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**HOUSEHOLD CONSUMPTION AND SAVINGS AROUND
THE TIME OF BIRTHS
AND THE ROLE OF EDUCATION**

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ABSTRACT

This study examines households' financial situation around the time of births using a panel of Dutch households over the period 1987-1993. I find that at all levels of education households accumulate wealth before and draw on their liquid savings after having given birth to their first child. Nevertheless, households draw too little on their savings to offset the decrease in income due to a reduction in female labor supply. Consequently, consumption decreases with the birth of a child. Relative to households of highly educated women, households of women with a lower level of education have a stronger decrease in consumption with the birth of a child, which is due to a larger reduction in female labor supply and, consequently, a larger decrease in income.

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I INTRODUCTION

Households may experience significant changes in their financial situation around the time of birth of their children. Children are costly, hence an increase in consumption may be expected, and many women choose to reduce their labor supply after having given birth, hence a decrease in household income. Today's contraceptive methods enable households to schedule births in a period that is most desirable for them and they may anticipate on this expected combination of an increase in consumption and a decrease in income by saving before having children and drawing on their savings when children are present.

Mainly due to data limitations empirical evidence on consumption and savings behavior of households around the time of births is scarce. The few studies available show that, in contrast to the hypothesized increase in consumption with the birth of a child, consumption actually decreases with the birth of a child. James Smith and Michael Ward (1980), using US data for the period 1967-1970, report that young children depress savings for young families but also report that consumption decreases with the birth of a child. They conclude that the main reason for this reduction in savings and consumption is the fall in household income. In line with this, Patricia Apps (2001), using 1993 Australian data, reports lower income and consumption levels for households with young children than for (young) households with no children and that the difference in income is higher than the difference in consumption, consequently savings are lower in households with children. This empirical finding of a decrease in consumption with the birth of a child may appear to be in conflict with the empirical findings on the positive costs of children¹. However, in case of, for instance, liquidity constraint consumers, consumption may well track income (Stephen Zeldes, 1989), hence consumption decreases when income decreases. In the literature this latter effect is often referred to as excess sensitivity of consumption with respect to (expected) income changes (Majorie Flavin, 1981, Annamaria Lusardi, 1996, Rob Alessie and Annamaria Lusardi, 1997).

The main contribution to the literature of this study is a detailed examination of households' financial situation around the time of births and in particular households' savings behavior by level of education. Hereby making the distinction between housing wealth and liquid assets. This is especially of importance since mortgage contracts may be such that households need to draw on their liquid assets rather than reduce mortgage payments when household consumption exceeds household income. Issues such as female labor supply and earnings around the birth of the first child are examined in detail to understand the changes in household income around the time of births. In addition an empirical analysis is carried out based on a lifecycle model of household consumption decisions to assess the extent to which births and predicted income changes affect consumption.

¹ Angus Deaton and John Muellbauer, 1980, Ranjan Ray, 1983, Martin Browning, 1992, and Martin Browning and Annamaria Lusardi, 1996.

This study employs a panel of Dutch households over the period 1986-1994. The main advantage of these data is that households are followed over a considerable length of time.

The outline of the paper is as follows: Section 1 discusses the data. Section 2 provides a complete picture of the households' financial situation around births. Section 3 analyzes consumption changes using an Euler equation. Section 4 summarizes the main findings.

2 DATA: THE DUTCH SOCIO-ECONOMIC PANEL

The micro data used in this study are taken from the Socio-Economic Panel (SEP) of the Netherlands. The panel started in 1984 and is conducted by Statistics Netherlands. About 5000 households respond to the survey in each wave. There can be more than one respondent per household.² Each respondent is asked questions about his or her socio-economic and demographic situation. Up to 1990 the survey has been conducted twice a year, a wave in April and a wave in October. Information on earnings has been collected in the October waves and information on household wealth is collected in the April waves. From 1990 onwards the survey is conducted only once a year and all information is collected in May. At the time of starting this research all waves up to and including 1994 were available. However, information on households' financial wealth is only available from 1987 onwards and information on labor income is not available for the year 1994³.

I exploit the panel nature of the data and compare households' situations before and after the birth of their first child. Furthermore only couples, either married or cohabiting, are being considered. Thus only couples for which the first birth is observed within the observation period are selected. Furthermore observations with missing values on any of the relevant variables are excluded from the sample.⁴ The resulting sample contains information on about 120 households per year over the years 1988-1993. Tables 1 and 2 report the relevant sample statistics. All financial statistics are reported in 1994 Euros. The sample statistics show that the sample ages over time, this is due to the sample selection criteria. This causes the female employment rate and the average hours of work to decrease over time. Virtually all men in the sample are full-time employed. As discussed above, the time between the 1989 and 1990 wave of the panel is less than one year because the month of interview changed from October to May. This shortening of the observation period causes fewer births for 1990. Statistics on the age distribution of children show that most households have, in the end, two children. Marital rate increases to 99%, which is presumably an age effect. The homeownership rate increases from 0.57 in 1987 up to 0.72 in 1993. A comparison of these numbers with macroeconomic statistics yields the conclusion that this is mainly a time effect.

² A respondent is a person at least 16 years old. In principle each person in the household over 15 should complete the questionnaire.

³ In 1994 questions about earnings over 1993 are asked.

⁴ A more detailed description of the data cleaning process is available upon request.

Table I. The number of observations and sample averages per year.

Year	1987	1988	1989	1990	1991	1992	1993
Number of observations	111	123	144	141	127	113	102
Variable	Sample Averages						
Age of the woman	26	27	28	29	30	30	31
Educational attainment ¹							
level 1	0.14	0.22	0.19	0.16	0.14	0.12	0.12
level 2	0.58	0.53	0.55	0.55	0.55	0.58	0.58
level 3	0.28	0.25	0.26	0.28	0.31	0.30	0.30
Female Employment rate ²	0.75	0.62	0.53	0.47	0.39	0.42	0.36
Wage rate of the woman ⁴	7.16	7.46	6.63	7.11	7.17	7.48	8.49
Hours of Work ⁴	32	30	30	30	30	27	24
Age of the man	29	30	31	31	32	33	34
Education attainment of the man ¹							
level 1	0.16	0.19	0.14	0.13	0.23	0.12	0.14
level 2	0.48	0.46	0.49	0.45	0.37	0.45	0.40
level 3	0.36	0.36	0.37	0.42	0.40	0.42	0.46
Male Employment Rate	0.99	0.98	0.97	0.98	0.98	0.99	1.00
Wage rate of the man	8.06	8.07	7.95	8.58	8.99	8.88	8.97
Hours of Work	39	40	40	38	38	38	38
Birth Rate ⁵	0.29	0.27	0.31	0.23	0.32	0.41	0.40
Number of Children equal to 0	0.71	0.54	0.40	0.33	0.24	0.13	0.00
Number of Children equal to 1	0.28	0.43	0.53	0.50	0.46	0.44	0.45
Number of Children equal to 2	0.01	0.02	0.06	0.16	0.29	0.41	0.49
Number of Children equal to 3	0.00	0.01	0.01	0.01	0.01	0.02	0.06
Marital Status	0.82	0.87	0.92	0.92	0.94	0.96	0.99
Homeownership	0.57	0.59	0.64	0.70	0.74	0.73	0.72

Level 1 is at most primary education or secondary education, level 2 is intermediate vocational education (MBO), level 3 is higher vocational education (HBO) or a university degree.

Equal to 1 if the woman is employed, 0 otherwise.

In years, calculated on a sample of employed women

Calculated on a sample of employed women.

Equal to 1 if the woman gave birth to a child in this year, 0 otherwise.

Table 2 reports on household income, consumption and savings over time. Household income includes earnings of both the man and woman in the household, child allowances, money transfers made to the household (for instance an inheritance) and interest payments on financial assets⁵. Household income is net of income tax and social security contributions. Liquid Assets include checking and savings accounts, savings certificates, money lent to other people, stocks, bonds, and the value of cars owned by the household. From this measure the total amount of debt and loans is subtracted. Pension wealth is not observed. The value of the house and mortgages are excluded from this measurement because it is not considered to be a liquid asset⁶. Housing wealth is defined as the value of the house minus the mortgage commitments. Thus total household wealth equals the liquid assets plus housing wealth. Liquid savings is the difference in liquid assets between two subsequent periods. Savings in the house is the difference in housing wealth between two subsequent periods. The negative savings rate in the recession year 1991 is in line with the National Accounts. Table 2 shows that housing wealth is on average almost twice the value of the liquid assets.

Table 2. Household income, household savings, liquid assets, homeownership and housing wealth.

	Year	1987	1988	1989	1990	1991	1992	1993
Number of observations		111	123	144	141	127	113	102
Household Income	Mean	26021	24726	24109	23916	24646	23541	24556
	Media	25348	23487	23695	23018	24206	22684	23661
Household Consumption	Mean	22767	22346	22236	22491	26266	20697	22974
	Media	20326	21323	21370	20977	22075	18394	19344
Household Savings								
Total Savings	Mean	3255	2381	1873	1426	-1620	2843	1581
	Media	2712	1630	2366	596	-449	2275	1565
Liquid Savings	Mean	177	-1092	457	587	-1045	-2155	-276
	Media	990	-602	465	274	-368	-626	-624

⁵ A real interest rate of 3% is used and the interest payments are set equal to $0.03A_t$. There might have been a questionnaire effect in the measure of income since in 1989 questions on income over 1989 are asked while in 1991 the questions on household income over 1990 are asked.

⁶ A more detailed description of wealth can be found in Rob Alessie, Annamaria Lusardi and Trea Aldershof (1997).

Increase in Housing Wealth (for homeowners)	Mean	3235	4434	1068	693	-854	6175	1709
	Media	2589	1854	2008	110	399	4572	5995
Household Assets								
Total Assets	Mean	24435	27314	29493	31910	35727	35339	39261
	Media	15458	18779	21380	23327	26111	26426	31384
Liquid Assets	Mean	13017	14037	12986	13845	15021	14918	14127
	Media	9956	10720	9959	11613	12034	13965	10473
Homeownership Rate		0.57	0.59	0.64	0.70	0.74	0.73	0.72
Housing Wealth (for homeowners)	Mean	21468	22371	25839	25472	27975	27802	35118
	Media	16828	16211	20015	18383	18759	21160	29451

3 HOUSEHOLDS' FINANCIAL SITUATION AROUND BIRTHS

To examine the financial situation of households around births the data are centered on the year of birth of the first child. The years from the year of birth of the first child is denoted by YFB. For example, three years before the birth of the first child YFB is equal to -3 , at the time of birth YFB is equal to 0, and three years after the birth of the first child YFB is equal to 3. Given 7 years of panel data YFB ranges from -6 to 6.

3.1 AGE, MARITAL STATUS AND EDUCATIONAL ATTAINMENT

Table 3 shows that the average age at which women give birth to their first child is about 28 years. This is in line with Gijs Beets and Pauline Verloove-Vanhorick (1992) who report an increase in the average age at which Dutch women give birth to their first child from 25 in the early 1960's to 28 in the early 1990's. Table 3 (K-column) shows that several years after the birth of the first child households have about two children, which is in line with the descriptive statistics reported in Hans Bloemen and Adriaan Kalwij (2001) using different data from the Netherlands. Most couples are married for some time before having children but a significant proportion gets married in the years before giving birth to the first child, i.e. an increase in the proportion of married couples from 0.50 to 0.95. The fact that the marital rate remains close to one is an artifact of the data: a couple that divorces is removed from the sample from the time of divorce since they essentially start two separate new households.

Table 3. YB is the year from first birth (for instance, YB=-5 is defined as 5 years before the birth of the first child). N denotes the number of observations. The age of the woman (Age), the number of children (K), Birth Rate (BR), Marital Status (M).

YB	N	Age	BR	K.	M
		Mean		Mean	Mean
-6	2	23.5	0.00	0.00	0.50
-5	11	25.2	0.00	0.00	0.55
-4	30	25.9	0.00	0.00	0.63
-3	48	26.9	0.00	0.00	0.81
-2	82	27.1	0.00	0.00	0.82
-1	125	27.7	0.00	0.00	0.88
0	173	28.4	1.00	1.05	0.95
1	137	29.5	0.13	1.09	0.98
2	101	30.0	0.34	1.44	0.98
3	72	30.2	0.39	1.72	0.99
4	48	31.1	0.25	1.94	1.00
5	23	31.8	0.04	1.91	1.00
6	9	32.4	0.00	2.00	1.00

Following the seminal work of Gary Becker (1960) most empirical studies examine the effects economic variables such as of wages, income and educational attainment, on the number of children or the timing of births (John Newman and Charles McCulloch, 1984, Wim Groot and Hettie Pott-Buter, 1992, James Heckman, Joseph Holtz and James Walker, 1985, and James Heckman and James Walker, 1990). Table 4 is used to illustrate several of the main results that appear in the economic literature on household fertility decisions and in particular the timing of births. Firstly, in line with previous research Table 4 shows that the average age at which women give birth to their first child increases with educational attainment, from 26.8 years for education level 1 to 30 years for education level 3. In other words, highly educated women, or highly waged women for this purpose, schedule births later in life than women with a lower education level. Secondly, the data show no clear evidence that highly educated women schedule births closer together than women with a lower education level. However, to analyze such a detailed issue thoroughly one needs a much larger dataset. And thirdly, contrast to some findings in the literature, Table 4 does not provide much evidence that the highly educated women have fewer children compared to women with a lower education level. Heckman and Walker (1990), using Swedish data, conclude that highly educated women have fewer children compared to women with a lower education level. Adriaan Kalwij (2000), using Dutch data, finds a slightly lower completed fertility the higher the education level of the woman. Robert Moffitt (1984), using US data, finds relatively small and insignificant schooling effects on completed fertility.

Table 4. Number of Observations, Age, number of children and marital status by year from first birth (YB) and educational attainment.

YB	Education Level 1				Education Level 2				Education Level 3			
	N	Age	K	M	N	Age	K	M	N	Age	K	M
-6	0	-	-	-	2	23.5	0.00	0.50	0	-	-	-
-5	2	22.0	0.00	0.50	5	24.2	0.00	0.60	4	28.0	0.00	0.50
-4	5	24.4	0.00	0.60	18	25.4	0.00	0.72	7	28.1	0.00	0.43
-3	6	26.0	0.00	1.00	30	26.3	0.00	0.87	12	28.8	0.00	0.58
-2	14	26.6	0.00	0.86	46	26.7	0.00	0.91	22	29.0	0.00	0.59
-1	19	25.4	0.00	0.89	71	27.2	0.00	0.97	35	30.1	0.00	0.69
0	33	26.8	1.06	1.00	96	28.1	1.04	0.97	44	30.0	1.05	0.89
1	22	28.2	1.00	1.00	75	29.0	1.11	0.97	40	31.1	1.10	0.98
2	14	28.4	1.14	1.00	58	29.8	1.50	0.97	29	31.2	1.45	1.00
3	9	28.2	1.33	1.00	41	30.0	1.83	0.98	22	31.4	1.68	1.00
4	5	27.2	2.00	1.00	26	31.2	1.96	1.00	17	32.2	1.88	1.00
5	4	28.5	2.00	1.00	10	31.8	1.90	1.00	9	33.2	1.89	1.00
6	3	29.7	2.00	1.00	3	32.7	2.00	1.00	3	35.0	2.00	1.00

3.2 INCOME, CONSUMPTION AND SAVINGS

Table 5 reports on both the sample mean and median of household income, consumption and savings around the time of births. Median household income drops from around 27.000 Euros before the birth of the first child to around 22.000 Euros after the birth of the first child. Median household consumption does not increase with the birth of a child. In fact, consumption appears to slightly decrease when children enter the household. This would be in line with the earlier work of Smith and Ward (1980). The decrease in income with the birth of a child makes consumption exceed income and households to draw on their savings (the second last column). However, the median savings (last column) show that although households do save less they do not draw on their savings, hence most households continue to accumulate wealth after the birth of their first child. Table 6 reports on income, consumption and savings for each level of education of the woman in the household. The levels of income, consumption and savings are clearly different. But the pattern over time appears to be roughly the same as in Table 5: after having conceived the first child income decreases, consumption decreases slightly or remains constant and households start saving less. For women with a lower education level the relative decrease in consumption after having given birth to the first child is highest and savings rates are negative all through the observation period, which basically shows the hardship these households face.

Table 5. Household Income, Consumption and Savings.

YB	N	K		Income		Consumption		Savings	
		Mean	Mean	Median	Mean	Median	Mean	Median	
-6	2	0.00	21991	21991	18678	18678	3313	3313	
-5	11	0.00	24836	26179	22722	23151	2114	3205	
-4	30	0.00	26032	25546	21314	21774	4718	3469	
-3	48	0.00	27386	26818	22809	22244	4577	3709	
-2	82	0.00	26471	26413	24604	22620	1867	2903	
-1	125	0.00	28009	26960	24627	21509	3382	3329	
0	173	1.05	23884	22982	21758	19675	2126	1674	
1	137	1.09	22701	21918	22739	20499	-37	390	
2	101	1.44	22724	21828	21126	20591	1598	322	
3	72	1.72	22285	21368	24409	19943	-2123	69	
4	48	1.94	23196	22179	21480	18036	1716	1738	
5	23	1.91	22586	20835	23822	18522	-1236	299	
6	9	2.00	23285	20663	22224	18853	1061	206	

Table 6. By level of education: Median Income (I), Consumption (C) and Savings (S).

YB	Education Level 1			Education Level 2			Education Level 3		
	I	C	S	I	C	S	I	C	S
-6	-	-	-	21991	18678	3313	-	-	-
-5	17731	20093	-2306	26179	19145	3425	28194	23833	4362
-4	22632	14921	2221	25423	19490	4264	29500	29646	617
-3	24441	25942	-1774	25834	20842	5069	27466	24121	3537
-2	22484	20388	2770	25194	22683	2360	29402	23158	5634
-1	22257	18880	970	25934	21719	3329	29787	22682	5968
0	19908	15912	-481	23036	20398	1672	27998	23701	2321
1	17757	15011	210	20910	21194	364	25616	22229	1707
2	16042	17078	-1106	21841	21073	771	24323	20591	558
3	17664	16332	-1790	22078	21582	36	21614	18755	677
4	18603	21477	-11	22179	15778	2465	24236	19775	3749
5	18459	18429	-347	20742	16603	3108	21271	22779	-733
6	18330	18125	-47	23171	23891	-720	35434	32225	3313

3.3 EMPLOYMENT AND HOURS OF WORK AROUND THE TIME OF BIRTHS

First of all I examine the labor earnings of both the man and woman in the household around the time of births in more detail. Table 7 reports on the female employment rate and the hours of work when employed per level of education. An employed woman on maternity or parental leave is registered in the data as being employed. The maternity leave period may start about one month before the expected date of birth of the child and lasts at most up to three months after the birth of the child. After this leave the woman has to return to work or leave employment. In 1991 a parental leave scheme was introduced which makes a further six months leave possible but only with the

consent of the employer and mostly unpaid.⁷ It is not observed whether or not a woman is on parental leave and this will appear in the data as a reduction in labour supply. In case the woman is working zero hours while being employed I consider this woman to be not employed. Returning to Table 7, the female employment rate drops dramatically around the time of first birth and the more so the lower the level of education. This is in line with the empirical evidence from the labor supply literature (Thomas Mroz, 1987). For women with education level 1 the employment rate drops from 64% 2 years before giving birth to the first child to 7% 2 years after while for women with education level 3 the employment rate drops from 100% 2 years before giving birth to the first child to 48% 2 years after. The main difference across levels of education in the employment rate is when women have children. In line with Bloemen and Kalwij (2001) Table 7 shows that after giving birth to the first child women with a lower education level are more likely to stop working than highly educated women. Furthermore, women who do stay employed decrease their number of hours of work significantly. On average most women start working part-time after having given birth to their first child, irrespective of educational attainment. Male employment rate is close to one and virtually all men work fulltime (not reported on in the Tables) and male labor income increases steadily with time. Thus most of the decrease in income as reported in Tables 5 and 6 is due to a decrease labor supply of women. This decrease is largest for households of women with a lower education level and this may explain these households relatively large decrease in consumption with the birth of child (Table 6).

Table 7. Female Earnings: Employment rate (E), hours of work if employed (H) and labor income if employed (LI) and labor earnings of the male partner by women's level of education. Median incomes are reported.

YB	Education Level 1				Education Level 2				Education Level 3			
	E	H	LI	LI-M	E	H	LI	LI-M	E	H	LI	LI-M
-6	-	-	-	-	1.00	29	8192	13637	-	-	-	-
-5	0.50	36	8472	13361	1.00	38	11652	13634	1.00	29	12861	14066
-4	0.60	38	10367	14841	1.00	38	10471	14422	0.86	34	12915	15722
-3	0.83	28	9673	14898	0.93	36	11499	14159	0.83	38	12238	16559
-2	0.64	28	10073	15080	0.85	36	11035	14745	1.00	38	13028	15624
-1	0.53	32	9657	15101	0.90	36	11004	15000	0.94	38	13492	16406
0	0.18	18	6454	15341	0.40	29	9771	16198	0.66	25	10900	16433
1	0.09	6	2023	15774	0.21	23	8381	15571	0.60	20	8796	17393
2	0.07	23	4765	14654	0.21	24	8020	16295	0.48	20	10454	16853
3	0.00	-	-	17046	0.17	20	7661	16456	0.36	19	7870	16808
4	0.00	-	-	17229	0.23	20	5543	16483	0.35	20	8992	19345
5	0.00	-	-	17366	0.10	32	10714	17166	0.44	20	9453	18369
6	0.00	-	-	17289	0.00	-	-	21198	0.67	19	12260	20746

⁷ For many civil servants a parental leave scheme has been in place from 1989 onwards.

3.4 LIQUID SAVINGS AND MORTGAGE COMMITMENTS

Section 2.2 (Tables 5 and 6) discussed that households start consuming less while still having positive savings rates after the birth of the first child. This in itself is a puzzling observation since having young kids may typically be a time in the lifecycle of a household in which the financial situation is tight and households need to draw on their savings. It may be that household consumption patterns change in such a way that they consume less. However, as will be examined in this section, it may well be that homeowners have mortgage commitments as such that it restrict them from drawing on their savings. To put it differently, it might be difficult for homeowners to reduce mortgage payments in tight financial times. To get more insight in this issue the distinction is made between liquid savings and mortgage commitments, or, in other words, liquid assets and housing wealth.

The first two columns in Table 8 show that households do draw on their liquid savings when children are in the households. Table 8, middle section, shows households save for their home also in the presumably tight budget period when having young kids. Again, this may be due to the design of the mortgage contract. In other words, although in Table 5 it appears households do not draw on their savings, Table 8 shows that they are in fact reducing liquid wealth while still accumulating housing wealth. As a result liquid assets decrease after the birth of the first child (last two columns). Table 9 shows that even the households of highly educated women, or almost equivalently the higher income households, draw on their liquid assets. Table 10 sums up the wealth situation of household for each level of education of the woman in the household.

Table 8. Household wealth excluding housing wealth, i.e. liquid assets (A), savings excluding mortgage commitments (S), homeownership rate (HOR), housing wealth (AH) and mortgage payments (SH) for homeowners.

YB	Liquid Savings		HOR	Mortgage Payments (if homeowner)		Total Assets		Liquid Assets	
	Mean	Median		Mean	Median	Mean	Median	Mean	Median
-6	2500	2500	0.50	1627	1627	2301	2301	1458	1458
-5	-5194	1440	0.55	240	-551	14131	9969	14925	9432
-4	1282	1670	0.60	4055	2786	20010	17362	10708	8302
-3	199	2118	0.56	4993	3813	21881	16201	12551	9390
-2	2271	2650	0.60	-1268	-1342	27665	18053	12839	10892
-1	490	-78	0.62	3319	2726	29558	23920	14806	13624
0	-1321	-481	0.68	4151	3031	31641	24986	15388	12440
1	-1977	-497	0.72	1921	1319	36501	27307	16007	12982
2	85	-118	0.72	2094	359	34052	21330	13363	9641
3	-2837	-1047	0.75	1326	1020	36326	23867	13446	10079
4	1479	457	0.75	-230	2963	41747	30253	12932	9199
5	-302	-733	0.70	-2295	1208	36397	28596	9125	7697
6	1899	2435	0.56	-1508	-1946	23267	22094	3346	1150

Table 9. Liquid Savings and Mortgage commitments. Sample medians are reported.

YB	Education Level 1			Education Level 2			Education Level 3		
	LS	HOR	MC	LS	HOR	MC	LS	HOR	MC
-6	-	-	-	2500	0.50	1627	-	-	-
-5	-801	0.50	-4168	2154	0.60	-52	658	0.50	2703
-4	-838	0.80	2786	2995	0.56	4106	-71	0.58	1554
-3	-1403	0.67	1134	2472	0.53	5193	3418	0.64	3813
-2	1840	0.36	2185	2362	0.65	-1712	5354	0.57	-1922
-1	-353	0.47	518	-81	0.68	2761	1542	0.68	3469
0	-1720	0.48	3694	-254	0.74	2614	-323	0.78	3749
1	315	0.50	1505	-880	0.76	1319	-911	0.83	976
2	-330	0.29	-2340	-690	0.78	1368	391	0.63	-51
3	-1790	0.33	-26357	-1353	0.78	1141	-461	0.86	885
4	-11	0.20	-2004	848	0.77	1703	904	0.88	4534
5	-347	0.00	-	-934	0.80	3470	156	0.89	-573
6	-47	0.00	-	4413	1.00	-6940	3049	0.67	7625

Table 10. Liquid Wealth and Housing Wealth for homeowners. Sample medians are reported.

YB	Education Level 1			Education Level 2			Education Level 3		
	LW	HOR	HW	LW	HOR	HW	LW	HOR	HW
-6	-	-	-	1458	0.50	1686	-	-	-
-5	8384	0.50	-7860	6657	0.60	3313	10794	0.50	21091
-4	6214	0.80	7244	10033	0.56	19929	9308	0.58	10720
-3	5389	0.67	11313	11092	0.53	13478	10569	0.64	13100
-2	8493	0.36	16782	11605	0.65	20224	12588	0.57	13595
-1	6026	0.47	21441	12812	0.68	19772	14883	0.68	13077
0	3922	0.48	22350	13587	0.74	22487	15106	0.78	14794
1	2432	0.50	20992	13761	0.76	24633	15035	0.83	20015
2	1443	0.29	24358	12327	0.78	22313	10888	0.63	17434
3	582	0.33	34821	13732	0.78	19556	11935	0.86	16327
4	-2338	0.20	17398	13378	0.77	32025	11378	0.88	24620
5	-729	0.00	-	7823	0.80	34524	8380	0.89	25221
6	-3343	0.00	-	1313	1.00	21458	6764	0.67	43198

4 AN ANALYSIS OF CONSUMPTION GROWTH, INCOME GROWTH AND BIRTHS

Section 2 has shown that with the birth of a child both consumption and income decreases, hence consumption tracks income, but also that households draw on their liquid assets to facilitate the decrease in income and costs of children. In other words, households do appear to smooth consumption to a limited extent. One component of income not yet mentioned before is child allowances, which depend on the age of the child and the number of children in the household. Child allowances cause household income to increase with the birth of a child. Based on the Tables discussed in section 2.3, this increase is clearly smaller than the decrease due to a reduction in female labor supply. The main objective of this section is to quantify the effects of a predicted change in income and a change in the number of children on consumption.

As discussed in the introduction, the fact consumption tracks income can be because of liquidity constraints. Table 10 shows, however, that medium liquid wealth levels are considerably high, also during years after the birth of the first child. This casts some doubts on the presence of liquidity constraints for most households. Precautionary savings may be one reason for not drawing on savings to the full extent. Clearly, the financial decisions taken by the household around the time of births is very complex and interrelates with many other household decisions such as family labor supply and home purchase. This study does not aim to provide an answer to why consumption may track income and at this point takes as given that there may be excess sensitivity of consumption with respect to (expected) income changes. Therefore, to examine the relationship between consumption growth on the one side and births and income growth on the other side, I take a standard Euler equation approach that is extended to allow for excess sensitivity of consumption with respect to (expected) income changes (John Campbell and Gregory Mankiw, 1990, Annamaria Lusardi, 1996). I refer to the Appendix for a formal derivation of the equation of interest. For the purpose of this study I am interested in estimating the following reduced form equation explaining consumption changes over time with changes in the number of children and income:

$$\Delta \ln C_{it+1} = \beta_{0,t} + \beta_1 \text{Age}_{it} + \beta_2 \Delta \text{Children}_{it+1} + \beta_3 \Delta \ln Y_{it+1} + u_{it+1}. \quad (1)$$

As shown in the Appendix, unobserved household specific preferences are differences out. An econometric problem when estimating this equation arises if some of the observed changes in income are unexpected and, consequently, consumption changes as well. In other words, the change in income may be correlated with the error term u_{it} and is a potential endogenous explanatory variable. For this reason the consumption growth equation is estimated using an Instrumental Variables (IV) estimator. Since the data are panel data I employ a random effects estimator. For the choice of instruments I follow the previous literature and use variables such as educational

attainment of both the man and woman in the household. The complete list of instruments is reported underneath Table II.

Table II. Estimation results of the Euler equation for household consumption allocation. The estimators used are a Random Effects Least Square (RE-LS) and a Random Effects Instrumental Variables (RE-IV).

Estimator:	RE-LS	RE-IV ^{a)}	RE-IV ^{b)}
Dependent Variable: $\Delta \ln(C_{it+1})$			
Constant, $\Delta(\text{Age}_{it+1})$, β_0	-0.176 (0.164)	-0.190 (0.158)	-0.233 (0.166)
Time dummy Variable for 1989	-0.019 (0.070)	-0.028 (0.067)	-0.031 (0.068)
Time dummy Variable for 1990	-0.001 (0.067)	-0.016 (0.065)	-0.014 (0.066)
Time dummy Variable for 1991	-0.048 (0.070)	-0.013 (0.069)	0.009 (0.070)
Time dummy Variable for 1992	-0.232 (0.074)**	-0.224 (0.071)**	-0.228 (0.071)**
Time dummy Variable for 1993	-0.043 (0.077)	-0.020 (0.080)	-0.022 (0.080)
$\Delta(\text{Age}_{it+1})$ Squared, β_1	0.006 (0.006)	0.007 (0.006)	0.008 (0.006)
$\Delta(\text{Children}_{it+1})$, β_2	0.033 (0.043)	0.081 (0.047)*	0.075 (0.046)*
$\Delta \ln(Y_{it+1})$, β_3	-	0.748 (0.348)**	-
$\Delta \ln(Y_{it+1}) \times$ Education Level 1	-	-	0.772 (0.428)*
$\Delta \ln(Y_{it+1}) \times$ Education Level 2	-	-	0.650 (0.369)*
$\Delta \ln(Y_{it+1}) \times$ Education Level 3	-	-	0.880 (0.412)**
Education Level 2	-	-	0.015 (0.058)
Education Level 3	-	-	-0.026 (0.067)
Number of Observations	512	512	512
Goodness of Fit, R^2	0.044	0.052	0.057
F-test on the excluded instruments ^{c)}		2.86**	3.55*
Over-Identification Test ^{d)}		11.0	10.8

The additional instruments are marital status in year t , employment status of the woman and man in year t , educational attainment of the woman and man (3 levels), educational attainment of the woman crossed with the changes in the number of children, crossed with age and crossed with age times the change in the number of children, age of the man. In total 15 additional instruments.

Instruments listed under a) minus two dummy variables for the level of education of the woman.

Critical values at a 5% significance level are: $F(15,490)=2.08$ and $F(13,490)=2.22$ for, respectively, column two and column three.

Critical values at a 5% significance level are: $\chi^2(14)=23.7$ and $\chi^2(10)=18.3$ for, respectively, column two and column three.

* Significant at a 10% level.

** Significant at a 5% level.

4.1 EMPIRICAL RESULTS

I exclude from the empirical analysis observations that have excessively high changes in consumption to avoid outliers to affect the parameter estimates.⁸ The estimation results are reported in Table 11. I include year dummy variables to account for aggregate (macro) shocks and changes in the interest rate over time. The parameter estimate of β_2 is interpreted as the effect of a birth on household consumption. One has to keep in mind that this parameter estimate is a mixture of the cost of a child and the change in preferences of consumption over leisure with the birth of child. The parameter estimate of the coefficient corresponding the change in log-income (β_3) is often referred to as the excess sensitivity measure of consumption to expected income changes.

The first column of Table 11 shows the results of a standard Euler equation using a random effects least squares estimator. The estimate of β_2 is insignificant and small, implying that children do not affect consumption. Intuitively, this is a rather implausible outcome.

The second column allows for excess sensitivity measure of consumption to expected income changes and takes into account that income changes are potentially endogenous. In other words I instrument observed income changes with exogenous variables, hence identify β_3 with predicted income changes. Before proceeding to the estimation results I evaluate the validity of the instruments used. John Bound, David Jaeger and Regina Baker (1995) suggests two tests to check the validity of the instruments and these are reported in the last two rows in the second column: the over-identification test statistic reported in the last row implies that the additional instruments can be considered exogenous and the partial F-test statistic in the second last row implies that the additional instruments have sufficient power in predicting income changes.

The estimate of β_2 in column two is positive and significant, implying that consumption increases with the birth of a child. This estimate is in line with earlier studies, mostly using US data and reporting estimates around 0.1. The estimate of β_3 is large and significant, suggesting that a 1% decrease in predicted income decreases consumption by 0.75%. Most estimates using US data are around 0.2-0.5. Rob Alessie and Annamaria Lusardi (1997), using Dutch data, find no significant excess sensitivity of consumption to income changes. A comparison of results, however, has to be interpreted with caution since there is actually no real economic interpretation of this reduced form coefficient. It may depend, for instance, on the sample used. In this study the sample consists of young households who may face tight liquidity constraints and, moreover, have a long planning period with a lot of income uncertainty in front of them.

Table 10 shows that especially households of women with a lower education level have on average a relatively low level of liquid wealth in the years after the birth of their first child. One may therefore expect these households to be more liquidity constraint than the households of highly educated

⁸ To be more precise on this: I exclude an observation if $\ln(C_{it+1} / C_{it})$ is outside the interval $[-1, 1]$. This causes

women. To examine this I allow in the third column the excess sensitivity parameter to differ with the level of education of the woman in the household. Column three shows that the estimated sensitivity of consumption to a change in predicted income is roughly the same across levels of education. This result casts some doubts on the explanation of liquidity constraints being the cause of excess sensitivity of consumption to predictable income changes. More likely candidates to explain consumption tracking income may be that households at all levels of education face the same degree of uncertainty which triggers precautionary savings or that all households use the same rule of thumb to make consumption decisions. These are clearly speculative explanations and more research on this is needed to obtain a more robust conclusion on this.

The main contribution of the empirical analysis is the quantification of the effects of a predicted change in income and a change in the number of children on consumption. An on-the-back-of-an-envelope calculation immediately shows that consumption decreases on average with around 4% when a child is born: The birth of a child is estimated to increase consumption with about 8%. Average income decreases by around 16% with the birth of a child (Table 5) due to a decrease in female labor supply. The estimated excess sensitivity of consumption implies that this 16% decrease in income results in a 12% decrease in consumption, assuming the decrease in income is expected. This leaves an estimated decrease in average consumption of around 4%.

a reduction in the number of observation of about 20%.

5 SUMMARY

This study examines households' financial situation around the time of births, and in particular households' savings behavior by level of education, using a panel of Dutch households over the period 1987-1993. The main new empirical findings can summarize as follows: At all levels of education households accumulate wealth before and draw on their liquid savings after having given birth to their first child. Nevertheless, households draw too little on their savings to offset the decrease in income due to a reduction in female labor supply, and as a result consumption decreases with the birth of a child.

The average reduction in consumption with the birth of a child is estimated around 4%. Relative to households of highly educated women, households of women with a lower education level have a stronger decrease in consumption with the birth of a child, which is due to a larger reduction in female labor supply and, consequently, a larger decrease in income. The so-called excess sensitivity of changes in consumption to predicted income changes is found to be of equal magnitude across women's levels of education. The estimation results suggest that a 1% decrease in income results in a 0.75% decrease in consumption. The birth of a child is found to increase consumption with about 8%.

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APPENDIX

The Euler Equation for Optimal Consumption Allocation.

Robert Hall (1978) uses the Euler equation for optimal consumption allocation to test the permanent income hypothesis under rational expectations. Following Hall (1978) I assume that households choose consumption as such that they maximize the expected value of a time separable lifetime utility function subject to a budget constraint. This is formalized using a value function notation:

$$V_{it}(A_{it}) = \max_{C_{it}} U_t(C_{it}; \theta_{it}) + \frac{1}{1 + \delta} E_t[V_{it+1}(A_{it+1})],$$

(A1)

$$\text{s.t.} \quad (1 + r_t)A_{it} - A_{it+1} + Y_{it} - C_{it} = 0, \quad (\text{A2})$$

where i is an index for the household, t denotes the year, $V_{it}(A_{it})$ is the value function with as argument the stock variable household assets at the beginning of period t (A_{it}), C_{it} is household consumption, $U_t(\cdot)$ is a household utility function, θ_{it} is a taste shifter, Y_{it} is household income, r_t is the real interest rate, and δ the rate of time preference. Solving this maximization problem yields the familiar Euler equation for the allocation of consumption over two periods:

$$E_t \left[\frac{1 + r_t}{1 + \delta} \frac{\partial}{\partial C_{it+1}} U(C_{it+1}; \theta_{it+1}) \right] = \frac{\partial}{\partial C_{it}} U(C_{it}; \theta_{it}). \quad (\text{A3})$$

Given the assumptions made above, the Euler equation for optimal allocation between periods t and $t+1$ is as such that the marginal utilities of consumption in both periods are equal. I assume households have a constant relative risk aversion utility function of the following form:

$$U_t(C_{it}; \theta_{it}) = \frac{1}{1 - \gamma} \left(\frac{C_{it}}{\exp(\alpha_{it})} \right)^{1 - \gamma}, \quad (\text{A4})$$

where γ is the coefficient of risk aversion and concavity requires γ to be positive. The function $\exp(\alpha_{it})$ can be interpreted as an adult equivalence scale but, also, as taste shifters. By substituting (4) into (3) the Euler equation can be written as:

$$\left(\frac{1 + r_t}{1 + \delta} \right) \left(\frac{C_{it+1}}{C_{it}} \right)^{-\gamma} \left(\frac{\exp(\alpha_{it+1})}{\exp(\alpha_{it})} \right)^{\gamma - 1} = 1 + e_{it+1},$$

(A5)

where $E_t[e_{it+1}] = 0$ and $E_t[e_{it+1}^2] = \sigma_{it+1}^2$. The parameter α_{it} is assumed to depend on the number of children in the household and the age of the woman in the following way:

$$\alpha_{it} = \alpha_i + \alpha_0 \text{Age}_{it} + \alpha_1 \text{Age}_{it}^2 + \alpha_2 \text{Children}_{it} + \varepsilon_{it}, \quad (\text{A6})$$

where α_i is an unobserved household specific component and ε_{it} is an idiosyncratic shock. By substituting (6) into (5), taking logs and using a Taylor approximation, I obtain⁹:

$$\Delta \ln C_{it+1} = \beta_{0,t} + \beta_1 \text{Age}_{it} + \beta_2 \Delta \text{Children}_{it+1} + u_{it+1}. \quad (\text{A7})$$

The error term u_{it+1} has mean zero, $E_t[u_{it+1}] = 0$ and is assumed to be uncorrelated with age and

the change in the number of children, $\beta_{0,t} = \frac{1}{\gamma} \left(\ln \left(\frac{1+r_t}{1+\delta} \right) + \alpha_0 (\gamma-1) + \frac{1}{2} \sigma_{t+1}^2 \right)$,

$$\beta_1 = \frac{\alpha_1 (\gamma-1)}{\gamma} \text{ and } \beta_2 = \frac{\alpha_2 (\gamma-1)}{\gamma}.$$

To test for excess sensitivity John Campbell and Gregory Mankiw (1990) and Annamaria Lusardi (1996) propose to add the growth of household income to the Euler equation:

$$\Delta \ln C_{it+1} = \beta_{0,t} + \beta_1 \text{Age}_{it} + \beta_2 \Delta \text{Children}_{it+1} + \beta_3 \Delta \ln Y_{it+1} + u_{it+1}. \quad (\text{A8})$$

The parameter β_3 is interpreted as a measure for excess sensitivity of consumption to expected income changes. If the Permanent Income hypothesis holds then this parameter is estimated to be insignificantly different from zero.

⁹ See Martin Browning and Annamaria Lusardi (1996, pp. 1804-1805).

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Juni 2000 Marc van der Meer (ed), Adriaan van Liempt, Kea Tijdens, Martijn van Velzen, Jelle Visser.

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