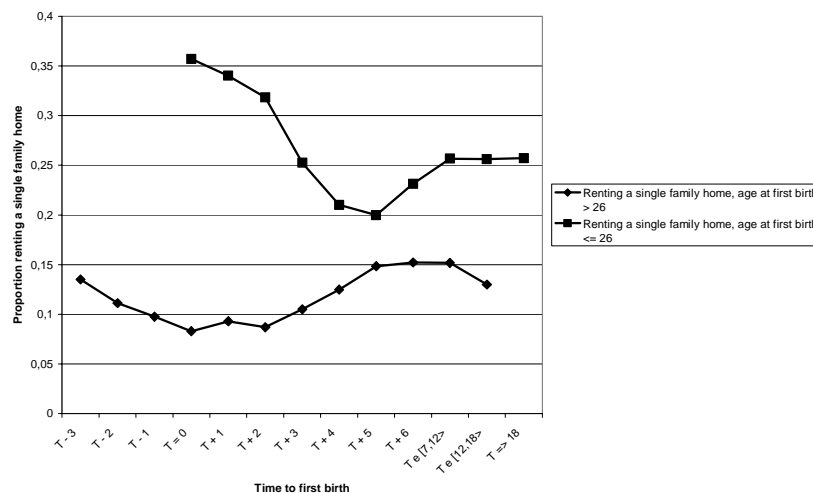*Figure 6.12: Development of renting a single family home, surrounding the time of first birth, by age at first birth, three year moving average.*
Source: DHS, 1993 – 2005

6.4 Case study: high educated early movers

Table 6.10 below presents the results for a series of independent samples t-tests on the group of high educated households, comparing the sub group 'early movers' to those giving first birth at ages

generally observed in the literature. Right censored households are excluded from this particular analysis. In the analysis presented above, we have found evidence that this specific sub group of our sample appears to suffer from penalties with respect to the households' financial position and home ownership, related to the timing of their first child. The data reported below pertains to averages for the full period the respective households have spent in observation. Small sample sizes prohibits a more in depth statistical analysis of their position. The general demographics indicate that the group of early movers is slightly younger when observed. Women work significantly less hours, are employed to a lesser extent as they spend more time working in the own household. This results in a negative effect on female income. Next to this, total household income and the evaluation of the financial position of the household are significantly lower as well. In section 6.2 we have found little or no effect of reduced female labour supply on the households' financial position, so this result is interesting. Home ownership is significantly lower, whereas renting a single family home is significantly more predominant. From this, we gather that early moving households do indeed appear to lag behind their later moving counter parts. However, the income levels reported for the early movers below compare quite favourably with those reported for the general sample in table 5.1, as does home ownership. As such the penalties discussed earlier exist predominantly in relative terms; the group does not appear at risk of severe welfare deterioration at the arrival of children.

	Age at first birth <= 26		Age at first birth > 26		t-test for Equality of Means		
	Mean	Std. Error Mean	Mean	Std. Error Mean	t	df	Sig. (2-tailed)
Female age at first birth	24,06	0,23	30,09	0,13	-22,95	151	0,00
Female age	31,75	0,43	33,60	0,17	-4,00	115	0,00
Male age	35,04	0,61	36,17	0,25	-1,72	113	0,09
Female hours worked per week on average	8,57	1,68	17,53	0,96	-4,50	333	0,00
Male hours worked per week on average	38,75	2,34	37,59	1,05	0,47	296	0,64
Female is employed	0,39	0,05	0,70	0,02	-5,49	132	0,00
Female is looking for work	0,09	0,03	0,07	0,01	0,59	409	0,56
Female works in own household	0,52	0,05	0,23	0,02	5,15	123	0,00
Male is employed	0,89	0,03	0,88	0,02	0,06	409	0,95
Male is looking for work	0,05	0,02	0,08	0,01	-1,28	170	0,20
Male is working in own household	0,02	0,01	0,01	0,01	0,60	409	0,55
Female total real net income / 1000	10,73	1,28	15,54	0,71	-3,24	279	0,00
Male total real net income / 1000	29,60	1,97	32,64	1,06	-1,28	270	0,20
HH total real net income / 1000	29,26	2,20	35,56	1,14	-2,53	345	0,01
Financial situation of the HH	0,49	0,12	0,64	0,06	-1,11	305	0,27
HH is a home owner	0,78	0,05	0,88	0,02	-1,85	76	0,07
HH is renting a single family home	0,16	0,05	0,06	0,01	2,07	73	0,04

Table 6.10: Independent samples t-tests, high educated households, for timing of first birth
Source: DHS, 1993 – 2005

6.5 Summary

In this chapter we have studied the relationship between the arrival of the first child and income, as well as housing arrangements, for young Dutch households. Generally, results were presented for two separate educational categories, as our earlier review indicated that constraints and opportunities vary considerably across these groups.

We start our discussion with the low / middle education group. Women in this category significantly lower their amount of hours worked, upon the arrival of the first child. There is a strong negative baseline effect, which is compensated to some extent by positive effects in the year of birth, as well as the three years that follow. Female labour supply remains at a low level on average, the first significant increase occurs when the oldest child reaches school going ages. We found no specific effects from female age at first birth. For the demographic and socio economic covariates we generally found the expected signs. With respect to income, we found similar trends, be it that the trends related to children were less pronounced.

This decline in female labour supply does not appear to affect total household income to a great extent. The only significant drop off we find is associated with the year of birth, after which the timing – income profile remains stable. For this educational group, household income is mainly explained through basic socio economic variables, with a simple baseline coefficient picking up the negative effect of children. The evaluation of the financial position of the household provides us with a rather more volatile picture. A strong significant negative baseline effect is compensated in the first years after birth by positive timing effects, similar to the coefficients found for female labour supply. The evaluation in itself is only moderately related to female income, with male income being the more important explanatory variable. Next to these results from the multivariate model, there appear to be little or no interesting trends in the evaluation in the period surrounding first birth. This reflects the relative stability of real household income. Only when the oldest child reaches the age of 18, do we find a significant increase.

For the low / middle education group, the effect of children on home ownership is rejected, leaving predominantly male income, next to female age, to pick up most explanatory power in our multivariate model. The dependent variable in our model was existing home ownership. Estimating a similar model on transitions into ownership might have provided us with a different result, however small sample sizes were prohibitive in that respect. Our next best alternative, paired t-tests on successive observations, proved fruitful in the sense that we found a significant increase in ownership before first birth, be it at the 10% level. With respect to renting a single family home, we found negative effects for income, as well as female age effects, indicating an inverse U shape with a maximum around age 31. This is approximately five years after the mean age at birth of 26 we have reported for this sub group in table 5.1. There were little or no time trends with respect to children however.

We turn to the sub group of high educated households. We find a strong negative effect of male income on female labour supply, given the financial situation as well as for female income. This is most likely related to the specific sample under study, consisting of young couples in the process of household formation as, generally, income of partners is positively related. Similar to the low / middle education group, we find a strong negative baseline effect of children. But unlike the low / middle group, we find this effect only for female labour supply, not for income. Also, there are no timing effects, apart from a significant negative effect on both income and labour supply for a sub group of the sample we have referred to as the 'early movers': women with a lower than average age at the time of first birth. Univariate time trends for female income and labour supply are quite similar to those reported for the low / middle education group.

With respect to total household income, the effect of children is on the verge of being insignificant, as the rather stable univariate time series underlines. We find no negative baseline effect, but the model does include a series of negative time series dummies, and a negative effect from being an early mover. Apparently these effects caused non-linearities in the model that caused the simple baseline effect to turn insignificant. The effect of children is rejected however for the financial evaluation model, as male income serves to explain most of the variation therein.

In general, home ownership is highly prevalent among households in our sample, and around the time of the first birth we find a significant increase on top of that. In our multivariate analysis we find positive effects for male income, and negative effects on home ownership from being an early mover. Next to this, the relationship with presence and timing of children appears not strong, as is for the case of renting single family homes. High educated households are unlikely to rent, and this affects the explanatory power of our model through sample sizes. High educated early movers are however likely to rent.

We have concluded this chapter with a closer inspection of these early movers. From the preceding analysis the impression rose of a sub group that suffered to a great extent from a lack of human capital accumulation at a crucial age: finishing the educational career and starting a labour market career. Although this group does not perform as well as the general group of high educated households, their sample statistics still compare rather favourably to those of for example the low / middle educated group. The extent of penalties stemming from multivariate analysis should therefore not be overrated.

7 Summary and conclusions

Households are faced with a multitude of possibilities and constraints in their process of family formation, of economic, social and biological nature. Many of those have been shown to affect timing and quantum of fertility, and moreover, many are affecting life after the first birth as well. In our discussion of determinants of fertility in chapter 2 we identified a number of these factors and their respective impact on household fertility decisions. The interrelatedness that exists between those factors has lead previous researchers of the topic to adopt a variety of statistical approaches, aimed at factoring out the complex endogenous patterns that seemingly exist in household decision making. We have found that a key characteristic in this respect is the household's, or more specifically, the female's earning capacity which depends on education and working experience. A second factor of importance is intra household decision making, including the role and (economic) contribution to the household's welfare of the partner, as well unobserved personal characteristics such as attitudes.

In order to assess the impact of changes in the financial welfare of households, Statistics Netherlands applies correction scales to income data, resulting in 'Needs Based Income'. This measure is used to compare level incomes between households of varying composition. The correction applied is general in nature, leaving the measure quite suitable to study overall trends. However, it is difficult to ascertain the exact causes of certain shifts, using composite measures such as Needs Based Income. In general, households are reported to experience a setback of around 18% upon arrival of the first child, related to increased costs as well as a decline of hours worked by the mother. There is a considerable amount of variability around this average however. Eligibility to government transfers serve to cushion the adverse effects somewhat. Higher educated women that manage to limit their time away from work, minimize the financial setback related to having children.

In our sample, we have found significant declines in hours worked by women, with different timing patterns for low / middle educated women, and higher educated women. The effects of these shifts on household income, as well as the evaluation by members of the household, remain limited however. Often it is male income that is the most important determinant of household financial welfare. For the high educated groups, female labour supply is related negatively to male income. This indicates that women are often able to reduce their hours worked without compromising the household's financial situation too much. For the low / middle educated groups, we found compensating effects for the first few years after birth working against a negative baseline effect on evaluation of the financial position of the household. Overall, compared to the drop off reported by Statistics Netherlands, the process appears to be rather smoother for our sample of households.

With respect to housing, young cohorts are found to be moving into long stay, or 'high commitment' housing at increasingly younger ages. The relationship with both union formation as well as the fertility career appears to be weakening for this group. Conversely, economic aspects such availability

and affordability of suitable housing become increasingly important. Nevertheless, anticipation effects are found with respect to the birth of the first child: households want to provide suitable living conditions, and are likely move to single family homes in the years before birth. In general, being in a union is a strong predictor for home ownership, as this provides the stable household situation, as well as the financial clout to take up such a long term commitment. Moving into rented single family homes provides an alternative for groups who are either not up for the long term commitment, or lack the financial means to own a home.

With respect to children two factors appear at work: anticipation effects of wanting to provide suitable living conditions and cost effects related to the new born which may act to prohibit a move into ownership. A discussion of earlier results revealed that evidence is mixed, and that careful study of samples and specifications is required to identify the two separate effects.

For our sample, we found significant anticipation effects, for both education levels. However, the variables related to presence and timing of children were rendered jointly insignificant in our multivariate model with respect to the low / middle educated group. Also, for the high educated group the relationship appears not strong. For our sample, with an already high proportion of existing owners, economic motives for home purchase appear more important. Renting single family homes is negatively associated with income, higher educated households in our sample very rarely rented. The relationship with the presence and timing of children again is very weak, or not existent.

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