Household Composition and Savings:

An Overview

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Edited by Axel Börsch-Supan

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Abstract

In recent years the literature on household saving behavior has been enriched by a number of contributions focusing on the problem of modelling a household as a single decision unit. It has reasonably been argued that with respect to household consumption and saving behavior the simple approach of modelling households as one representative decider could involve major mistakes. Thus the literature has enriched the basic model by incorporating variables that describe the composition of a household examples being the number and age of children, household member's life expectancies and the intra-household distribution of income. This paper reviews these developments and empirical results in the latest literature, with a particular focus on intra-household income distributions.

Introduction

In the traditional models of household life cycle saving behavior a household is regarded as a single representative decision unit, which maximizes its lifetime utility out of consumption with respect to a lifetime budget constraint. Even though the models have been extended to incorporate some heterogeneity between households[1] they are to a large extent still based on the assumption of more or less homogenous households. Differences between households concerning their attitudes towards risk, their sophistication in planning future expenditures and their preferences in general are probably a source of different saving behavior. However, these issues will not be raised here. The focus here is on observable differences in household composition and characteristics and their influence on saving behavior. Thus the purpose of this paper is to shed some light on the following question: what kind of diversity among households or families concerning their composition is potentially important to explain differences in life-cycle savings and to derive testable hypotheses. In other words, is the abstraction from differences between households (e.g. singles vs. couples) a source of major mistakes when statements about saving behavior are made?

The paper is organized as follows. Section 2 provides the basic framework used by economists to describe household consumption and saving behavior over the life cycle. In particular, in a brief survey extensions of the life cycle model are discussed which were developed in attempts to explain observed household saving behavior. Section 3, the main part contains the presentation of some new developments, which explicitly take into account variables related to household composition like the number of children in a household and different life expectancy of men and women. Hereafter the problem of modeling the household as a single decision unit with one utility function over consumption will be addressed. A brief discussion of so called models of collective household choice and their possible implications for the saving behavior of couples will be presented at the end of section 3. After that some empirical work and its basic results are briefly discussed in section 4. Section 5 concludes.

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[1] An example is the time path of children present over the life cycle of the household.

1. Basic Models of Saving and Extensions

2.1 The life-cycle hypothesis

The first thing that has to be settled is an exact definition of the term saving as it will be used in the following discussion. One definition of saving is to regard it as the amount of disposable per period income, which is not consumed in the same period, i.e. the difference between per period income and consumption. Alternatively, savings could be defined as the per period change of household wealth. These two definitions are not necessarily equivalent since household wealth changes due to changing asset prices and is thus to some extent not under control of the household.[2] For the change of a household's real and financial wealth that is under the household's control the term discretionary savings[3] has been coined. It is this definition of savings that is used here. Changes of wealth which are not under the household's control or obligatory contributions to public pension or insurance schemes, which could be regarded as savings are not included in the definition as it is used here.[4]

The possible motives for discretionary household savings are numerous. And since differences in household compositions – as will be discussed below - effect household savings through various saving motives, some short remarks about these motives will be made. In a survey on household saving, Browning and Lusardi (1995) consider possible motives for saving from Keynes *General Theory*. These motives can be divided into two different groups. The first kind of saving motives suggests that individuals regard saving as valuable per se. That is individuals save for reasons of prestige, independence and the like. The second group of motives is based on the observation that saving is a means to reallocate consumption between different periods of ones life. Consumption is the ultimate source of an individual's (or household's) well-being and saving is the means to allocate resources between periods of different income and needs whether in the short or the long run. Thus when households' saving behavior is analyzed, household members are considered to be rational individuals that save to provide resources for retirement, to insure against unforeseen income shocks or increases in expenditures or for the purchase of expensive goods like cars and the like.

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[2] However, if per period change of asset value due to price changes is regarded as household income the two definitions are theoretically equivalent.
[3] Compare Börsch-Supan et al. (2003).
[4] For the empirical analysis of household savings in Ch. 3 saving is not calculated on the basis of income and consumption. For the measure of savings used in the empirical section compare p. 45.

Another dimension when analyzing saving behavior is the way people allocate their savings on different kind of assets. Although this question is not the focus of this thesis we will come back to it later on.

Let us now turn to the basic model of life-cycle savings. At the core of the model is a representative household which maximizes its lifetime utility out of consumption with respect to a lifetime budget constraint. In this most simple form of the model a household lives for a certain time of T periods, receives an exogenously given real income Y_t in each period and starts with initial real wealth of A_0. It faces a perfect capital market that allows him to lend and borrow at the same fixed real interest rate r. Thus the household's lifetime consumption is restricted by the following budget constraint.[5]

$$\sum_{t=1}^{T} C_t (1+r)^{-t} \leq A_0 + \sum_{t=1}^{T} Y_t (1+r)^{-t} \qquad (1)$$

The household's objective is to maximize its lifetime utility out of consumption subject to equation (1). A common assumption concerning utility is, that lifetime utility is additively separable in consumption of each period C_t such that lifetime utility is a weighted sum of period utilities, the weights representing the household's subjective discount rate ?, i.e. its relative preference for current consumption as compared to future consumption. The single period utility function $U(C_t)$ fulfills the standard assumptions of monotonicity and decreasing marginal utility. The maximization problem is then given by:

$$\max_{\{C_1 \dots C_T\}} \sum_{t=1}^{T} (1+\boldsymbol{r})^{-t} U(C_t) \qquad \text{s.t. (1)} \qquad (2)$$

The solution to this problem is an optimal lifetime consumption path that yields optimal saving as residual if the income path is given. The solution to this problem is given in equation (3) which relates the marginal utility out of consumption in two consecutive periods to the interest and the subjective discount rate.

$$\frac{U'(C_{t+1})}{U'(C_t)} = (\frac{1+\boldsymbol{r}}{1+r}) \qquad (3)$$

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[5]The notation follows Romer (1996) pp.309-341.

It is the standard result of consumer choice that relates the allocation of resources on different goods (Consumption today and tomorrow) to the relative price of the goods and preference parameters. The interest rate and the consumer's impatience measured by ?, determine the time path of consumption (the percentage change from period to period). Thus, if r > ?, consumption is increasing from one period to the next and vice versa.[6] Under the assumption r = ?, marginal utility of consumption is held constant over all periods which means that in this simple specification of utility each period's consumption is the same fixed fraction of life time resources. If the life cycle path of income follows an inverted U-shape due to changing productivity over the lifetime, households borrow in the early stages of the life cycle, start to save when income becomes higher than optimal consumption in the middle period of life and so build up a stock of wealth which provides resources for the retirement phase where income is typically lower than desired consumption.

The basic prediction of the life cycle model is that consumption is not determined by current income but by the amount of resources which are available over the household's entire life. Saving then is a means to reallocate resources for consumption between different phases of life and thus is just a byproduct of the optimal lifetime consumption path given the lifetime income path. If one thinks of a household life cycle as divided into three basic phases (pre working age, working age, retirement age) and assumes a corresponding income path (low income, increasing income till the age of 50, decreasing income) the implications for saving are clear-cut. Since consumption is smoothed over lifetime a typical household should borrow in the first phase then start to save at the beginning of the second phase to build up wealth out of which consumption can be financed in the third phase.

2.2 Extensions of the basic LCH-model

The simple model presented in the last section is of course not directly applicable to describe empirically observed household saving behavior. Its level of abstraction is too high to make the model an adequate basis for empirical analysis. Empirical findings on household lifecycle consumption suggest that consumption approximately tracks income over the entire lifetime[7], which means that a fixed fraction of current income is saved in each period. However, this does not mean that the life cycle model (LCM) is

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[6] Decreasing marginal utility of consumption means increasing consumption.
[7] Compare Attanasio (1999).

useless for a better understanding of saving behavior. It still provides the framework for several extensions that have been developed in the last forty years. Some of these will briefly be described below.[8]

First of all, individuals are uncertain about their future life. There is risk of loosing the job, uncertainty about future health status and obviously about the time of death. Thus people facing uncertain future labor income or for example unpredictable increases in health expenditures might want to save to ensure themselves against unforeseen shortfalls in income or increases in necessary expenditures. This self-insurance motive for saving is one possible explanation for the observation that people save more in early ages and dissave at a lower rate in old age than predicted by the simple LCM and is known in the literature as precautionary motive.

A second reason why young people save more or borrow less than the simple LCM would predict are liquidity constraints. Why do young people, especially students who generally have a low income as compared to their expected future earnings, do not borrow to smooth consumption? One answer to this question[9] could be that they simply cannot borrow. Either they do not get a loan or the interest rate on loans is higher than that on deposits such that optimal borrowing in the early stages of the life cycle is lower than predicted by the simple model.

A third extension of the basic model is the incorporation of uncertain lifetime.[10] A common specification of the consumer's lifetime utility maximization with uncertain lifetime is used by Hurd (1999). The lifetime utility is specified as the discounted weighted sum of period utilities integrated up to a maximum possible lifetime, the weights representing the probabilities of being alive at age t. The result is that uncertain lifetime acts like an increase in the subjective discount rate. The higher the probability of death at time t, given one has survived to t the more future consumption will be discounted. Intuitively, if the probability of being alive at some point of time in the future is very low, there is no need to save much to provide resources for consumption for that time.

Liquidity constraints and a precautionary motive are candidate explanations for the observation that households save more in the early stage of their life cycle and in old

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[8] For extensive surveys see Browning and Lusardi (1995) and Attanasio (1999).
[9] See Browning and Crossley (2001).
[10] Uncertain lifetime was introduced into the model by Yaari (1965).

age than predicted by a simple life cycle model. However, the reasons why a precautionary motive and liquidity constraints effect savings of young people are probably others than that for people in old age. Empirically it is observed that households still save in old age in contrast to what the life cycle model would predict. Whereas young people face a substantial income risk, in retirement most households finance their consumption out of accumulated wealth and/or public or private pension annuities and therefore face little uncertainty about future income. However old people might want to provide resources for extreme longevity and face an increasing risk of bad health status and thus of increasing expenditures for medical care which could increase savings for precautionary reasons.

Another extension of the basic model is the inclusion of a bequest motive[11] which is usually incorporated in the life cycle model by extending household lifetime utility by an altruistic term, i.e. parental utility depends on own consumption and on the wealth left to their children at the time of death. Optimal behavior then implies that households do not want to completely exhaust their stock of wealth at the time of death and thus save more than a simple LCM would predict. Bequest motives are particularly interesting for differences in household savings due to different household composition. Although people also bequeath wealth to e.g. public institutions, one would assume that the bequest motive is stronger for couples with children.

Besides these straightforward extensions of the basic model, additional critique has been raised in the behavioral economics literature. Roughly speaking the critique can be summarized into two major categories that could be described with the slogans time inconsistent preferences and mental accounts. The first point of critique dates from the observation, that in many instances human decision makers do not stick to decisions once made for the future when the time comes where the decision is to be executed. That is, humans often lack the willpower to stick to decisions which where once made because they where considered to be optimal.[12] In the context of savings, this means that even if a fully rational decision maker plans the optimal intertemporal allocation of life time resources at the beginning of his life cycle and establishes an optimal saving plan, he could lack the willpower to stick to his plan in the future. Such kind of behavior is modeled by preferences that exhibit hyperbolic discount rates, i.e. discount rates that

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[11] For a life cycle model with bequest motive see Hurd (1989) and the references therein.
[12] Examples from everyday life are numerous and part of everybody's experience.

are high over short time spans and relatively low over longer horizons. With hyperbolic preferences, a consumer's valuation of relative utility between period t and t+1 consumption from today's perspective differs markedly from his valuation when he has reached period t. In other words, today he might decide to consume at the same level in two future consecutive periods t and t+1, but in period t he does not care as much for consumption in t+1. The literature know claims that people tend to impose restrictions (e.g. saving plans which are costly to cancel) on themselves to prevent such inconsistent behavior in the future and that such behavior helps explain why consumption tracks income.[13]

The second point of critique concerns the assumption of fungibility of wealth. In the life cycle framework it is implicitly assumed that different forms of assets are perfectly fungible.[14] That is a rational decider calculates his discounted lifetime wealth and optimally allocates that wealth to consumption over his life life-cycle, regardless of the composition of his wealth. A different way to think about saving decisions is to assume that individuals have mental accounts[15], e.g. a current income account, an asset account, and a future income account and that marginal propensities to consume out of these accounts differ markedly. That is, people are more inclined to save, say, out of unforeseen capital gains than to save out of current income.[16]

Although the extensions of the model are able to explain some patterns of observed life cycle consumption profiles, they are still based on the assumption of a representative household. Strictly speaking, it is a single consumer whose consumption behavior is analyzed. But households commonly are not single individuals. Thus there is possibly more than one decider with conflicting interests and the consumption needs of a household typically change over its lifetime due to a changing household composition.[17] This heterogeneity between households and its implications for saving are discussed in the following section.

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[13] For a model of optimal lifetime consumption with hyperbolic discounting compare Laibson (1997).
[14] Of course it is abstracted from transaction costs and the like.
[15] Compare Thaler (1990).
[16] For empirical evidence on different MPC's for different forms of income see Thaler (1990) and the references therein.
[17] E.g. children are born and leave the household at some age. There is transition from couples to single households when couples divorce or people die leaving a widowed single.

2. Household Composition and Saving

3.1 Preliminary Considerations

Strictly speaking, the basic model is a simplified description of a single individual's problem of allocating resources over its lifetime. That is, if households would consist of single persons starting to work, say, at the age of twenty five, retired at the age of sixty and died at the age of eighty, one could expect the model, including its extensions, to make fairly good predictions of saving behavior. Since consumption is smoothed, the shape of the exogenous lifetime income stream determines the saving path.

However, the life cycle of a household is not that easy to define. For a first approach we recur to a concept developed by sociologists to think about a typical family life cycle. According to this concept the lifetime of a typical family is grouped into six phases:[18]

1)   Foundation of a household at marriage

2)   Birth of the first child

3)   Birth of the last child

4)   Marriage of the first child

5)   Marriage of the last child

6)   Death of the first spouse

7)   Death of the second spouse

Heterogeneity among households can now be considered within this framework, i.e. we can compare households according to how long the households stay in the various phases of their life cycle or how and when the composition of a household changes during its lifetime. The most obvious aspect when considering household heterogeneity is to distinguish between a single and a two-person household. According to the above concept there is only one phase for a single but two phases for a couple without children. A couple faces transition from a two person to a single person household at some point in time. The relative length of these two periods within the life cycle of a couple depend on the life expectancies of both spouses and on their age difference. How couples allocate their resources between these two periods then depends on the remaining life expectancies of both. For an illustrative example consider a couple where

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[18] Compare Höhn (1982) p. 15.

both are of the same age and compare it to one of an age difference of twenty years. Since the younger spouse of the second couple faces a longer expected remaining lifetime after the death of its partner, one would expect this couple c.p. to save more. Furthermore, the allocation of expenditures between these two phases is probably influenced by economies of scale in consumption, due to an increasing number of household members. The higher the economies of scale, the higher are the expenditures of a single relative to a couple to maintain the same per capita utility level. Thus a first guess would be that savings to provide resources for the 'single person phase' are c.p. higher, the larger the economies of scale.

A second dimension of heterogeneity among households is the time path of children. During the phase when children are in the household consumption needs increase which c.p. decreases savings of a household with children as compared to those of a childless couple. Thus the saving behavior of a household probably depends on the number of children and the length of time they stay in the household.

Of course the above concept of a typical household life cycle cannot account for all possible changes of a household's composition over its lifetime. Couples divorce, old people rejoin their children's household and so forth. But in principle all the variables which affect the composition of a household over time could be incorporated in the life cycle framework of modeling consumption. That is, the household's choice is still modeled as the maximization of a household utility function (unitary framework), but utility depends on factors of household composition like the number of household members, the age difference between household members and probabilities of transition (either through death or divorce). Although a model that incorporated all variables relevant for household composition would be far too complicated this approach has been taken in the literature by incorporating some of the possibly relevant variables as exogenous.[19] The problem is even more complicated when it is considered that in principle such variables like the number and timing of children and the labor supply of couples are subject to the household's choice and thus endogenous.

A different way to think about household saving decisions is within the collective choice framework of household demand. The literature on collective household choice originates from the idea that a household consists of many members with different

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[19] See Hurd (1999) for the incorporation of mortality risks and transition from couple to single and Browning and Ejrnaes (2002) for the inclusion of the number of children.

preferences who are involved in taking decisions. Usually a household's (or couple's) decision is modeled as either a cooperative or non-cooperative game where the relative influence of each spouse on a decision depends on variables like the distribution of income within the household or the difference in education between the spouses. In the context of saving, Browning (2000) claims that saving could be positively correlated with the wife's income share since women live longer and are typically younger than their husbands and thus have stronger preferences for saving for old age.

To summarize, there is definitely heterogeneity among households concerning their structure and change of composition over the life cycle. Whereas in the simple life cycle model saving is ultimately determined by the exogenous path of lifetime income, realistically there are other variables like couples' age difference, life expectancies, the time path of children, labor market status of couples, spouses income shares, which probably effect the saving behavior of a household. Theoretically their influence on savings have been rationalized either within a unitary model of household choice or in the collective choice framework.

3.2 Unitary Framework

In this section the saving behavior of couples will be discussed within the unitary framework i.e. the modeling of the decision of a couple as the maximization of a single household utility function. The influence factors on saving behavior in the unitary models which are discussed in the following sections are uncertain lifetime and different life expectancy of couples, distribution of income within the household, the female labor supply and the path of children over the life cycle.

The introduction of uncertain lifetime into the LCM of a single individual basically has two effects on the predicted saving behavior. First, the increasing risk of dying in old age leads to a higher subjective discount rate, in other words, to an increasing impatience which c.p. causes less saving or a higher rate of dissaving. Second, the uncertainty about the time of death implies a risk of living to very old age. To insure themselves against the risk of running out of resources when living to extreme old age people should be expected to increase saving.[20] Assuming that the only uncertainty derives from the uncertain lifetime, in the following the saving behavior of a couple will be analyzed and compared to that of a single person within a unitary framework.

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[20] Compare Yaari (1965); Kotlikoff and Spivak (1981).

A couple faces the transition from a two-person household to a single household at some point in time. The time of transition and the expected length of the period that the surviving spouse lives alone depend on the relative life expectancies of husband and wife and thus on the sex age composition of the household. Thus the saving behavior of a couple is not accurately analyzed by an individual LCM, particularly for old couples, where the probability of transition from a two-person household to a single household is high.[21] But even if both spouses were identical with respect to their remaining lifetime, the saving of couples should differ from that of a single person since couples can share the risk of extreme longevity. If one partner lives to very old age, the probability that its spouse has died and left a bequest becomes high.[22]

The question of how the saving behavior of an old couple differs from that of a single is analyzed by Hurd (1999) within a life cycle framework in continuous time. He considers a couple that earns a fixed (pension) annuity income A_t in each period t, has initial wealth of w_0 and each individual faces an uncertain lifetime and the maximum age to which one can live is given by T. The couple gets utility out of joint consumption as long as both are alive and each spouse gets utility out of remaining wealth w_t when the other spouse dies at time t.[23] The couples' optimization problem is then given by:

$$\max_{\{C_t\}} \int_0^T U(C_t)e^{-rt}a_t dt + \int_0^T M(w_t)e^{-rt}p_{m_t} dt + \int_0^T F(w_t)e^{-rt}p_{f_t} dt \qquad (4)$$

$$\text{s.t.:} \qquad \frac{dw_t}{dt} = rw_t - C_t + A_t; \qquad w_t \geq 0 \ ^{24}$$

where M( ) and F( ) are husband's and wife's utility of wealth respectively, r is the real interest rate, ? the couples subjective discount rate, p_{m_t} and p_{f_t} are the probability densities for the husband becoming a widower at time t and the wife becoming a widow, respectively, and a_t is the probability that both will be alive at time t. The only uncertainty in this specification of the household's maximization problem derives from the uncertain time of death of both spouses.

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[21] Compare Hurd (1999).
[22] This point was first made by Kotlikoff and Spivak (1981).
[23] Originally Hurd included a true bequest motive, i.e. a utility out of wealth in the state where both are dead.
[24] Borrowing against pension annuity is not allowed.

For simplification the single person's problem is first considered to compare male and female optimal behavior. The single person's problem reduces to

$$\max_{\{c_t\}} \int_0^T u(c_t)e^{-rt}a_t dt \quad \text{s.t.} \quad \frac{dw_t}{dt} = rw_t - c_t + A_t ; \qquad w_t \geq 0. \qquad (5)$$

where a_t is the single's probability of being alive at time t and c_t is its per period consumption, the notation otherwise being the same as above. The solution to this problem is:

$$\frac{du'(c_t)}{dt} = u'(c_t)(h_t + \mathbf{r} - r) \quad \text{for } w_t > 0; \qquad c_t = A_t \qquad \text{for } w_t = 0. \qquad (6)$$

The second part of the solution is due to the assumption that borrowing is not allowed, i.e. wealth cannot be negative. The first part is the continuous time counterpart to the solution of the simple LCM, with the difference that here the uncertainty about the time

of death is incorporated by the parameter $h_t = \dfrac{m_t}{a_t} = m_t \left/ (1 - \int_0^t m_t) \right.$, i.e. the probability

of dying at t given that one has survived to time t. Intuitively this mortality hazard acts like an increase in the subjective discount rate. Hurd gives a simple comparison of a female and male optimal consumption path, assuming the real interest rate to be r = 0.03 and ? = 0. From U.S. mortality data he takes h_{66} = 0.03 for males and h_{74} = 0.03 for females.

Thus a single female's optimal consumption path peaks at the age of 74, whereas a single male's one at the age of 66.[25]

This analysis gives a first indication of how the consumption path of a couple might differ from that of a single person. Under the assumption, that there are no economies of scale in consumption and each maximizes the same single person utility function given that each (husband and wife) receives half of the household wealth and income, the couple's per capita consumption profile is simply the average of a female and male optimal profile. Thus per capita consumption is less than that of a single male when consumption increases and more than that of a single male when consumption decreases. The per capita consumption profile is simply flatter.

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[25] Compare Hurd (1999): when the right hand side of equation 6 changes from negative to positive by an increasing h_t marginal utility starts to increase, i.e. consumption decreases. Furthermore Hurd shows, that at this point wealth starts to decline because otherwise there would be wealth left at the maximum age T which is not optimal when there is no bequest motive.

The analysis of the couple's optimal saving behavior is posing a more complex problem. A couple faces three different states. Either both are alive, the husband only is alive or the wife only is alive. The solution to the problem of a couple's optimal allocation of consumption over time is given by the differential equation:

$$\frac{dU'(C_t)}{dt} = U'(C_t)(h_t + \boldsymbol{r} - r) - (M'(w_t)\boldsymbol{f}_t + F'(w_t)\boldsymbol{m}_t) \qquad (7)$$

where $\boldsymbol{f}_t$ is the wife's mortality risk, i.e. the probability that the wife will die given that she has survived till t, $\boldsymbol{m}_t$ is the husband's mortality risk and h_t the couple's mortality risk (the probability that one will die at t given that both are alive at t).

Assuming utility to be of the CES type Hurd compares the consumption profiles of retired couples consisting of two identical individuals to that of a single person of the same age. Comparing the consumption profile of a single person to that of a couple with the same per capita wealth and annuities he derives the following conclusions. First, the lower the economies of scale in consumption, the higher per capita consumption when both are alive and thus the higher is the rate of dissaving. Second, the lower the risk of longevity the higher is the rate of dissaving (the lower saving for self-insurance). This effect exists for singles too but is weaker since couples share the risk of longevity. Third, the higher the risk aversion, the lower is the rate of dissaving. Again this effect is stronger for single individuals, i.e. higher risk aversion will lead to greater dissaving of couples relative to singles. To sum up, smaller returns to scale, higher risk aversion and a smaller risk of living to extreme old age result in a greater rate of dissaving of couples relative to singles.

The distribution of labor income between husband and wife is certainly an important type of heterogeneity among households. The range of households goes from more traditional households with the husband being the sole earner to modern ones with both spouses working fulltime. How the distribution of income within the household effects saving has mainly been analyzed in the collective choice framework.[26] On the first sight there is no reason why the income distribution within a household should matter if the household behaves as if it maximizes a single utility function. On the ground of the LCM one would argue that income is simply pooled and lifetime utility is maximized given the exogenous pooled income stream.

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[26] For a detailed discussion see section 3.3 below.

However, there are reasons why the intra household income distribution could effect saving, which can be rationalized within the unitary framework, i.e. when household choice is regarded as the maximization of a single utility function. Browning (1995) provides two intuitive arguments.

First, consumption and labor supply may not be separable. If both partners work, consumption may simply increase because there are costs of going to work like transport expenditures, clothing etc. In addition, if consumption is measured as purchase of market goods then consumption increases when both are working, due to the fact that there is less time to produce household goods like child care and domestic services to substitute for goods purchased in the market. According to this argument, a more even distribution of household income should be positively correlated with consumption and thus reduce saving. On the other side, with female labor supply income increases and in the context of optimal lifetime allocation, households might increase saving to provide resources for times of lower income when the wife stops working (e.g. in the event of pregnancy). This would lead to a correlation between consumption and income distribution between spouses in the opposite direction. Second, a household consisting of two earners faces less income risk than a single earner household if the risks of husband and wife are not perfectly correlated. Thus if a precautionary saving motive is important, this will lead to less saving of a household consisting of two earners.

A second possible effect of a higher female labor supply on saving is due to a higher contribution to a public pension scheme. A longer female working history leads to higher public pension annuities which possibly reduces discretionary household saving.[27] For an empirical investigation of how the labor market status of couples effects saving, Apps and Rees (2000) distinguish different types of households according to the labor supply of the secondary earner: traditional households where the wife supplies no market labor, non traditional households with the wife working part time and non traditional households with the wife working full time. They find evidence for higher savings in non-traditional households, i.e. their data suggest that the marginal propensity to save out of the secondary earner's income is very high.

The analysis of the effect of children on household saving is difficult since there are a number of plausible arguments why the saving decision might be effected in one or the other direction. First the arrival of children will lead to higher expenditures on

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[27] Compare Attanasio and Banks (1998).

household goods like housing and food but not proportional to the number of household members due to scale economies. On the other side parents probably change the composition of goods they consume, i.e. they might reduce expenditures for goods like holidays or going out.[28] The first effect will probably outweigh the second if the number of children increases and children become older[29] and thus consumption will increase with the number and age of children. But there are reasons why couples with children might save more than childless couples. Parents might want to save to finance future expenditures for children like expensive education. This motive is not very strong in Germany where education is publicly financed but it is definitively important in other countries like the U.S.A. In addition, a bequest motive is another reason why couples with children might c.p. save more than childless couples.

A common way to model the effect of children on household saving is simply to assume that household period utility depends on the number of children present. Household period utility then becomes $u_t = u(C_t, z_t)$, where z_t is a variable indicating the number of children present at time t.[30] The well known lifetime utility maximization then yields an optimal consumption path that depends on the number of children. Usually, utility is specified such that marginal utility of consumption increases with the number of children. Since optimal behavior requires constant marginal utility over time, this means that consumption increases with the number of children. However, it is not obvious how parents allocate their consumption expenditures between phases where they are alone and phases where children are present. It might well be that parents reduce non-child consumption like going out or expensive holidays when they have children and spend more on e.g. expensive journeys when children have left home.[31]

3.3 Collective Choice Framework

The method to model household decisions as the maximization of a single household utility function is not in line with the central assumption of individual preferences in microeconomic demand analysis. In addition the assumption of a household utility function does not allow the analysis of the allocation of resources within the

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[28] Compare Browning and Ejrnaes (2002).
[29] Browning and Ejrnaes (2002) estimate the effect of number and age of children on household consumption and find that the increase of consumption is offset by a reduction in consumption on e.g. entertainment, tobacco etc. as long as there is only one small child.
[30] Compare Browning and Ejrnaes (2002). They use a 'one-child' specification, i.e. z is a dummy variable indicating whether a child is there or not, and utility is independent of the age of children.
[31] Compare Browning and Ejrnaes (2002).

household.[32] But if household members have different preferences for the allocation of expenditures within and between periods, the composition of the household could have an effect on its saving decisions. The collective choice models that will be presented have primarily been developed in the context of within period allocation of goods (i.e. labor supply and consumption demand analysis) but their basic idea is also applicable to the analysis of between period allocation of resources.

The collective choice framework models the household decision either as a cooperative or non–cooperative two-person game.[33] Basically a household is considered to consist of two members, indexed by H and W in the following. Each member has a utility function over the consumption of private and public[34] goods. Thus, the two household members' preferences can be written as $U^H(x^H, X)$ being the husband's utility out of his own consumption and the level of consumption of household (public) goods, and $U^W(x^W, X)$ being the wife's utility, respectively. X denotes the vector of public goods for the household, whereas x^W and x^H denote the vectors of goods privately consumed by wife and husband, respectively. The disposable incomes of each are y^W and y^H, respectively. Thus both face the individual budget constraint $y^i = p \cdot x^i + P \cdot X$ where p and P are the price vectors of private and household goods and $i = H, W$. Specification of utilities varies between a pure 'egoistic' case where each household member's utility depends on his own private consumption alone and there are no household goods and an altruistic case where the consumption of both enters each utility function. The decision process is either cooperative or non-cooperative. In the cooperative framework the decision over the allocation of household income on consumption of different goods is simply assumed to be efficient, i.e. the couple comes to an agreement such that utility of one spouse cannot be increased without decreasing the other's utility. A popular approach used in the cooperative decision framework is Nash bargaining. That is the household maximizes the Nash product

$$(U^H(\cdot) - V^H(p, P, y^H)) \cdot (U^W(\cdot) - V^W(p, P, y^W)) \qquad (8)$$

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[32] Compare Bourguignon and Chiappori (1992) p.356.
[33] For the cooperative setting compare Mc Elroy and Horney (1981); Manser and Brown (1980) or Bourguignon and Chiappori (1992) for an introduction. For a non-cooperative model see Ashworth and Ulph (1981).
[34] Public goods are those which are public on the household level, i.e. consumption of a public or household good by one spouse does not reduce the level of consumption available for the other.

under the household's budget constraint, V^H and V^W being the husband's and wife's reservation utilities or threat points, respectively.[35] When threat points are assumed to be indirect utilities of staying single, gains of forming a household exist by shared consumption of household goods. These gains are distributed according to the relative bargaining power of each spouse reflected in their indirect utility of staying single. The solution to this problem is a household demand function which depends on the income shares of both spouses.[36] Thus an increase, say, of the wife's income, leaving total household income unchanged, will shift household demand towards goods which are of relative higher value for the wife, which is not the case in the unitary framework where household demand is derived from a single household utility function.

Browning (2000) applies a non-cooperative version of the collective choice framework to model the saving decision of a couple. Starting from the observation that women have stronger preferences for saving for old age since they live longer and are typically younger than their husband he develops a simple two period model of household consumption. Both husband and wife get utility out of consumption of a good which is public at the household level.

$$u_H = u(C_1) + \boldsymbol{l} \cdot u(C_2) \qquad u_W = u(C_1) + u(C_2) \qquad (9)$$

The husband's second or 'retirement' period utility is discounted with ? (0< ?<1), the probability that he will survive to the end of the second period, whereas the wife is assumed to survive with certainty. Both spouses have an exogenously given first period income and the share of the wife's income in total income is ?. Overall household saving is then the result of a two person Cournot like game in which each maximizes its lifetime utility over the amount saved in the first period, given the partner's saving and the restriction that individual saving can not exceed individual income.[37]

First, the cases are considered where one of the spouses can dictate the saving decision. If the husband could dictate how much to save out of total household income Y, he would set saving to pY, with p < 0.5. He would prefer to save less than half of the income since his probability to survive the retirement period is less than one. The wife's preferred saving rate is clearly 0.5. Browning shows that there is a unique Nash

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[35] Threat points are often defined as the indirect utility attainable when staying single. Alternatively they could be defined as the utility of each in an equilibrium of a non – cooperative game.
[36] Intuitively the spouse's bargaining position could well be linked to other exogenous variables like education which would then influence household demand.
[37] Second period income is zero by assumption, as is the real interest rate for simplicity.

equilibrium in which the wife saves all of her income if $r \leq 0.5$ and saves half of the total household income if $r > 0.5$. The husband saves none of his income if $r \geq p$ and $(p - r)Y$ otherwise.

The main result is that for the specific range of the wife's income share between p and 0.5 the household's propensity to consume out of an additional unit of income depends on who receives the income. If p < ? < 0.5 household saving in Nash equilibrium is ?Y. An extra dollar received by the husband will be completely spent whereas the wife would still save an additional dollar of income.

The model makes of course a lot of simplifying and unrealistic assumptions. There are only two periods, there are full economies of scale in consumption, both spouses are not caring for their partner's welfare, incomes are exogenous and there is only one saving instrument.[38] However, it seems plausible that women should have a higher concern for saving for old age which might cause household saving to increase as a function of the wife's disposable resources.

Within the same modeling framework Browning also considers a couple's portfolio choice. In addition to the private saving instrument an actuarially fair pension annuity and an actuarially fair insurance are introduced. The private saving instrument pays out a dollar for each dollar saved, for each dollar invested in the pension plan $?^{-1}$ dollars are paid out in the second period as long as the husband lives and the insurance policy pays $(1-?)^{-1}$ dollars for each dollar invested if the husband dies. A first intuitive result is that the husband will always prefer the annuity to the other two saving instruments since for him it gives a higher expected return, whereas the wife will never contribute to an annuity since the expected return is the same as that of private saving but there is some uncertainty attached to it. Starting from this intuitive result the portfolio choice of a couple conditional on the wife's income share is analyzed. Again there exists a unique Nash equilibrium. For a low income share of the wife, the husband invests in pension annuities and the wife spends all of her income for insurance, i.e. she insures against the risk of becoming a widow in period two. For a medium income share the household invests in all three instruments and for a wife's income share greater than one half the wife spends half of the household's income on private savings whereas the husband does not save anything. For a simple model as this these are very specific predictions

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[38] For a discussion of the assumptions see Browning (2000).

and they can certainly not be taken at face value. But the model puts the focus on the fact that some saving instruments are more or less attractive to men and women due to the longer remaining lifetime of women. Which means that the composition of a couple's portfolio could well depend on the relative influence each spouse has in the decision.

3. Empirical Results

Since the application of the collective choice framework to model household saving behavior is still in a very early stage, there has not been much empirical work in this field. The few empirical findings on the impact of intra-household distribution of income on saving behavior do not particularly support the predictions made by the collective models. The first to mention is an analysis by Browning (1995) of the relationship between household saving and the distribution of income within the household. Browning first provides some intuitive arguments why a couple's saving behavior might depend on the intra-household distribution of income. Some of them can be rationalized within the unitary framework others are based on the collective choice approach. Based on five cross sections of the family expenditures survey (FAMEX), data on Canadian households, he conducts a regression of household saving rates on different household variables. These variables include income, family composition variables like number and age of children, variables on education and occupation, labor force status of household members, age variables, regional dummies and variables on the distribution of income within the household. It is found that the distribution of income does not have a significant effect on the saving rate if disposable income is controlled for and that a higher income share of the wife c.p. leads to lower saving rates when disposable income is not included in the regression. This result is in contradiction to the collective model but cannot be interpreted as rejecting the hypothesis that the wife's income share has a positive effect on saving. There are a lot of other reasons[39] (e.g. sharing risk of income shocks, non separability of consumption and labor supply) why the saving behavior of a couple might be affected by the income distribution in one or the other direction and it is difficult to disentangle these different effects.

A second study conducted by Lundberg and Watts (2000) aims at the identification of a relationship between the relative bargaining power of couples and their saving decision.

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[39] Compare section 3.2.2. above.

On the basis of a collective choice model they argue that the accumulated wealth of a couple near retirement should be higher the stronger the wife's influence on the saving decision. Referring to Browning's study they argue that education differences might be an additional and possibly better measure for long-term potential income differences and thus for relative bargaining power. For a sample of married and cohabiting couples near retirement (men aged 45-70 and women aged 40-65) of the 1992 cross section of the Health and retirement study (HRS) they regress the log of household's net wealth on couple's characteristics including potential measures of relative bargaining power like income shares, relative education and age difference. They confirm Browning's result, i.e. they find a negative correlation between the wife's income share and household's net wealth. In addition they find that a very low education of the wife relative to her husband has a significant negative effect on household net wealth but are careful with interpreting this result as evidence for a relation between relative bargaining power and saving.

In a study by Euwals, Börsch-Supan and Eyman (2000) the attitudes of household members towards saving for old age and their impact on portfolio choice are analyzed. Their study is based on a panel of households (couples with or without children) from 1994 to 1997 of the Dutch CentER Savings Survey. Their main results will briefly be described. They find that in a representative panel wives find saving for old age more important than husbands, whereas in a high income panel there is no difference between husbands and wives. The household members' attitudes towards saving is linked to the husbands collected pension rights, i.e. the more years of contribution to public pension the less important is saving. In an analysis of portfolio choice behavior they find that both members' attitudes positively effect the probabilities of holding annuity and endowment insurance whereas only the husband's attitude is related to the probability of having stocks. In addition it is found that only the husband's attitude has a positive impact on the amount of household wealth. They conclude that husbands dominate saving and portfolio choice decisions.

So far the empirical work has no clear answer to the question how household saving is related to the relative influence of spouses on the saving decision and what characteristics of household members determine their relative 'bargaining' power. A severe problem is to find good measures of spouses' influence on saving and the fact that a lot of unobserved characteristics might have an impact on spouses' relative bargaining positions.

4. Conclusion and Hypotheses

Traditionally the saving behavior of households has been modeled within the life cycle framework of a representative individual. Its basic prediction is that marginal utility of consumption is held constant and thus saving is ultimately determined by the exogenously given stream of lifetime income. This approach ignores heterogeneity among households. There are other variables than income which are a source of heterogeneity with respect to composition among households like household size, difference of age, income and education of couples, the length of time children stay within the household and the labor market status of couples. On the one hand some attempts have been made to incorporate this heterogeneity into the unitary life cycle framework. On the other hand it has been argued that the decision of a household is the result of a 'bargaining' process within the household. If the relative influence of household members on the decision depends on observable characteristics like relative income, heterogeneity with respect to these characteristics may be a source of differences in the saving behavior of households. This chapter concludes with some hypotheses on how the saving behavior may differ due to differences in household composition and characteristics of household members.

1) The first hypothesis concerns the comparison of dissaving behavior of retired couples. The rate of saving should increase with the age difference between husband and wife other things equal. Comparing two couples at retirement with the same age of the husband and the same wealth and income levels, the wealth of the couple with the younger wife should decline at a lower rate.

2) When comparing male to female singles in retirement theory would predict that a female single saves more or dissaves at a lower rate than a male single with identical resources due to her longer remaining lifetime.

3) Saving of a couple with children, in general should be lower than that of an otherwise identical couple due to increasing costs during the time when children are present.

4) A bequest motive should on the other side increase savings of couples with children as compared to childless couples.

5) From the collective choice models a positive correlation between saving and variables which could possibly reflect the wife's influence on the saving

decision are expected. Such variables include the income share of the wife, education differences as proxy for differences in potential lifetime income and possibly marital status.

6) A more even distribution of income within the household reduces low-income risk and should thus reduce precautionary saving by couple consisting of two earners as compared to a single earner couple with the same household income.

7) On the other side saving should increase in phases where both spouses are working to provide resources for phases when there is only one earner.

In light of the dramatic changes observable in modern societies, like the increase of singe households and the decrease of couples with children, more attention to the impact of household composition on savings should be devoted when analyzing saving behavior.

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