PORTFOLIO-BASED SEGMENTATION AND CONSUMER BEHAVIOR

Empirical Evidence and Methodological Issues

Jonas Gunnarsson

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This dissertation deals with how and why people save, and in particular how different groups of households differ in the ways they construct their portfolios. This is what I label portfolio-based segmentation and explore from different angles. Marketing research in consumer behavior with regard to savings has only relatively recently gained momentum, and I hope that the dissertation will be a useful contribution to this field of research.

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Stockholm, December 17, 1998

Jonas Gunnarsson

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Chapter 1:

Introduction:
Dealing with Consumer Heterogeneity in Saving Behavior and Portfolio Choice

Jonas Gunnarsson

Problem Area and Synopsis

Recent work in the area of retail financial services marketing almost invariably cite the deregulation of national and international financial markets and the ensuing significantly increased competition as a major reason as to why financial institutions have a need for better knowledge of their customers' behaviors and needs. One crucial piece of information is the composition and characteristics of the most common customer segments. Marketing departments at venerable financial institutions are scrambling to update marketing practices and information gathering tools to the modern, dynamic marketplace. Among the most sought-after information are better ways to segment and target the market, i.e., *how* do groups of households behave with regards to their savings and investments, *why* do they behave in certain ways, how can we *reach* them and how do they *respond* to marketing activities? In this thesis we will attempt to shed light on some salient aspects of the first two of these four questions.

The thesis also draws on theoretical and empirical work in the study of the consumption and saving behavior of households and individuals in economics. To do otherwise would be to exclude much of the important work on saving behavior, especially in terms of empirical observation of actual behavior. However, since the need for new research at the micro level is becoming more and more imperative in the retail financial services industry, with operational managers clamoring for information which can be translated into business strategy, economic studies alone cannot serve such a purpose in the modern retail financial services firm. We acknowledge that economics still has an important role to play, as theory-generator and supplier of empirical evidence of household saving behavior. There is also a strong trend in economics to take into account the heterogeneous saving behaviors of different consumer groups, which has led to a more flexible, powerful and ultimately, for business purposes, somewhat more useful theory.

However, to reiterate, in this thesis market segmentation is the approach we take to study consumer heterogeneity in the market for retail financial services for households. In marketing, this is a common and powerful tool for dealing with customer heterogeneity, and indeed, as Wedel & Kamakura (1998, p. 3) remark "market segmentation is an essential element of marketing in industrialized countries."

As several authors observe, although numerous segmentation studies have been made of the financial services market, many have failed to build on previous work and prove to be of much practical use (Elliott & Glynn, 1998; Harrison, 1994; Speed & Smith, 1992). Further, and most importantly for this thesis, very few of the studies have used portfolio behavior as a starting point for the analyses. This indicates a gap in research, as, from a behavioral segmentation point of view, banks and insurance companies, at least in theory, have easy access to detailed databases on their customers' current investments and the pattern of transactions over time. These databases should be put to active use in the firm's marketing strategies. Also, behaviors are often more useful than psychographics for segmentation purposes (e.g., Wedel & Kamakura, 1998), and may give interesting indications as to households' real preferences with regards to their savings.

According to the methodology espoused in this thesis, households may be assigned to groups according to similarity in behavioral response to the supply of financial instruments. After grouping the households, differences between groups can be related to different background characteristics by means of analysis of variance, discriminant analysis and/or logistic regression analysis (forward segmentation; see van Raaij & Verhallen, 1994). This requires that data on such background characteristics are available. If they are not, similar results may possibly be obtained using data fusion after the behavioral segmentation has been carried out.

A complication is, however, that most customers usually have one primary financial institution and one or more secondary ones which are used differently and for different purposes (cf. Laroche & Taylor, 1988). This makes it imperative to avoid selecting customers for analysis based on incomplete, and therefore misleading, behavioral data. The recent flurry of mergers in the financial services sector should make it more feasible to conduct segmentation studies on the basis of customer records for single institutions. However, this requires far-reaching integration of computer systems and databases, which for many institutions may be difficult to achieve in the near term (Meadows & Dibb, 1998).

The studies presented here avoid the pitfalls of incomplete customer records by basing analyses of household financial behaviors on complete, albeit self-reported portfolios, taking into account the portfolios of all household members. This is necessary in order for us to understand *household* portfolio behavior.

In the second chapter of this thesis, we refer to different patterns of savings and debts in portfolios as *household financial strategies*. After having found groups of different Swedish households with homogeneous financial strategies, we then go on to use them as domains when we examine the process of human time preference calculation, a concept widely used as an integral variable in economic applications of consumption and saving theory. It is shown that there is substantial heterogeneity in the way individuals calculate discount rates, a common proxy for time preference.

Given that there is change in demand and supply side conditions over time, and we have been successful in detecting groups of households with significantly different portfolio behaviors, how valid is such a grouping that has been found in the cross-section? This illustrates another methodological and theoretical problem in marketing research, namely the stability (or stationarity) of a particular market partitioning, resulting in a specific segment structure. Can the segmentation be validated in the cross-section, and how stable are segment characteristics and the individual households belonging to specific segments over time? Behavioral segmentation of Dutch household financial portfolios is applied to this problem.

In the literature, different types of psychological variables have been shown to correlate with financial behaviors. Such results are important for the practitioner in order to make the results as actionable as possible; merely observing a market partitioning based on behavioral data is ultimately unsatisfactory. Economists frequently have access to excellent data on household financial behavior, which they try to model on the aggregate level using theoretical constructs which can be rather limited in nature for practical business purposes. Thus the two types of data – psychological and behavioral – nicely complement one another. It is seldom that we find a data source with both types of data, but in this thesis use is made of survey data from Sweden and the Netherlands which give us the opportunity to relate them directly to each other at a detailed level.

However, in this we encounter another little-researched problem, since, as noted above, the forward segmentation methodology calls for use of different types of psychological data collected from the household in order to construct a background 'profile' of the households. The collection of behavioral and psychological data from multi-member households has traditionally been made by identifying the individual in the household who is most knowledgeable about household financial matters. This individual's personal characteristics are then used as a proxy for the entire household. It is not immediately apparent that this is a satisfactory solution for the researcher as it may result in poor-quality data potentially fraught with biases and with substantially reduced validity. This problem is examined using differences in risky portfolio behavior among Dutch households as the basis for analysis.

Purpose of the Thesis

Many mainstream economic theories of consumption – such as the 'pure' life-cycle/permanent-income model (in the form of the standard certainty-equivalence model, CEQ) – are mainly concerned with the accumulation of wealth and what mechanisms drive people's saving behavior; e.g., when and how much they save. But when a decision has been made to save or borrow (negative saving), the specific form of saving and borrowing has to be chosen out of the many that are available and combined with existing ones. Other aspects of saving behavior are thus the portfolio choice of households and the capital structure of households' portfolios.

Saving and consumption are therefore multi-faceted behaviors that can be studied in many ways. We argue that households can be seen as investors who are faced with the same decisions as a professional investor. There are three important decisions that the household has to make. (1) When and how much to save (if at all), (2) which assets to include in the household's portfolio and in what proportions, (3) how much to lever the assets in the portfolio by borrowing.

We could say that these three decisions – whether consciously or unconsciously made – constitute the household's financial strategy. We define financial strategies as *the observed pattern within a group of households of different forms of financial assets, including types of debts and credits, utilized by the households*. Three of the papers in this volume are based on the segmentation of the market for retail financial services based on different such financial strategies. The fourth paper is also focused on the concept of heterogeneity, this time as expressed by different agents within the individual household.

The main theme and general purpose of the thesis is thus to answer the following questions: (1) given the fact that households exhibit different patterns of financial behaviors, can we segment them utilizing this behavioral base; (2) can we construct a useful explanatory model as to why households behave heterogeneously; (3) how consistent are the segments over time in terms of typologies and household segment membership (switching); and (4) what methodological issues will we encounter?

Although we consistently draw on theoretical and empirical work in the area of consumption and savings, the focus is on portfolio behavior (expressing the second major investment decision the household has to make) and issues pertaining to this area from an economic-psychological and marketing point of view. The thesis does not cover segmentation strategy and implementation issues.

The Structure of This Introductory Chapter

In the following two sections we will review some of the theoretical and empirical evidence in economics and marketing prompting researchers to increasingly take into account different aspects of population heterogeneity in the study of household saving and portfolio behavior. We will sketch the outlines of some of these studies in order for the reader to better grasp the strong connections between contemporary research in the economics of saving and portfolio behavior to modern retail financial services research in consumer behavior, market segmentation and marketing research.

The concept of market segmentation will also be dealt with at some length, ultimately focusing on some recent fruitful approaches to the segmentation of the market for household retail financial services. Some methodological problems concerning data collection in studies of saving and portfolio behavior are discussed. Finally, we will review the most important aspects of the four studies presented in this thesis.

The Heterogeneity of Saving and Portfolio Behavior in Recent Economic Thought

The financial behavior of households has become the object of increasing interest in the economic-psychological and marketing communities. Economists have piled up an impressive array of theoretical and empirical research spanning centuries. However, many economists have become more critical of fundamental theories such as the life-cycle/permanent-income model, which we term the certainty-equivalence model (CEQ); and the capital asset pricing model (CAPM). One important reason for this is that the empirical evidence tends to lend weak support to broad aggregate models of household savings and consumption, and portfolio behavior (cf. Browning & Lusardi, 1996; Burbidge & Robb, 1985; Carroll, 1998; Danziger, van der Gaag, Smolensky, & Taussig, 1982; De Bondt & Thaler, 1994; Hochgürtel, 1998a; Kotlikoff, 1989; Kroll, Levy, & Rapoport, 1988; Weil, 1991).

Recognizing population heterogeneity, much of this research has found subgroup analysis (e.g., wealth groups, age-groups and occupational groups) to be a fruitful approach, rather than trying to fit all household behaviors under one theoretical 'umbrella.' (Examples are provided by Burbidge & Robb, 1985; Campbell & Mankiw, 1990; Campbell & Mankiw, 1991; Carroll & Summers, 1991; Carroll, 1997; Carroll, 1998; Weil, 1991).

We would like to emphasize that no claim is made that the literature review in this section is complete. Making such an extensive review is not in line with the purpose of the thesis. Instead, we refer the interested reader to the excellent overview of recent advances in savings research made by Martin Browning and Annamaria Lusardi (1996).

Financial Economics and Household Portfolio Behavior at the Micro Level

Attanasio, Banks, & Tanner (1997, p. 2) note that "The composition of household portfolios is of extreme interest for a wide range of questions (such as the ability and willingness of individuals to diversify risk) and yet remarkably few studies have analyzed it." For instance, in financial economics the issue of actual selection and composition of household portfolios has received a comparative paucity of attention relative to the majority of the general empirical finance literature which primarily studies capital markets and asset prices and returns (Hochgürtel, 1998). Hochgürtel (1998, pp. 2-3) also remarks that "the financial literature has lost sight of households...[and] the empirical literature on portfolio choices using household data is tiny...but growing." Finally, Browning and Lusardi (1996, p. 1800) write that "we have very little to say about portfolio choice...largely because there is very little work on this that uses micro data directly."

Traditional finance theory[1] imposes a number of restrictions (about preferences, credit constraints, information, taxation, etc) through its reliance on simplifying assumptions of human behavior which may hamper deeper understanding of why households behave in the way they do. Early on, this prompted work which considered possible restrictions to consumer choice in static models of portfolio choice. Some of the restrictions studied include transactions costs, differential asset taxation, minimum purchase requirements and liquidity constraints.

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[1] Here we refer to the capital asset pricing model. In its 'pure' form, the CAPM involves several very simplifying assumptions about investor preferences, credit constraints, information, taxation, etc.. The *mean-variance model* assumes that the trade-off between risk and expected return fully describes the portfolio choice.

Expected return is a measure of the profitability of the investment and the variance measures its risk (Kroll et al. 1988).

The finding that wealthy households tend to hold more risky assets can, for example, be attributed to the absence of heavy transaction costs and substantial marginal tax advantages for such households (Hochgürtel, 1998a).

Another interesting strand of research concerns the 'inertia' of consumers, in which they are hypothesized to learn to make more complex decisions concerning their investments over time. In a well-known study by King & Leape (1987) age and educational attainment correlated with the sophistication of financial portfolios. Independent of economists King & Leape, this was also found in a marketing research study by Kamakura, Ramaswami, & Srivastava (1991), in which portfolio diversification and a measure of 'financial maturity' were positively related to age and education.

From a *normative* point of view we also have plenty of evidence as to the fact that the vast majority of households are investment sub-optimizers and appear to be extremely risk-avert (the equity premium puzzle; Benartzi & Thaler, 1995; Mehra & Prescott, 1985). This is because so few households hold a significant amount of stocks in their portfolios, or indeed any asset apart from bank accounts. For example, Michael Haliassos and Carol Bertaut (1995) examine this issue based on micro-data from the 1983 U.S. Survey of Consumer Finances, and show that only 25 percent of households hold stocks directly, and 36.8 percent if indirect holdings (e.g. pension funds and Individual Retirement Accounts) are included. Haliassos & Bertaut cannot adequately explain this phenomenon. Similar figures of stockholding are produced by, e.g., Pålsson (1988) in Sweden and Alessie, Pradhan, & Zandvliet (1993), Alessie, Lusardi, & Aldershof (1994) and Hochgürtel (1998c) in the Netherlands.

Criticism has been leveled at the assumptions of finance theories as applied to consumers (e.g. De Bondt, 1998; De Bondt & Thaler, 1994). Apart from the unrealistic assumption of perfect capital markets and perfect information, this criticism primarily focuses on the bounded rationality of consumers as expressed in their inability to properly understand and make use of the relationship between risk as measured by the fluctuation in price of an asset (the variance or standard deviation) and its expected yield. A second problem has to do with the notion of *beta*, that is, the asset allocation in an efficient portfolio should be made having the co-variances of all the assets in the portfolio in mind. Individuals typically ignore this when making investment decisions (De Bondt, 1998; Kroll et al., 1988; Müller, 1994).

Empirical findings such as those mentioned above are therefore important to help develop a stronger theory as to *why* households exhibit different portfolio behaviors, and are extremely useful not only for economists, as is shown in the case of Kamakura et al. (1991), but also for marketing researchers. No one factor can fully account for the behavioral heterogeneity among households, but the trend in empirical research is to try to document and explain more of these deviations from 'rational' portfolio behavior. In behavioral economics, some of the more prominent work dealing with portfolio choice and offering alternative explanations to observed behavior has been made by Richard Thaler, Hersh Shefrin and Werner de Bondt and their associates.

In terms of empirical results, there is much pertinent information to be found in the growing literature on household portfolio behavior at the micro level. Researchers such as Hochgürtel (1998a) express hopes that as access to high-quality data becomes easier, this area of research should begin to grow rapidly. The ideal situation would of course be to use behavioral data which are coupled with psychological measures.

Incorporating Household Heterogeneity Into the Life-Cycle/Permanent Income-Model

We will adhere to the terminology of Browning and Lusardi (1996) and label as certainty-equivalent (CEQ) any standard model of savings and consumption that assumes that:

1. Households are rational and maximize an expected intertemporally additive utility function, subject to a lifetime budget constraint.
2. There is no precautionary saving motive and no uncertainty.
3. Households form rational expectations.
4. Households face perfect capital markets.
5. The real interest rate is constant and equal to the rate of time preference.

The CEQ thus incorporates any model that assumes that agents are consumption-smoothing forward-looking optimizers, such as the life-cycle (LC; Modigliani & Brumberg, 1954) and permanent-income (PIH; Friedman, 1957) models. However, as Browning and Lusardi remark, modern theory has evolved to become much more general than this simple framework, and can to some extent accommodate uncertainty, imperfect capital markets and the precautionary saving motive. This having been said, Browning and Lusardi (1996, p. 1850) conclude their extensive survey of modern savings research by conceding that "although substantial progress has been made in the past 20 years, more problems remain than have been satisfactorily answered."

In connection with the purpose of this thesis, we are interested in some of the problems that have been encountered in micro-level empirical research, namely those that deal with the difficulty in making models general enough to reconcile them with the observed heterogeneity of household behavior.

The Precautionary Motive and Buffer Stock Saving

To begin with, a substantial amount of work has shown that there is evidence that liquidity constraints and income variance are important for understanding consumer spending. Why? It indicates that if households are not forward-looking, but instead liquidity-constrained and excessively worried and uncertain about their income development, they may tend to hold a precautionary *'buffer stock'* of assets (Carroll, 1997; Deaton, 1989). This stock may be related to some rule of thumb, such as a certain number of months of consumption, i.e., not dependent on the stage in the life-cycle. The result of buffer-stock behavior would be intermittent reactions to income shocks, when the household's wealth-to-permanent-income ratio drops below or above the target ratio.

The notion that households will differ in how much they are 'forward-looking' formed the basis for a series of articles by John Campbell and Gregory Mankiw (e.g., Campbell & Mankiw, 1990; Campbell & Mankiw, 1991). They propose that nesting the permanent-income hypothesis in a more general model, where varying consumption and saving preferences are taken into account, can explain some of the empirical findings above. In this model, a fraction of agents in an economy is hypothesized to consume all of their share of total disposable income as current income, termed λ, while the remainder of total disposable income ($1-\lambda$) goes to households which consume their permanent income (as a standard CEQ-model would predict).

Campbell and Mankiw (1990) show that the λ-model predicts that about 50 percent of all U.S. households consume their current income, rather than being consumption-smoothers. In a follow-up study (Campbell & Mankiw, 1991), the authors show that data on consumption growth in the U.S., the U.K., France, Canada, Japan and Sweden yield a fraction of the total disposable income consumed by non-smoothing households of between 0.2 (Canada) and 1.0 (France). This strongly indicates that non-smoothing behavior is prevalent internationally as well.

Carroll (1997) elaborates further on the consumption/income parallel and the buffer-stock model and presents the most thorough analysis of the implications of the model so far. He argues that neither the Keynesian model, the standard CEQ-model nor Campbell & Mankiw's λ-model can adequately explain:

1. Why households' consumption is observed to track income development closely at the macro level (the consumption/income parallel).

2. Why, in microeconomic data, consumption instead can be observed to be far from current income for individual households (the consumption/income divergence).
3. Why slow-downs in productivity growth do not necessarily mean growing household wealth accumulation over the life-cycle if the principal reason for some households' saving is to use wealth to buffer transitory and random shocks to income.

These puzzles are much more easily explained within the buffer-stock extension to the standard CEQ-model, where the precautionary motive for saving plays a dominant part. In Carroll's simulations, a lower discount rate (time preference) lead to higher wealth for consumers, as will expectations of lower income growth and higher income uncertainty. Estimates of the discount rate for consumption out of an increase in expected future income range from 13,982 percent for consumers with a wealth/income ratio of 0.2, to 22 percent for a ratio of 1.6, where the buffer is much larger and about the 'average' for consumers. This is much higher than the CEQ-model would predict and consequently leads to a quite lower life-cycle wealth accumulation overall.

Finally, the buffer-stock model can explain a puzzle which has been reported earlier in the literature, namely why the CEQ-model fails to adequately explain empirically observed household wealth accumulation patterns, in the sense that households usually do not accumulate or decumulate wealth gradually, but wealth appears to be drawn upon in a much more spasmodic manner over the life-cycle in response to transitory shocks. If creating a buffer were the primary motive for saving, such behavior could be predicted from such a model. The conclusions to Carroll's paper are that "The buffer-stock model does not, of course explain all behavior of all consumers...Probably the appropriate place for the buffer-stock model is as an explanation of truly discretionary 'high frequency' saving decisions of the median customer" (1997, p. 50).

Advances in research during the past decade therefore leave the door open for accepting the proposition that non-forward-looking households also are utility-maximizers, and hence that some groups of households can be non-savers or appear to have inadequate savings for retirement as compared to a CEQ-model's predictions. In this vein, Weil (1991) and Hubbard, Skinner and Zeldes (1994) argue that if households have 'forced' savings in the form of social security payments that they cannot use to borrow from to finance current consumption, it is rational for some households not to have any life-cycle savings at all and not smooth consumption.

There is therefore considerable empirical evidence that the heterogeneity of household consumption and saving behavior is strong enough that a nested model à la Campbell & Mankiw or Carroll is necessary to account for some of this variance. Accepting an amended CEQ-model that incorporates a precautionary motive and buffer saving indicates that not only will life-cycle saving behavior differ between groups of households, but portfolio composition for such groups will differ as well. An hypothesis could for example be that a group with low income variance invests relatively more in medium- to long-term assets than a group which consumes more or less all of its current income. Finally, as Carroll (1997) observes, there are groups of consumers for which no standard model is appropriate, such as the 'rich' and the 'poor.'

Wealth Accumulation, Consumption Patterns and Occupational Classes

Another issue that has been debated quite fiercely is the path of wealth accumulation in the later stages of the life-cycle as predicted by the standard CEQ-model. Typically, the prediction is that households will accumulate wealth in a 'hump-shaped' manner, reaching its peak around retirement and then dissaving will cause wealth to be depleted by the time of death. The empirical evidence shows that such a simple description cannot capture the behavior of more than a fraction of households. Instead, many households decrease their consumption during retirement and also do not decumulate their assets completely (see e.g., the seminal article by Danziger et al., 1982). A variety of extensions to the CEQ have been proposed, some of which argue that the time-horizon has to be extended beyond the individual's own death in an altruistic overlapping-generations model (the Barro-hypothesis; Barro, 1974). This is in stark contrast with the liquidity-constrained households described above, for which the life-cycle was too *long* a perspective.

In a much-debated article from 1985 on the topic of wealth-age profiles, Burbidge & Robb demonstrate that there are significant differences between the saving behaviors of blue-collar and white-collar households, which are 'masked' in the profile of the average Canadian household. White-collar households typically do not follow the consumption/savings path predicted by the CEQ, and actually tend to increase their wealth even after retirement. In contrast, blue-collar households follow the predicted path of hump-shaped accumulation of wealth and rapid dissaving after retirement.

The important point for this thesis is that we again, this time based on type of occupation, can identify at least two different groups of households which exhibit very different saving behaviors, and whose behaviors cannot be easily handled simultaneously in the standard CEQ-model. In fact, examining these two sub-groups as Burbidge & Robb do adds substantially to our knowledge of household saving behavior.

The Rich

The Burbidge & Robb (1985) study also contained other interesting findings, which lead us in to the next area of household heterogeneity: the behaviors of the rich. The wealthiest households in the Canadian study were excluded in one analysis, which doubled the amount of explained variance. This was to be expected, because as Weil (1991, p. 168) observes: "The very rich also seem poor subjects for the forward-looking model. This may be because it is simply impossible for them to consume their wealth quickly enough...or for some other reason – for example, because they value wealth for some reason other than future consumption. Since they appear so rarely in surveys, are reluctant to answer questions, and are probably far from homogeneous anyway, little is known about this group."

Carroll (1998) discusses the problem of the saving and consumption behaviors of the rich more in-depth. He argues that apart from providing an opportunity to run an acid test on the standard CEQ-model, the rich are interesting in their own right because they account for a large part of aggregate savings in any economy. Discarding both the standard life-cycle model and a 'Dynastic' model à la Barro, Carroll finds little support for the argument that the explanation for the saving behavior of the rich be found within a traditional CEQ-framework. Instead, he argues in favor of a 'Capitalist Spirit'-model, in which wealth enters consumers' utility functions directly, i.e., wealth is an end in itself ('greed'), and the observed saving behavior is not due to smoothing consumption motives. Other motives for amassing wealth are said to be that wealth represents a way of keeping tally of job performance; the more cash one can show off with, the better one is doing at work; and also that the very rich use their wealth to pursue philanthropic activities. But, as Carroll succinctly observes, whatever the motivation, ultimately wealth is used in itself to give immediate gratification for the rich.

Although the Capitalist Spirit-model is formally presented, no direct empirical test is carried out, but the implications seem clear: the only model which may be able to explain the behavior of the rich must let wealth enter the utility function directly. For the purpose of this thesis, it seems evident if we were to use wealth to segment households on the basis of their saving behaviors, at least two groups would emerge: the average household and the rich household; with a possible third group in the form of the poor.

Conclusions

The empirical evidence shows that household financial behavior is complex enough that breaking the population down into groups of homogenous households (a priori based on any of the several characteristics mentioned above) gives us valuable insights not attained in a standard forward-looking consumption-smoothing framework. It is also clear that there are significant effects of saving behavior as expressed in a non-standard CEQ-framework on households' portfolio composition. One such effect is that households with more uncertainty and greater liquidity constraints will have different motives for saving than other households, causing investment behavior to differ in terms of the time-horizon motive for asset holdings.

Potentially Homogeneous Groups of Savers

David Weil (1991) concludes his review of Laurence Kotlikoff's anthology "What Determines Savings?" (1989) by arguing that any standard CEQ-model of saving should be thought of as one of *three* models applied to different wealth classes. Weil's proposed categories are non-savers, forward-looking savers and non-forward-looking savers. These categories can also be derived from the empirical and theoretical studies presented above.

Since so few households hold any assets to speak of apart from liquid assets (e.g. bank accounts) and housing, it is hard to see such households as 'operative forward-looking savers.' These *non-savers* may behave differently if, for example, forced savings for social security were less and/or uncertainty about retirement provision and employment were to increase.

The 'normal' saver would here be the household or individual which most closely adheres to the standard CEQ-model, i.e., are *forward-looking* consumption-smoothers. In portfolio terms, these households would probably have different financial strategies for reaching their goal of a fairly steady rate of consumption. Some would manage their assets on their own with an efficient mix of stocks, bonds and liquid savings, while others would concentrate on retirement schemes which are managed professionally, hence be willing to pay a second party to achieve their saving goals. A third strategy might be to invest in housing, and reverse-mortgage it during retirement.

The third group would consist of *the rich* ('non-forward-looking savers'). Since their saving behavior appears to be driven by motivations which are quite different from mainstream households, their financial strategies and portfolios would also differ from the median household's. Here very heterogeneous and complex portfolio structures are to be expected and in segmentation terms, sub-segments would proliferate.

Since these three categories in themselves are fairly broad there is of course a gray zone consisting of any number of distinct financial portfolios and saving regimes. These are also liable to change over time in response to exogenous and endogenous factors, even if the general categories are more or less stable. Empirical studies of the sort conducted in two of the papers in this thesis will therefore add to the general knowledge of the most common saving and portfolio regimes that households pursue.

Potentially Viable Explanatory Factors

The factors which have been identified as important explanatory factors of 'deviant' saving behavior (i.e., not conforming to the standard CEQ-model or capital asset pricing models) can also be utilized as variables in multivariate explanatory models of the financial strategies of different groups of households. Such factors include (1) *environmental or exogenous factors*, e.g. capital asset taxation legislation and labor market uncertainty; (2) *household characteristics*, e.g. income, wealth, education, type of occupation and stage in the life-cycle; (3) *individual characteristics*, e.g. saving motives, discount rates (time preference) and planning horizon, perceived income risk and risk attitudes.

From a segmentation point of view, these variables could be utilized for a number of purposes such as product development, marketing communication strategies and prediction of behavioral change in different customer groups.

The Heterogeneity of Saving and Portfolio Behavior: Segmentation in Financial Services Markets

Introduction

Until the 1950's, classical economics had dominated the way economists and practitioners viewed the market and the consumers. This view assumed that all consumers possessed similar or identical demand curves, which was consistent with the traditional industrialist and mass production view of production and markets. Sheth & Parvatiyar (1995) note that as urbanization began in earnest there were masses of people in the cities that needed and could pay for basic conveniences such as food and clothing. The producers and retailers satisfied this demand by relying on economies of scale to produce, distribute and sell cheap products in bulk. This, according to Sheth & Parvatiyar (1995, p. 406) was a break with earlier centuries' more relationship-oriented marketing in favor of a transactional approach, "whereby marketers became more concerned with sales and promotion of goods and less with building ongoing relationships." Marketers were mostly concerned with manufacturing products in bulk and pushing them through the distribution channel as quickly as possible. The alienation of consumers from producers led to middlemen gaining more influence in the distribution channels.

By the 1950's two developments were occurring which began to change the transactional focus on marketing (Sheth & Parvatiyar, 1995). One was the realization that repeat purchase was important, which prompted a closer look at quality, consumer satisfaction and brand building. A second development was that producers gained a stronger hold of the distribution channels through administered vertical marketing systems. This lessened the traditional information monopoly of the middlemen and brought producers in closer proximity to the consumer. As competition intensified and many markets matured, identification of different consumer groups with different needs and behaviors became an increasingly important marketing tool.

Edward Chamberlin's theory on monopolistic competition formed the basis for early theories of consumer heterogeneity. Chamberlin defined monopolistic competition in product differentiation terms, arguing that this was *"...any significant basis...for distinguishing between the goods (or services) of one seller from those of another"* (Chamberlin, 1948, p. 56).

In Wendell Smith's seminal article in the Journal of Marketing (1956) the concepts of market differentiation and market segmentation are contrasted. To Smith, segmentation is not merely *"the bending of demand to the will of supply...an attempt to change the slope of the demand curve for the market offering for the individual supplier,"* but instead he asserts that:

> *Segmentation is based upon developments on the demand side of the market and represents a rational and more precise adjustment of product and marketing effort to consumer or user requirements (1956, p. 6)*

This is a step beyond merely admitting that there *ought to exist* homogeneous groups of customers. Smith says that marketers should actually *start to actively find out* which these groups of customers are, what their needs and preferences are and to start tailoring product development, production and marketing communication with customers' specific needs as the basis.

Smith's contemporaries Arne Rasmussen (Rasmussen, 1955/1977) and Wroe Alderson also expounded the theory that monopolistic competition and heterogeneous consumers fundamentally altered the conditions for marketing. Alderson wrote in his massive work on marketing and executive action (1957, pp. 30-31) that:

Obviously the model for the perfectly homogeneous market has no counterpart in the real market. It is only a convenient fiction adopted by economists who want to think about the economic problem of price rather than the marketing specialist who wants to think about the marketing problem of information. While both the homogeneous model and the heterogeneous model are abstractions, the heterogeneous model impresses the marketing specialist as lying closer to the actual market place. It may be that the marketing specialist takes a microscopic view and hence is aware of differences which seem minor or irrelevant to the economist. It may also be true that the differences of viewpoints are appropriate to differences in the problems which each discipline sets out to study.

Alderson illustrates the debate concerning micro and macro perspectives, where economists often argue that too low an abstraction level is useless in terms of policy implications. Here one may ask what *is* the appropriate level of abstraction for understanding a phenomenon in business or economics? Well-known economic psychologist George Katona (1975, pp 1-2) writes that:

> *Instead of deriving predictions from immutable principles of human nature, the behavioral scientist assumes that under conditions a_1, b_1, c_1 a set of stimuli would elicit one response whereas under conditions a_2, b_2, c_2 the same set of stimuli would elicit a different response. Attitudes and expectations, which as intervening variables modify the response, are subject to change according to time and circumstances. Instead of searching for a single necessary response to change in income, prices, or interest rates, the behavioral scientist studies circumstances under which a stimulus will produce the same or a different response.*

This perspective is fairly typical for behavioral research in business administration and marketing. There are hardly any simple methods or generalizations in practical business activities, the solution to each unique problem is instead highly situation-dependent. What marketing as a discipline can contribute are the tools to gather and analyze data, and *"its* approach *to problem identification and solution. The marketing approach is based on the operationalization of the marketing concept and the utilization of marketing research, management, and behavioral science concepts and methods as tools for better marketing decisions"* (Wind, 1982, p. 18).

This author therefore believes that there is no one answer to the question about appropriate abstraction level in business and economics, but, just as Alderson argues, this level has to be set with the specific problem and the objective of the research at hand in mind. This also has implications for the researcher's and practitioner's view of the market, and in practical segmentation terms, which aggregation level to choose and how many segments which are deemed appropriate for solving a particular problem.

Another often-cited difference between economics and the behavioral sciences is that economists gladly leave the 'black box' of human behavior for the behavioral scientists to look into. This is illustrated in the S-O-R-model (Stimuli-Organism-Response; e.g. Wärneryd, 1967 and see Ölander & Seipel, 1970 for an application on saving behavior) which has been used extensively in economic psychology. The argument here is that economists content themselves with observing a correlation between a stimulus, for example a tax hike, and a human response to that stimulus, for example in terms of increased tax evasion. All the while behavioral scientists would be interested in studying the organism, for example what cognitive factors are important in determining tax-payers' response to the stimuli, and how the response differs between groups of tax-payers.

In any event, since Smith's (1956) seminal article in the Journal of Marketing on market segmentation and product differentiation, the notion that markets should be divided into smaller 'segments' consisting of customers exhibiting similar behaviors or possessing similar socioeconomic, demographic or psychological characteristics has received an extraordinary amount of attention. It has become one of the cornerstones of modern marketing science and practice. Marketing research in the financial services area is no different from other areas in this respect.

It may be of interest to note that from time to time debates about the actual value of segmentation have cropped up in the marketing community, a recent case in point being the debate sparked off by Don Esslemont in the E-mail List for Marketing Academic Researchers (ELMAR) discussion group in 1996 (Esslemont, 1996). What is called for by critics of 'mindless' segmentation is good theory to support the segmentation effort, and evidence that marketing strategies based on segmentation results actually affect the bottom line. Such evidence as is provided by proponents of segmentation is usually viewed with extreme skepticism as the causality is hard to prove beyond doubt. On the other hand, one can argue that segmentation and classification do not necessarily always have to be used to improve the bottom line but can have other uses in marketing research.

Classification as a Theory-Generating Activity

This thesis is based on the premise that is exhorted by George Katona (1975): analyzing the behaviors of different groups of objects – individuals or households – is necessary for the behavioral researcher to gain better insight into human behavior. In order to make sub-group analysis possible, we devote a great deal of effort to the identification – or classification – of such behavioral groups based on their financial behaviors (strategies).

Kaufman & Rousseeuw (1989, p. 1) write that "the classification of similar objects into groups is an important human activity...A child learns to distinguish between cats and dogs, between tables and chairs, between men and women, by continuously improving subconscious classification schemes." Similarly, Aldenderfer & Blashfield (1985, p. 7) assert that "classification is...a fundamental process of the practice of science since classificatory systems contain the concepts necessary for the development of theories within a science."

Classification can be made with or without prior theoretical assumptions (cf. Wedel, 1990). If the theoretical base for which groups of objects are expected to be found is relatively weak, the goal of classification is more or less of an exploratory nature meant to generate hypotheses. Classificatory techniques can also be used to test hypotheses about the existence of sub-groups and their different characteristics. Hence, once classification has been made, the results can be used to confirm or reject prior hypotheses, or be further built upon to validate and develop the results. Although cluster analysis, to date the prime classificatory technique in market segmentation, is best served by some prior knowledge about the population to be classified and what groups may be found, this is not a requirement, and the technique can be (and frequently is) used for purely exploratory purposes.

Classification schemes of the type generated in this thesis can thus be used to generate new theory or to build upon existing theory. We believe that both these goals are attained: (1) a new partitioning is made of a market and (2) existing theoretical constructs are applied in the evaluation and explanation of different classificatory schemes. The ultimate aim is to contribute to the ongoing process of theory-building in the field of household financial behavior. As Kaufman & Rousseeuw (1990) note, humans continuously strive to improve on their classification schemes – the process certainly does not stop after childhood. To improve on existing schemes is also one of the goals of cumulative research in market segmentation.

Schools of Research in Market Segmentation

Dibb & Stern (1995) divide the market segmentation literature into two areas; *technical* (e.g. application of multivariate techniques) and *evaluative* (e.g. usefulness in marketing resource allocation). Frank et al. (1972) use a slightly different division, speaking of *behavioral research* and *decision-oriented research* into market segmentation.

The difference between the behavioral and decision-oriented schools are not great, and frequently both types of research are conducted in the same study. Frank et al. (1972, p. 14) summarize the differences between the two schools as follows:

Behavioral research:

- Identifies and documents group differences
- Searches for predictors of such differences
- Contributes to the theory of why such differences occur

Decision-oriented research:

- Assumes that some differences do in fact exist and focuses on how meaningful segments can be carved out from the heterogeneous population
- Searches for good predictors to aid in the "carving-out" process
- Develops procedures for allocating marketing resources to segments

The two schools thus complement each other in the sense that behavioral research can delineate theory, while decision-oriented research can apply theoretical constructs on practical problems. There is no question, however, that the behavioral approach is favored in this study. Since the study also places emphasis on methodology and statistical techniques, it also belongs to a more purely technical school.

Segments found in any study of this kind are liable to change over time. It is difficult to generalize findings from one segmentation study to another since few are made as exact replications of other studies. But as we have already remarked marketing as a science as a rule cannot provide powerful generalizations which apply to all cases in all situations.

However, once we accept that our analyses, in particular cross-sectional ones, will capture behavior as a snapshot in time, it is also reasonable to assume that they will provide us with some clues and methods that can be used in cumulative research. For example, they will allow us to pinpoint certain important determinants of financial behavior, test some hypotheses about the differences between consumers in different groups and as research accumulates ascertain how stable certain behavioral patterns are over time, situation and place. For marketing managers any clues to customer behavior and help in reducing a complex marketplace can, of course, be invaluable. This is also the present study's connection to decision-oriented segmentation research.

A Plethora of Segmentation Bases: Review of Segmentation Studies in Financial Services Marketing Research

This section will show that there is some parallel research in economics and financial services marketing, both at the theoretical and empirical level. However, it is concluded that economic theory and empirical findings too seldom are taken into account in marketing studies or vice versa.

A *segmentation base* is a set of variables or characteristics that is used to assign consumers to homogeneous groups. Depending on the data available and the problem at hand, the marketing researcher can make use of a number of different segmentation bases, each with its particular pros and cons. Frank et al. (1972) are often credited with developing a very useful two-dimensional classification of segmentation bases. The first dimension is anchored with *general* (independent of products, services or situations) and *product-specific* (related both to the consumer and the product and/or situations) bases. The second dimension is anchored with *observable* (variables are measured directly, e.g., buying behavior) and *unobservable* (variables or dimensions are inferred from other measurements, e.g., psychographics) bases.

An evaluation by Wedel & Kamakura (1998) shows that general and observable segmentation bases are very stable and usually make it quite easy to identify which consumers belong in which segments. Specific and observable bases using purchase or usage behavior of the type we are utilizing later in this thesis, are shown to yield substantial, identifiable, stable and uniquely responsive segments, but little in terms of ideas for the development of marketing vehicles such as advertising. General and unobservable segmentation bases such as lifestyle and personality variables can yield substantial segments in terms of size, but are not very good in terms of stability and accessibility. More specific and unobservable bases such as intentions, perceived benefits and psychographics can give plenty of creative ideas for a marketing plan which can enhance actionability and responsiveness to the firm's marketing communication strategy.

It is clear that it is important to choose the right segmentation base depending on what the problem of interest is; e.g., for improving on marketing communication perceived benefits can be a fairly safe bet. On the other hand it is not certain that these segments are neither substantial, stable nor accessible. Wedel & Kamakura (1998) advocate utilizing joint segmentation on several bases, e.g. benefits coupled with product ownership, as a way of solving this problem (cf. Ramaswamy, Chatterjee, & Cohen, 1996).

Segmentation Studies in Financial Services Based on the Life-Cycle

Product and service consumption behavior in different domains has been shown to correlate with stages in the life-cycle (e.g. Schaninger & Danko, 1993). Financial services consumption patterns are not exceptions, and it seems that what little economic theory has made its way into marketing research in this area has often been related to the consumer's stage in the life-cycle. Stage in the life-cycle has also been a simple and convenient heuristic segmentation base for bank staff at all levels. However, general and observable bases of this kind often make it difficult to pinpoint unique reasons for observed behaviors and to tailor marketing communication. Recent research, such as that carried out by McConocha, Tully, & Walther (1993) has also found that many households do not travel the once fairly predictable life-cycle path, but may have divorced, formed new families, etc.

Stanley, Ford, & Richards (1985) attempt to segment bank customers by age group, arguing that research has shown that usage of specific financial services to a great extent is determined by the customer's age – consistent with the 'pure' life-cycle hypothesis. A random sample of a total of 4,514 bank customers is drawn from the internal customer records of 17 American banks. Cross-tabulations by age group – seven groups ranging from 18 years of age to 63-plus – and type of service – 31 different, classified as "checking," "loan services," "trust services" and "miscellaneous services" – are made and tested with chi-square statistics. The results indicate that there in fact is a relationship between product usage and customer age. Time deposit usage is much more common in the upper age groups, while loan usage is frequent among the middle age groups, for example for home improvement. Safe deposit boxes are more frequently utilized in the older age groups. There are further indications that only about a third of the total number of services are heavily used by the sample. 22 services are used by less than 10 percent of the respondents. The authors conclude that banks could benefit by planning capacity and product assortment additions according to the demographic structure of their customers. Hence this study primarily gives clues as to product development and service levels for different age groups.

In a very interesting study Kamakura et al. (1991) attempt to identify the order in which households acquire financial services. According to the authors, it can be expected that a sequential acquisition process follows a sort of *logical ordering* similar to that of the acquisition of other services or products. Following an argument drawn from economic theory, they assert that because of resource constraints households have to prioritize their acquisitions according to needs and resource availability. The paper positions financial services and households along a difficulty and an ability dimension, which are thought be latent and hence unobservable directly, but is estimated by the authors indirectly. 'Difficult' services require greater financial resources, are more complex and risky, etc., and require higher investor ability or 'maturity.' The paper focuses on the decision whether or not to invest in a saving form and how saving forms complement each other.

Based on a latent class model of the acquisition order of eighteen financial services and position in the family life-cycle, a two-dimensional matrix is computed. One axis measures financial maturity and the other the probability of acquisition or ownership of a financial service. Correlates of the maturity dimension – such as income, net worth, age, education, weight of different investment objectives and occupation – are examined with regression analysis, most of which are shown to be significantly related to financial maturity.

Hence Kamakura et al. do find strong support for the "financial maturity"-hypothesis. *Foundation services* (checking and savings accounts, mortgages) are generally acquired before *contracting risk management and cash reserve services* (pension plans, life insurance). Followed by these are services for *growth to help offset inflation* (stocks, mutual funds), *risky, tax protection assets* (tax shelters, bonds, real estate other than home) and finally *current income-post retirement assets* (time deposits, annuities, CD's). The relationship between financial services may be thought of as complementarity over time.

The results are here potentially quite a bit more useful than those of the previous study by Stanley et al. (1985). This is because of the larger flexibility with regard to financial institutions being able to anticipate individual customer needs, regardless of exact age or stage in the life-cycle. Instead a combination of knowledge of life-cycle stage and product portfolio can help bank staff give customers more accurate and personal advice.

Segmentation Studies Based on Saving Goals

A number of studies have looked into saving goals as predictors of household financial behavior (e.g. Gasparski, 1990; Lindqvist, 1981). Some of the inspiration here comes from economic theory (frequently one incarnation or another of John Maynard Keynes' eight saving motives; Keynes, 1936), but also from psychological theories such as Maslow's controversial hierarchy of needs model (Maslow, 1954). The potential usefulness of motives for saving as segmentation base was examined in a Swedish study by Wahlund (1991). The motives can be characterized as a product-specific and unobservable segmentation base.

Based on psychological and economic theories, Wahlund uses the perceived importance of four different saving goals, stage in the life-cycle, income and economic situation to cluster respondents into groups which exhibit different financial behaviors using the Howard-Harris hierarchical clustering procedure. The results show that, according to these segmentation variables, there was a hierarchy of four saver "types" in Sweden in the mid-1980's. The groups are denoted wealth managers (23.4 percent of respondents), goal savers (17.7 percent), buffer savers (27.3 percent) and cash managers (31.5 percent). These groups also exhibit significant differences in portfolio behaviors and other characteristics.

The analysis was based on combined data from three independent cross-sectional surveys carried out with six-month intervals (1983-84), with monetary variables deflated for inflation. This resulted in high consistency over time in the segments that were found. There is, however, undoubtedly some segment drift in terms of both size and segment characteristics over time due both to exogenous and endogenous factors.

Segmentation Studies Based on Product Class Knowledge and Involvement

Product class knowledge and purchase involvement have been widely studied in marketing as factors which mediate between perceived need and product or service purchase. These two cognitive components have been found to be determinants of information search behavior and amount of cognitive elaboration (see e.g. Brucks, 1991 on product class knowledge; and Petty & Cacioppo, 1986 on the Elaboration Likelihood Model). Since financial services often are described as risky and complex (particularly as part of a financial portfolio), it is reasonable to assume that involvement and knowledge play a role in determining portfolio composition and which sources are relied on in the information search process. From a segmentation point of view these variables are general or product-specific unobservable segmentation bases.

McAlexander, Schouten, & Scammon (1991) examine financial planning services for individuals, more specifically utilization of professional financial advisors. In this case the segmentation base is knowledge about financial services – product class knowledge – and the level of intrinsic motivation, i.e., the willingness to engage in behaviors because it is enjoyable or rewarding in itself. Semi-structured interviews were conducted with 39 subjects about their interaction with financial advisors. The outcome of the interviews is presented in Figure 1 where the quadrants contain the four segments found by McAlexander et al.. They show how each respondent has been placed in a quadrant of the two-dimensional matrix with the axes denoting high or low knowledge and high or low intrinsic motivation with regards to the process of investing and financial management.

Intrinsic Motivation	Product Class Knowledge: High	Product Class Knowledge: Low
High	*Exhibits depth and breadth of understanding; Economic and hedonic motives. N = 5*	*Limited understanding; Economic and hedonic motives. N = 8*
Low	*Exhibits depth and breadth of understanding; Economic/ utilitarian motives. N = 15*	*Limited understanding; Economic/utilitarian motives N = 11*

Figure 1: Classification matrix to identify market segments for professional financial advisory services. Source: McAlexander et al., 1991, p. 153.

High intrinsic motivation for the process of investing is characterized by mentioning hedonic benefits, such as recreation or hobby. Respondents with low intrinsic motivation mention economic motives or utilitarian goals for investing. Product class knowledge was objectively measured by eight open-ended questions concerning attributes important in differentiating investments and special terminology.

This strategy for segmenting the market for professional financial planning services suggest that each segment will demand quite different levels of service. Their need for comprehensive services will also vary considerably, as will the frequency of contact with the advisor. The evaluation of the advisor and the services offered will also be quite different, the segment in the upper left-hand quadrant being the most demanding in their decision process.

In a British study, Harrison (1994) used qualitative interviews (N=15) in an exploratory study to segment the market for financial services, later repeating the study quantitatively on a sample of 1,398 customers of a large U.K. bank (Harrison, 1996; Harrison, 1997). The focal variables Harrison studied were perceived knowledge and understanding of financial services, confidence and ability in dealing with financial matters, and expressed level of interest (involvement) in financial services. Harrison measures 'financial maturity' using the classification made by Kamakura et al. (1991), i.e., by the type of services present in the individual's portfolio. Checking accounts and mortgages are examples of 'foundation products' and lower financial maturity, while stocks and government bonds are examples of riskier assets and higher financial maturity. Harrison hypothesizes that there are four segments, based on the variables mentioned previously, see Figure 2.

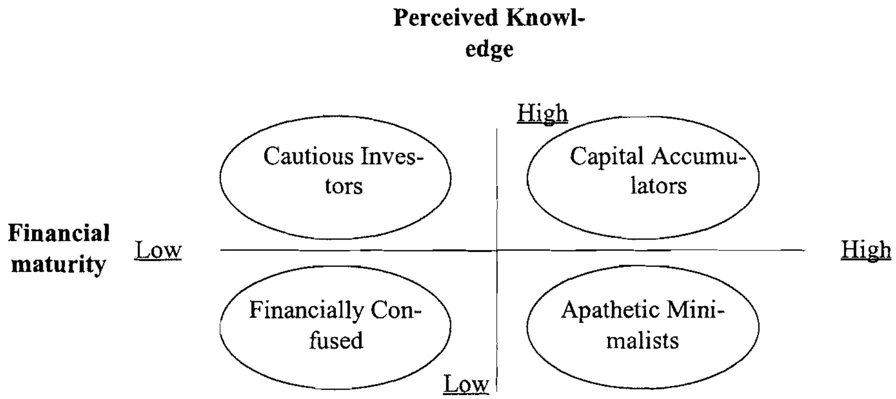

Figure 2: Financial services consumer segmentation. Source: Harrison, 1994, p. 21.

The results from Harrison's qualitative and quantitative studies indicate that this segmentation approach is a viable one. Segments differ both with respect to their financial behaviors as expressed in their portfolios, with respect to their involvement in financial services and their perceived level of product class knowledge. Segment membership was predicted with 95 percent accuracy in the quantitative study.

Quantitative study results employing cluster analysis (Harrison, 1997), showed that "the financially confused" (16 percent of the sample) exhibited low financial maturity, had low perceived knowledge about financial services and little interest in investments. They used only the most rudimentary financial services, e.g., checking accounts with no debit cards. The majority of individuals were either retired or unemployed. There was a lack of future orientation. For those individuals who did own stocks, these were very likely to come from privatization of state companies. Finally, they were the least likely to have borrowed money from a financial institution.

"Apathetic minimalists" (42 percent) had a low perceived level of knowledge of financial services coupled with a relatively high level of financial maturity. However, with respect to savings and investments, the individuals in the cluster had below average propensities to have bought shares, unit trusts, etc. Usage of loan and credit products was not very high.

"Cautious investors" (32 percent) were in the high financial maturity category, with an above average propensity to use most of the surveyed services, including shares, unit trusts, personal equity plans, etc. They had a high level of perceived knowledge of financial services. What distinguished them from the other groups was their heavier use of endowment policies, private pensions and other forms of "safer" savings accounts.

"Capital accumulators" (10 percent) were the most financially active of all groups. They were likely to use a range of financial institutions to better serve their needs. The group was also the most likely to hold shares, unit trusts and personal equity plans, but not as likely as the Cautious Investors to hold "safer" saving forms. The segment members also were the most likely to have borrowed from a financial institution. They were predominantly male, older (55+) and married.

Since Harrison succeeded in reducing the number of segmentation predictors from eight to four (capital accumulation, future planning, involvement and financial cognition) and still has such a high hit ratio, her approach obviously has its merits. This is especially true since she proves the link between financial behavior and perceived knowledge and involvement in household finances. This contributes to validating her findings. In terms of this thesis, which focuses on financial behavior and portfolio composition, Harrison's results contribute to our understanding of why portfolio behavior differs between groups, and also hints at which behavioral groups can be found.

Segmentation Studies Based on Perceived Benefits

This is the most common segmentation base in financial services marketing. It is based on the premise that the benefits which different consumers derive from services offered constitute the fundamental reason for heterogeneity in behavior (Haley, 1968; Wind, 1987). Benefit segments have traditionally been derived from importance weights given different attributes or components of a product or service. There are however more advanced methods, such as conjoint analysis, in which consumers are forced to make tradeoffs between attributes in bundles of services or products.

Examples of benefit segmentation in this domain are studies by Anderson, Cox III, & Fulcher (1976), Calantone & Sawyer (1978), Laroche & Taylor (1988), McDougall & Levesque (1994), Chang & Chen (1995) and Minhas & Jacobs (1996). What is usually measured are the benefits pertaining to bank branches regarding their bundle of benefits, such as their locations, hours and service quality. In other cases, the focus is on the benefits of investing, e.g., desired liquidity, amount of risk, etc. This last approach is related to measurement of saving goals.

Chang and Chen (1995) make a typical study. In this case three benefit factors with regard to retail financial services are identified: (1) stability, (2) liquidity and (3) growth. These are then used as segmentation base for a k-means cluster analysis producing five distinctive groups with different combinations of the perceived importance of the three benefit factors. It is shown that all of the five segments can be characterized not only in terms of their preferred benefit bundles, but also in terms of demographics, financial behavior and prioritized saving goals. This kind of results can be used to communicate more accurately to segments and give them information only about the services or service-extensions they are primarily interested in. It also gives us some hints as to how to choose media if we design a new marketing communication campaign, as well as some creative ideas for such a campaign.

Calantone & Sawyer (1978) made an interesting extension to this approach, where they examined the stability of benefit segments over a period of two years. The hypotheses underlying the study were that: 1) benefit segments should be consistent in different independent samples from the same time-period. 2) Segments would be similar over time in terms of benefits sought, size and demographic characteristics. 3) Individual consumers would be classified in the same segment in the two time-periods.

Cross-section analysis on the 1972 dataset was made using cluster analysis on four benefit factors. Split-half sample tests confirmed that a five-cluster solution was appropriate for the data, which also validated hypothesis 1 concerning the internal consistency of the segments. A second, identical, analysis was then made on the 1974 dataset. Again, the segments were internally consistent and showed a close resemblance to the 1972 segments in terms of size and benefit weights, which partly confirmed hypothesis 2. However, demographic characteristics had changed somewhat in the segments. The last hypothesis was rejected, as only 28.8% of the individuals remained in the same segment over the two-year period.

The results strongly indicated that it was worthwhile to monitor customer segments closely over time, especially since segment switching was very common. Marketing management might decide to rely on a self-selection strategy for example in marketing communication, since segments were consistent in terms of desired benefits. However, demographic characteristics appeared to change over time, which should affect the effectiveness of segment targeting and media decisions.

The problems detected by Calantone & Sawyer's study (i.e., that although segment characteristics in terms of benefits are consistent, the individuals in each segment are not the same) are dealt with at length in this thesis' third chapter.

Segmentation Studies Based on Financial Behaviors

We have reached the product-specific and observable segmentation bases. This base, as expressed in households financial portfolios, has so far not been much utilized in the literature. If it can be combined with appropriate demographics and psychographics, it should yield useful results. Two examples of portfolio-based segmentation can be found in the second and third chapter of this thesis. We shall not disclose the findings here, but instead provide an example of joint segmentation, based both on financial services usage and motives for saving.

Ramaswamy et al. (1996) apply a binomial mixture joint segmentation model to 554 consumers' responses as to their ownership of thirteen financial services (denoted s) and their most important saving motives (u). Two different partitionings are obtained in this manner, yielding s=4 and u=4 segments, all with significantly different motivations to save as well as different portfolios. For financial services usage, the segments identified were (1) *infrequent investors* (holding mainly liquid assets), (2) *simple investors* (holding retirement-related assets), (3) *advanced investors* (broadly diversified portfolios, taking advantage of investment counseling services) and (4) *conservative investors* (diversified portfolios, but preferring safer assets such as certificates of deposit).

Computing the joint probabilities of membership in segment s_j and u_j, the authors show that there is considerable overlap between the segments. They argue that these findings are useful to identify potentially interesting sub-segments and develop new products or marketing communication tailored to these consumers. This is because when we are using the joint segmentation approach, various motivations can be found to lie behind different financial strategies.

If we want to analyze consumers' different saving and investment strategies directly, portfolio behaviors are a potential powerful segmentation base. Using forward segmentation we can first determine the existence of the most common portfolios, and then utilize a theoretical model together with external variables to explain behavioral differences, or profile the segments for further strategic analysis.

It is also possible to vary the level of aggregation in the analysis, i.e. conduct analysis on primary units (households) or secondary units (individual household members). The exact choice of segmentation base and level of aggregation of different types of assets also make for a number of opportunities to explore different aspects of financial behavior. There are possibilities to classify households according to their capital structure, the shares allocated to different types of assets, asset type ownership, amount invested in each saving form or their debt structure. As we show later in the thesis, different choices of segmentation base produce somewhat different information about households' financial strategies. The stability of the segmentation can also vary with segmentation base.

An important point that we made in the introduction to this chapter was that financial institutions are uniquely equipped with the data to analyze customers' financial behaviors. However, in many cases there is still an array of practical problems concerning the practical usage of these databases that have to be solved. The behavioral data should also be supplemented with other data either gathered through surveys or input via data fusion from various external databases. This kind of supplementary data may, for example, be gleaned from geographical information systems (GIS) or other firm internal or firm external surveys made on the population covered by the firm's customer databases.

However, possession of data sources does not necessarily mean that it is utilized. In this respect the situation in the retail financial services industry may be compared to the situation in the fast-moving consumer goods (FMCG) retailing industry a decade ago, when point-of-sales (POS) scanner data, in spite of its easy availability, was hardly utilized at all for marketing purposes. For financial services there may also be tighter legal restrictions on data usage for banking privacy reasons to take into consideration.

Conclusions

There is indeed a plethora of approaches to the study of segmentation in the retail financial services market. As we argued in the discussion of appropriate level of abstraction and the contribution of marketing science to problem resolution, all of the approaches have their merits (and demerits). To a varying degree all of them suffer from being unclear about their further implementation in firms' marketing strategy, except for in very general terms. However, this thesis does not cover implementation issues. Instead we are interested in what we can learn from the studies in terms of (1) behaviorally homogeneous groups of individuals or households and (2) factors which may explain differences in behavior.

Potentially Homogeneous Groups of Savers

It seems fair to say that regardless of which segmentation base is used, portfolio behavior among groups of households can be roughly divided into (a) 'unsophisticated,' transaction- and liquidity-dominated, (b) 'sophisticated,' well-diversified, (c) 'forward-looking,' pension-oriented and cautious and (d) 'high-involvement,' very motivated investors with creative investment behavior. All of these groups should also contain sub-segments.

The group of 'unsophisticated' households is the largest group, with the 'forward-looking' group the second largest. In terms of impact on aggregate saving or profitability for the individual financial services firm, the more sophisticated groups are strong contenders to be the most interesting. However, although this is something that many marketers argue, it has not been established empirically that such is the case for the firm. Sophisticated investors may very well cost more in 'maintenance' than they bring in to the firm in the form of their capital and fees and charges on services utilized.

Potentially Viable Explanatory and Descriptive Factors

Since most of the segmentation studies we have reviewed are interested in portfolio behavior only as a descriptive or profiling variable, we can evaluate the different segmentation bases to find which produce substantially different behaviors. Harrison's (1994, 1996 and 1997) and McAlexander et al. 's (1991) use of cognitive variables appears to discriminate well between individuals also in terms of financial behavior. Saving goals as used by Wahlund (1991) and Ramaswamy et al. (1996), i.e. not applied directly but with supplementary variables, also seem to be effective. Chang & Chen's use of perceived benefits also produced markedly different group behaviors. In many of these analyses, several *other* variables concurrently showed to be statistically different between groups.

To sum up, there are, just as we found in our discussion of economics and saving behavior, three different types of explanatory (or descriptive) factors. The *first* consists of demographics such as the life-cycle and age; the *second* covers socio-economic factors such as income, education and financial wealth and the *third* consists of a variety of 'psychological' factors of the type perceived benefits, involvement, risk attitudes, perceived knowledge, intertemporal choice, etc.

There is not really a lack of interesting factors to explore, the problem is that few attempts have been made to apply a stringent view on measurement and modeling problems. Finally, the focus has only very infrequently been on portfolio behavior. Unlike in the field of the economics of saving and consumption, segmentation research in financial services marketing has not been of a cumulative nature.

Discussion: Integrating the Two Perspectives?

We have reviewed and discussed theoretical and empirical findings from economic studies on financial behavior as well as segmentation studies of the retail financial services market. Although the purpose of the studies, type of data, segmentation bases and geographical markets studied are quite heterogeneous, we will attempt to summarize and draw some general conclusions from the material. We propose that the following behavioral groups may be found, where varying degrees of overlap are to be expected among groups:

- There is a large group of households that have rather small financial portfolios, debts and housing equity. This group also carries liquid and low-risk portfolios to the extent that they have diversified at all. The group will be over-represented by poor or blue-collar households with lower levels of education and life-time incomes.
- The behavior of a significant part of households is governed by life cycle demands. In particular, middle-aged households will exhibit a larger reliance on credit and debts, i.e., have leveraged their portfolios as much as possible. For most house-owning households, housing equity will be the single most important asset in the portfolio.
- Another large group of households will have portfolios geared towards meeting random shocks and will favor saving forms which are not highly volatile and are easily realizable in the short term. They will exhibit 'buffer-stock' behavior.
- For some households, longer-term security- or precautionary motives for saving will cause a concentration on pension-related assets. There may be overlap between this group and the previous.
- A small portion of households has highly diversified portfolios and also a level of net savings that contributes heavily toward the aggregate level of

saving in the population. These households' portfolios will have a much higher incidence of risky assets than in the general population.

- Very rich households will exhibit highly heterogeneous behavior. They will have large amounts of capital invested in businesses. Motives for saving will be highly individual.

In an integrative explanatory model the determinants of behavior will range from time preference to knowledge and interest in investments (an example of such an exhaustive economic-psychological model is provided by van Veldhoven & Groenland, 1993). The relationships between the variables will be highly complex and will tend to change over the household's life-cycle. For example, as domain-specific knowledge increases, the willingness to include more complex assets in the consideration set will increase, and risk attitudes may become more positive; which in its turn may affect wealth positively and reduce liquidity constraints for acquiring certain financial assets or being eligible for certain loans.

We would also like to stress the importance of behavioral constraints. For certain less well-to-do groups of households, liquidity constraints will be the only determining factor for portfolio behavior, since all income will go to current consumption out of necessity.

Slightly less constrained households will begin to show signs of diverging tastes, time preference, goals for consumption and saving and benefits demanded of the financial service providers. The complexity of behavior of and the determinants thereof will most likely also escalate further as households come to perceive themselves as self-sufficient in terms of current and future consumption. Precautionary motives will be downplayed and other mechanisms come into play. Motives for investing and assets that enter into the consideration set will proliferate and sophisticated investment services will sometimes be demanded of the service providers.

In Table 1 we detail some of the more important determinants of saving and portfolio behavior and how frequently they have been used in economics and marketing studies. There are evidently a whole host of possible explanatory factors than the researcher has to take into consideration. Some of these factors are only used in either of the fields, as is the case with the 'Big Five' personality dimensions which have been the object of some attention in economic psychology but not in economics (e.g. Wärneryd, 1996; Wärneryd, 1998). Here consumer researchers have the advantage of having access to personality measurement tools which have been stringently validated over a number of decades. This is also a good example of the way in which research differs between the two fields; in marketing and consumer behavior it is assumed that 'unobservables' or 'latent' factors can be measured using, e.g. psychological scaling, while such factors are measured indirectly through proxy variables in economics. Cases in point are time preference and attitudes towards financial risk taking. However, the boundaries are becoming somewhat blurred here, it should admitted, in measurement of perceived income risk (e.g. Hochgürtel, 1998b) and the importance of saving goals in explaining saving behavior. But it is in economics that psychological measurements are becoming more popular, usage of econometrics being scarce in consumer research due to a lower proficiency in such methodology.

Factor	Economics	Marketing/ Segmentation Research	Note
Life-cycle stage	Frequently used	Frequently used	
Saving motives	Frequently used	Infrequently used	Seldom measured explicitly (self-reports) in economics.
Liquidity constraints	Frequently used	Seldom used	Never measured explicitly.
Income uncertainty	Frequently used	Seldom used	Seldom measured explicitly.
Time preferences/ discount rates	Frequently used	Seldom used	Seldom measured explicitly in economics.
Service benefits	Not explicitly measured	Infrequently used	Service bundle preferences explicitly measured in marketing.
Product class knowledge	Infrequently used	Frequently used	Perceived and actual knowledge explicitly measured in marketing.
Involvement	Not used	Frequently used	Level of involvement explicitly measured in marketing.
Risk attitudes	Frequently used	Frequently used	Seldom measured explicitly in economics.
Innovativeness	Not used	Infrequently used	Innovativeness explicitly measured in marketing.
Ability (wealth, income)	Frequently used	Frequently used	
Personality	Not used	Seldom used	Very weak connection to behavior.
Owned or rented accommodation	Frequently used	Seldom used	
Legislation (e.g., taxation)	Seldom used	Seldom used	
Other external shocks (e.g., market shocks)	Seldom used	Not used	

Table 1: The author's assessment of usage of various determinants of savings and portfolio behavior in the economics of saving and financial services marketing research.

How feasible is it to attempt to construct a general model of savings or portfolio behavior? We would like to end this section by quoting veteran savings researcher Laurence Kotlikoff from the introduction to the anthology *"What Determines Savings?"* (1989, pp 34-35).

> *One way to describe the current state of knowledge about savings is that a great deal is known at a theoretical level about savings determinants taken one at a time. Much less is known about the interactions of these determinants, and too little is known at an empirical level about the true causes of savings. The theory has pointed out a number of subtle but powerful determinants of saving on which little data are available. New data will be needed to assess these issues, but some of this data will be difficult to collect...In sum, the question of what determines savings is like a good jigsaw puzzle. It has a number of pieces. Some of the pieces have been found...The pieces which are missing are not necessarily in the bottom of the box and indeed may be mixed up with identical-looking pieces in some other puzzle. While it is easiest to keep playing with the pieces at hand, the puzzle may never be solved without the tedious task of looking in the other boxes. While the outlines of the puzzle are getting clearer, the precise picture it displays remains well worth the search.*

This author agrees with Kotlikoff's assessment that the present state of ignorance regarding the interactions of important factors coupled with a lack of relevant data makes it very difficult to get a clear view of all the complexities of household saving behavior. This thesis, as indeed some of the recent research in economics, provides indications that a general model of saving behavior may be unfeasible. Instead, some of the problems and deviations from theory may more easily be understood using homogeneous behavioral groups of households as a base. There have been attempts also in economic psychology to construct general models of saving behavior, e.g. van Veldhoven & Groenland (1993), but these have not been feasible to use for empirical research in their own right. Rather, *parts* of these models could be applied to a more limited problem or clearly defined group of households.

Kotlikoff's remarks display a frustration with the measurement tools and data available and he advocates keeping an open mind in future research. The present work aspires to go some way towards bridging the gap between the economics, sociology, psychology and marketing research areas, as both theoretical and empirical work from all these areas are drawn upon. There are useful ideas, tools and data in all these disciplines that can be applied to the explanation of household saving and portfolio choice. Sometimes solving the puzzle requires opening completely new boxes and making the best use of what one finds there.

This thesis also illustrates the author's progression from pure economic-psychological approaches to the study of portfolio behavior to more of a marketing approach. During this process, the author has developed the firm belief that a better understanding of household financial behavior can be gained from a more active cross-fertilization of different research areas, where the basic problem under scrutiny, i.e. households' portfolio choices, is the same. It is indeed encouraging to see that such efforts are actively being made in the international research community.

Methodological Issues

Before we conclude this chapter by reviewing the most important aspects of the studies contained in the thesis, we would like to focus on some methodological issues which are of consequence for large parts of the thesis.

Classification and Cluster Analysis

We have earlier discussed the use of classification in segmentation research. The theoretical development in segmentation research has been made concurrently with important advances in adjacent areas such as cognitive psychology, statistics and computer software and hardware. These advances have supported the quantitative focus of segmentation research.

Cluster analysis has become one of the prime tools for segmenting markets. Cluster analysis is a multivariate statistical technique which was originally developed for biological classification. Biologists Robert Sokal and Peter Sneath published their seminal text *"Principles of Numerical Taxonomy"* in 1963. Sokal & Sneath demonstrated that cluster analysis could be utilized to efficiently classify a dataset which contained all relevant characteristics of an organism. When the organisms had been classified based on these characteristics, it could be determined in which way they differed, and if they belonged to different species. In this way, Sokal and Sneath asserted, researchers could trace the path of evolution from one species to another.

An example of how cluster analysis can be used in the present context to trace how assets are held in portfolios is shown in

Figure 3, which is the result of a hierarchical analysis of usage of fourteen different saving forms in the Netherlands, i.e. dichotomous variables. The basis for the analysis is a proximity matrix computed from binary squared Euclidean distances between the variables.

At the upper end of the figure, saving certificates and bonds seem to be very likely to be held together, as are mutual funds and shares. At the lower end of the figure, employer-sponsored savings seem to be quite likely to be held together with Postbank saving accounts. Checking accounts are held independently of other assets. In this way, clusters of variables that are present simultaneously in the portfolios can be identified.

```
                         Rescaled Distance Cluster Combine

C A S E                        0         5        10        15        20        25
Label                      Num +---------+---------+---------+---------+---------+

Saving certificates            6  -+
Bonds                          13 -+
Private pension plans          10 -+-+
Growth funds                   11 -+ +-+
Savings & endowment insurance  8  ---+ +-+
Mutual funds                   12 ---+-+ +---+
Shares                         14 ---+   I   +---+
Single-premium insurance       7  -------+   I   +-----------+
Combined insurance             9  -----------+   I           I
Deposit books                  4  ---------------+           +-------------------+
Employer-sponsored sav plans   2 -----------------+-+        I                   I
Postbank saving account        3 -----------------+ +--------+                   I
Savings or deposit account     5 -------------------+                            I
Checking account               1 ------------------------------------------------+
```

Figure 3: Hierarchical cluster analysis of Dutch households' financial services usage with Ward's method and binary squared Euclidean distances. The segmentation base variables are dichotomous. N = 3,456, data taken from the 1996 VSB-CentER panel (see Nyhus, 1996).

The potential usefulness of cluster analysis was quickly appreciated by social scientists from diverse fields, such as sociology, marketing and psychology. Applications in the social sciences have exploded since the 1960's, in particular since the advent of cheap table-top computer power.

The principal goals of classification – as represented by cluster analysis – expounded by Aldenderfer & Blashfield (1985, p. 9) are:

1. Development of a typology or classification.
2. Investigation of useful conceptual schemes for grouping entities.
3. Hypothesis generation through data exploration.
4. Hypothesis testing, or the attempt to determine if types defined through other procedures than cluster analysis are in fact present in the data.

The segmentation base used in the second and third chapters of this thesis is financial behavior. In connection to a discussion of product-specific observable segmentation bases, Frank et al. (1972) make a convincing case for the importance of measuring not only if a consumer has bought a brand (or product) but how the *bundle* (in our case the *portfolio*) that the consumer has chosen looks like. Frank et al. call this a multidimensional classification system. This system emphasizes the importance of analyzing also the share that different saving or debt forms have of the total portfolio, not only possession or non-possession, as we do in chapter 3.

In marketing science, cluster analysis is used to find sets of characteristics which groups of consumers have more in common within the group than with other groups, e.g., a certain mix of quality and price preferences. However, it has often been pointed out that cluster analysis has shortcomings which sometimes provide severe limitations. One frequently mentioned drawback is the lack of statistical measures to evaluate any cluster solution or to find the 'optimal' solution. In is said that *'cluster analysis for market segmentation still reflects an often arcane mixture of intuition, judgmental estimates and individual case analysis to go along with the more routine outputs of canned computer programs'* (Helsen & Green, 1991, p. 1139). Some ways of getting around this seeming arbitrariness are discussed below.

Using Cluster Analysis for Market Segmentation

Great effort has been expended in attempts to formalize cluster analysis in order to put it on a par with other multivariate techniques commonly used in marketing research, such as factor analysis (see for example Aldenderfer & Blashfield, 1985; Arnold, 1979; Green & Krieger, 1995; Helsen & Green, 1991). But despite the popularity of cluster analysis, there are as yet no real solutions – at least not easily implementable on real-world data – to the fundamental weakness of the technique: the lack of formal and reliable statistical tests (cf. Dibb & Stern, 1995). However, the author's review of the literature on cluster analysis and market segmentation (Aldenderfer & Blashfield, 1985; Green & Krieger, 1995; Hair, Anderson, Tatham, & Black, 1995; Helsen & Green, 1991; Malhotra, 1993; Milligan, 1996; Punj & Stewart, 1983; Saunders, 1980) indicates that there are certain general rules of thumb that the researcher should follow when using the technique for market segmentation. The main issues involved in cluster analysis are nicely summarized in four general categories in the Punj and Stewart's influential article (1983, p. 144):

Data transformation issues

i. What measure of similarity/dissimilarity should be used?

ii. Should the data be standardized? How should the nonequivalence of metrics among variables be addressed?

iii. How should interdependencies in the data be addressed?

Solution issues

i. How many clusters should be obtained?

ii. What clustering algorithm should be used?

iii. Should all cases be included in a cluster analysis or should some subset be ignored?

Validity issues

i. Is the cluster solution different from what might be expected by chance?

ii. Is the cluster solution reliable or stable across samples?

iii. Are the clusters related to variables other than those used to derive them? Are the clusters useful?

Variable selection issues

1. What is the best set of variables for generating a cluster analytic solution?

Figure 4 below shows the proposed process of working with cluster analysis. Punj & Stewart, 1983, p. 145).

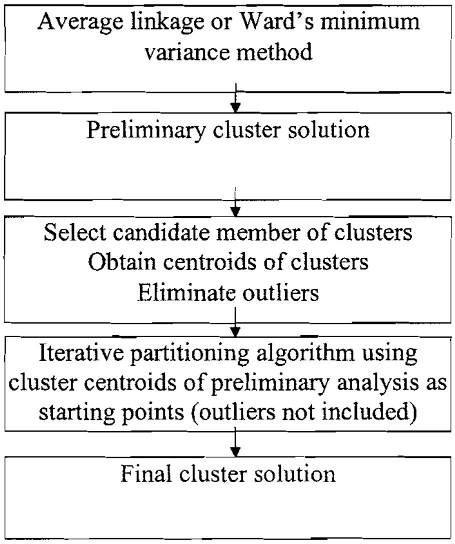

Figure 4: Two-stage clustering. Source: Punj & Stewart, 1983, p. 145.

Proposed Clustering Analysis Procedure

According to Wind (1978, p. 328), assessing the validity of market segments "...is by far the most crucial question facing management." If the segments do not exist in the population, if segments are not of the indicated size, or if segments do not respond in the hypothesized way to marketing actions, the value of a particular segmentation is nil, both from a practical and scientific point of view.

The textbook way of validating clustering-based market segmentation is to cross-validate by splitting the sample into two equal halves, usually randomly selected. The researchers can then use one half of the sample as estimation sample and the other as validation sample (Cooil, Winer, & Rados, 1987; Hair et al, 1995; Singh, 1990) and then pool the samples.

Aldenderfer & Blashfield (1978) assert that replication, i.e., repeating the analysis on a sub-set of the sample, is only a check of the internal consistency of a clustering-based solution. In their view, it is not a strong indication of actual validity. "The failure of a cluster solution to replicate is reason for rejecting the solution, but a successful replication does not guarantee the validity of the solution" (ibid., p. 65). Instead the authors give more credibility to the repeated finding of the same segments across a series of different datasets, as well as validation using external variables, i.e., variables not having being used as segmentation variables. This last method depends on the existence of an underlying theoretical model.

In contrast, Milligan (1996) heavily endorses an elaborated replication sample method in which the level of agreement between two partition sets in a holdout sample based on (1) a constrained cluster analysis (nearest neighbor centroid assignment using test sample centroids) and (2) an unconstrained cluster analysis (direct clustering with a random starting point) reflects the stability of the clustering in the data. According to Milligan, there are strong indications that this approach makes the evaluation of the appropriate number of clusters much more effective.

Similarly to Milligan's (1996) recommendations, Singh (1990) uses two samples, a test and a validation sample, and utilizes internal and external validation of the results. The *kappa* coefficient of agreement (Liebetrau, 1983) measures the stability of the cluster solutions generated by random initial seed points, and centroids based on a Ward's analysis on the test sample. External validation is performed on variables not used in the cluster analysis. Singh's methodology is used by the author in the chapter on segment stability in order to maximize the stability and validity of cluster solutions. See Figure 5 below for further details.

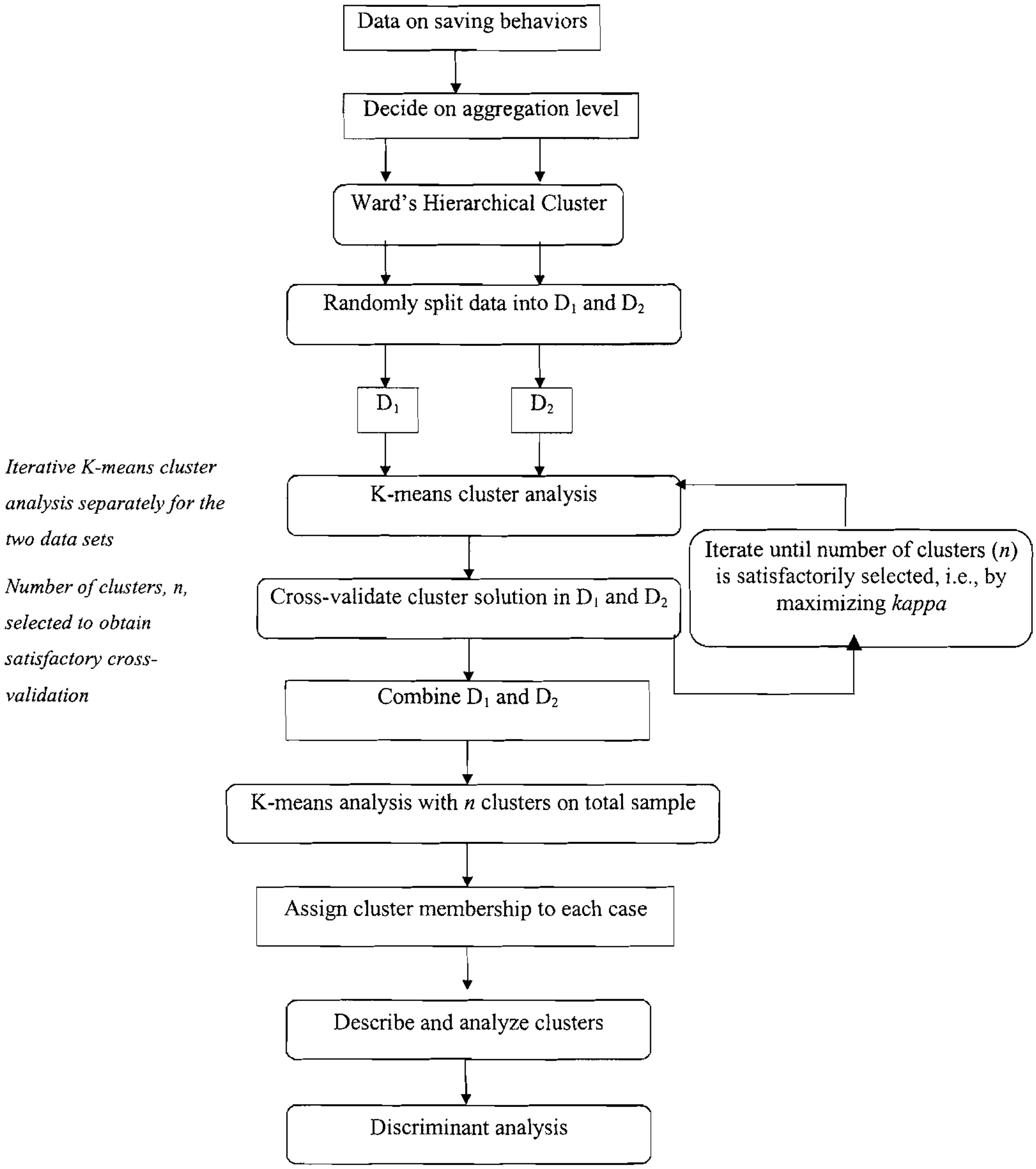

Figure 5: The method of analysis used in the chapter on segment stability, based on Singh (1990), pp. 76-77 and Milligan (1996).

Overview of the Studies

We will here provide summaries of the four articles contained in the following chapters of the thesis. We first study whether segments of households exhibiting different portfolio behaviors ('financial strategies') can be found in a cross-section of Swedish households. We then expand on the theme of segmentation of the financial services market by incorporating a temporal stability (or stationarity) dimension which we also discuss in more general marketing strategy terms. Here we utilize actual portfolio allocation as segmentation base. The third article (Chapter 4) deals with an important methodological problem: does it matter which spouse answers psychological questions relating to portfolio behavior in a household? The fourth article, finally, raises problematic aspects of the measurement of time preference in economics and economic psychology. This problem is studied using the previously found Swedish financial strategies as domains.

Summary of Study 1

In the first paper of this thesis we concentrate on examining the existence of Swedish household financial strategies, or which the most common Swedish financial portfolios held by households are. K-means cluster analysis of 35 standardized dichotomous variables measuring different forms of savings and debts is used to this end. The results show that groups of households exhibited different patterns of financial assets and debts. These patterns are called financial strategies. The study is based on a survey with 1,000 randomly sampled Swedish households with a response rate of 50.3 percent. The financial strategies are labeled:

1. Residual savers (45.5 percent of the analyzed households). These households had on average few forms of savings or debts and relied heavily on liquid saving forms for transactional purposes. Saving forms requiring long- or medium-term commitment, or were risky, were rare in this group. The cluster's average debt-to-asset ratio – total financial debts divided by total financial assets – was about 1.
2. Contractual savers (22.0 percent). These households relied on different types of loans and credits. They had large amounts of debt. Apart from loans they had mainly liquid financial instruments. The cluster's average debt-to-asset ratio was about 4.2.
3. Security savers (14.0 percent). On average the heaviest investors in retirement-related financial instruments such as private pension plans and other pension insurance. The households in the cluster also had investments in stocks and bonds, but largely tended to avoid riskier instruments. The cluster's average debt-to-asset ratio was about 1.3.
4. Risk hedgers (9.3 percent). This cluster's households possessed the most diversified financial portfolios. They appeared keen on investing in risky and

long-term assets (stocks, mutual funds and options). Their financial wealth was large. The cluster's average debt-to-asset ratio was about 0.52.

5. Prudent investors (3.2 percent). These households had behaved similarly to the risk-hedging cluster in that they had investments in many different forms of saving, but they were more reluctant to use risky assets such as shares. Instead they preferred bonds. The cluster's average debt-to-asset ratio was about 0.28.
6. "Divergent" strategies (6.0 percent). On average, these households invested in risky, complex and unusual assets such as options and had well diversified portfolios. The cluster's average debt-to-asset ratio was about 0.50.

Employing forward segmentation, a number of explanatory variables are shown to differ significantly between clusters. Among these are time preferences, degree of financial planning and control, interest in financial matters, financial activity and innovativeness, attitudes towards financial risk taking, propensity to save, stage in the life-cycle, household gross financial wealth and ownership of housing.

Summary of Study 2

Despite its theoretical and empirical merits, segmentation may fall short of the mark in certain respects, especially with regards to the assumed temporal stability or stationarity of a particular market segmentation. Segment stability over the time-period during which data are collected, analysis is made and marketing strategy drawn up and implemented is essential for successful marketing. Hence, this is a common assumption in marketing and is of general interest on any market and for any type of product or service.

The two main purposes of the study are (1) to develop a conceptual model of segment stability and (2) to empirically determine how stable a clustering-based behavioral segmentation of the market for household retail financial services in the Netherlands is over a four-year period (1993-1996). To this end six research hypotheses are formulated:

The first research hypothesis deals with the aggregate level-individual level stability problem and whether changes among sub-groups on the market can be substantial enough to be detected in market-wide behavioral changes.

H_1: Viewed at the aggregate market level, household portfolio behavior in terms of the allocation of financial wealth to different assets will not vary significantly over the studied time-period (four years).

Hypotheses 2 and 3 concern the stability of segments based on portfolio behavior, as well as the stability of segment sizes.

H_{2a}: At the micro (household) level, distinct portfolio behavioral patterns (segments) can be repeatedly found over the studied time-period.

H_{2b}: There will be significant changes in the portfolio behaviors of households over the studied time-period that will prompt reevaluation of the segments' typologies (manifest change).

H_{3a}: The segment assignment of individual households will vary significantly over the studied time-period (latent change).

H_{3b}: Any segments characterized by large amounts of assets allocated to shares or liquid assets will be more prone to suffer from segment switching.

H_{3c}: The segments will vary significantly in size over the studied time-period.

The last hypothesis concerns the stability of background descriptors commonly used to target and validate segments, explain their behaviors as well as evaluate their value to the firm.

> H_4: The explanatory factors derived from the model will change significantly in segments over time. The application of and interpretation of the explanatory model will consequently also not be consistent over time.

A conceptual model of segment stability is drawn up based on a literature review. An explanatory model is also formulated in order to validate the segmentation and discriminate among behavioral groups.

The Dutch household retail financial services market forms the basis for the empirical example in the paper. This market is interesting because competitive structures and customer competence and perceived needs have been rapidly changing in most of the European retail financial services market in recent years, which should lead to shifts in customer behaviors and hence segment instability. A Dutch panel study called the VSB-CentER Savings Project is utilized. The panel collects unique data at the micro level from all household members over the age of 15, maintaining a representative panel of about 2,000 households and a high income panel of about 1,000 households.

Cluster analysis was made on the percentage share of seven types of saving instruments in the households' total financial portfolios, i.e. how households had chosen to allocate their investments. The seven segmentation variables were liquid and transactional saving forms; savings or deposit accounts; bonds or savings certificates; funds; corporate stock; insurance and employer-sponsored savings plans.

Results showed that a five-cluster solution could be found and validated for the 1993, 1995 and 1996 panels. Several of clusters resembled patterns in Dutch household financial behavior documented in other studies. The clusters were labeled: (1) Diversifiers (circa 20 percent of all households sampled), (2) Liquid

Savers (circa 27 percent), (3) Security-focused (circa 14 percent), (4) Risk-minimizers (circa 8 percent), Non-savers (circa 7 percent).

Statistically significant differences among clusters on theoretically important variables were found. While, typologies and means for background descriptors were quite stable over time, segment sizes varied over the four-year period. Further, household segment switching was in the order of 40-50 percent for each year, increasing with time. Predictive discriminant analyses based on significant segment descriptors from the explanatory model classified under 40 percent of all households correctly. This was significantly higher than could be expected from pure chance models. Discriminant function interpretations varied between years.

The findings indicated that for behavioral segmentation in this domain, switching was the most pressing problem. The degree of switching also varied from segment to segment, something which has also been found in studies of brand choice behavior (loyals vs non-loyals). The segmentation made it easier to pinpoint changes in portfolio behavior at the aggregate level and indicated the importance of tracking behavioral changes at the micro level. Another interesting finding was the importance of market-external events, in this case the changes in tax legislation with regard to employer-sponsored savings plans. This change precipitated a rather quick and substantial shift in portfolio composition for many households, regardless of segment. Such events are hence critical to be wary of.

Finally, using pure panel (longitudinal) data contributed toward increasing the stability of the segments, i.e., their typologies, their sizes and their mean values on important descriptors. Repeated (semi) cross-sectional sampling produced somewhat more instability in this respect.

Summary of Study 3

In studies of household behavior which rely on survey data, it is important to know from what individual in the decision making unit to collect data from, or indeed if it is necessary to approach both partners in family households. If we use collect data from both partners, we do so in order to increase data validity. But we also run the risk of experiencing loss of data quality (one of the partners refusing or providing partial non-response). Another important practical consideration is whether it is worth the considerable extra expense to sample both partners in all family households, or if we can rely on one informant. If household decision making strategies for a particular task call for one partner to dominate, we may conclude that approaching that partner would be enough. The difficulty here is that not only do such strategies vary from task to task, but also from household to household, i.e. the researcher cannot from the outset be confident as to which decision making strategy is most common among the households of interest.

The purpose of this paper is to investigate whether the choice of household informant for psychological variables included in models of risky household financial behavior matters to the empirical researcher. Five research hypotheses are posited in relation to this purpose, which focuses on evaluating results from different correlation and regression analyses based on household level risky financial behavior, socioeconomic and demographic data. However, the psychological data are drawn from *either* the family financial officer (FFO) *or* the spouse in family households (N = 808) *or* from both partners. A sample of single households from the same database is used as control group (N = 211).

It could not be shown directly that the amount of explained variance differed significantly between multiple regression analyses, as measured in terms of the multiple *R*, in which the psychological data were drawn from different informants. However, other tests and analyses strongly indicated that including a set of FFO psychological variables increased the validity of the model, while the inclusion of a set of spouse psychological variables gave a marginally positive, albeit statistically significant, effect. The interpretation of the model also differed if different informants' data were used. Single household data used to estimate an identical model seemed to produce a better fit than for family households. Finally, measures of "couple" variables showed stronger agreement between spouses than "individual" variables. Zero-order correlations between psychological variables and measures of risky financial behavior differed significantly between spouses in a few cases.

The implication was that in this behavioral domain, psychological data should be collected from the family financial officer, while the spouse could be excluded without any severe consequences. This would also reduce the risk of having to eliminate households from analysis because of partial non-response.

Summary of Study 4

In economics and economic psychology, subjective discount rates have been used as measures of time preference to explain saving behavior. This has met with varying success. There is also lack of agreement between different explanatory models of subjective discount rates, and the individual rate of time preference has been shown to vary depending on frames such as magnitude, time horizon and reference points.

We argue that due to the limited cognitive capacity of humans and the different ways in which humans reach conclusions when faced with a judgment task contribute to differences in decision-making styles. Answers to tasks which are solved through sheer judgment, without any attempt to utilize a structural assumption about reality and background knowledge, and thus reason or compute a correct answer, can be expected to vary substantially or even come in conflict with each other. In this context, if people do have different decision making styles their 'mental discounting' processes should also differ. By utilizing background knowledge computational ability, some people should come close to discounting at the current market interest rate after taxes, which would be the outcome predicted by economists. Other groups of people could be expected to make 'random' judgments very difficult to explain by any model of the discounting process. Finally, these differences should be mirrored in how explanatory models of subjective discount rates differ between people. Examples of such differences are differing amounts of explained variance and differing regression coefficients.

We argue that better understanding of subjective discount rates can be reached by using groups with the different financial strategies found in the previous articles as domains. We see the financial strategies as indicators of saving decision-making styles.

The proposed explanatory model of subjective discount rates incorporates the following factors: age of respondent, sex of respondent, highest education level attained, self-employed or unemployed working status, existence of dependent children in the household. Further, we include the respondent's economic situation, interest in financial matters, reaction of the discount rate to a mental accounting time frame of one month and one year, perceived control over finances, actual knowledge of financial matters, respondent's degree self-control, financial risk taking attitude and expressed time preference with regards to discretionary income after monthly expenses have been paid.

Four hypotheses are posited: (1) the mean levels of subjective discount rates will differ between the domains; (2) the variances in subjective discount rates will differ; (3) the explanatory models will differ; (4) the explained variances will differ between the domains as expressed by the financial strategies.

It was shown by PLS and regression analyses that the mental discounting process did differ between groups practicing different financial strategies and that the explained variance of subjective discount rates and thus the understanding of such rates was improved by using financial strategy groups as domains.

A practical implication of the study was that marketing activities involving use of interest rates or discount rates must consider that different groups of people will reach different conclusions and will differ in their ability to include them in their decision making. Another implication involved the risk of reaching erroneous conclusions in studies of subjective discounting if the sample were biased.

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Chapter 2:

Household Financial Strategies in Sweden: an Exploratory Study

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Household Financial Strategies in Sweden: an Exploratory Study

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Abstract:

The paper presents and discusses some results from an exploratory study of Swedish households' portfolio behaviour. The results show that groups of households exhibit different patterns of financial assets and debts. These patterns have been called financial strategies. The study was based on a survey with 1,000 randomly sampled Swedish households. The response rate was 50.3%. K-means cluster analysis of 35 standardised dichotomous variables measuring different forms of savings and debts was used to examine the existence of financial strategies. The strategies were labelled the **residual saving strategy** (45.5% of the analysed households), the **contractual saving strategy** (22.0%), the **security saving strategy** (14.0%), the **risk hedging strategy** (9.3%), the **prudent investing strategy** (3.2%) and **divergent strategies** (6.0%). Among the factors differing between the financial strategies were time preferences, degree of financial planning and control, interest in financial matters, activity and innovativeness, attitudes towards financial risk taking, propensity to save, life-cycle categories, financial wealth and home ownership.

PsycINFO Classification: 3920, 3940

JEL Classification: D91, E21, G11

Keywords: Saving behaviour, household portfolios, life-cycle, attitudes, Sweden

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Introduction

The household financial services industries in many Western European countries are undergoing a transformation from a supply-side orientation to more demand-side oriented marketing strategies. The main reason is increased competition due to the deregulation of the financial services industries in for example the Netherlands, the UK (Harrison, 1994; Lamy & Moyer, 1995; Meidan, 1996), France (Sturdy & Morgan, 1993) and Sweden (Berg & Grip, 1992); cuts in social security systems, rapid technological advances (ATMs, PC-banking, telephone banking, smart-cards, etc.) and a harsher economic climate in general. For financial institutions, there is a requirement for more and more intimate knowledge of the firm's market and in particular any segments that may exist on this market (Anderson, Cox III, & Fulcher, 1976; Gwin & Lindgren Jr, 1982; Meidan, 1996; Wind, 1987).

Better knowledge of the financial behaviours of different groups of households will also mean that the effects of changes in the households' economic environment and policies that affect, e.g., social insurance and pension systems, on households' saving and debt behaviour (and consumption) for different groups of households can be studied in a more meaningful manner. Today, this is largely done at the aggregate level (Thaler, 1994; Weil, 1991).

In previous research, little attention has been devoted to analysing saving patterns and using these to study household portfolio behaviours. Indeed, a literature survey of segmentation research in the financial services sector shows that portfolio behaviours have never been used in a *post hoc* segmentation study (Speed & Smith, 1992). Most of the studies have used *a priori* segmentation bases such as age or *post hoc* benefit segmentation using cluster analysis (e.g., Anderson et al., 1976; Chang & Chen, 1995; Gwin & Lindgren Jr, 1982). Burnett & Chonko (1984) used usage frequency to divide different types of financial products into four groups (traditional, convenience, investments and debts).

Subsequent analyses showed that a number of predictor variables – socio-economic, demographic and psychological – correlated with usage of each group of financial services.

Using saving and debt forms as segmentation base will be close to using actual household preferences for the composition of their portfolios, since they reflect the outcome of decision processes within the household, given the supply of financial services. Studying portfolio compositions may give valuable information about different financial management styles and what influences these, especially if we concurrently measure explanatory variables that have been validated in earlier saving research.

We see households as being financial actors, more or less active and more or less conscious of their behaviours. Patterns of households' savings and debts may be viewed as expressing some sort of *financial strategy*, whether consciously or unconsciously practised. A financial strategy is here defined as *the observed pattern within a group of households of different forms of financial assets, including types of debts and credits, utilised by the households.*

We would expect different groups of individuals or households to exhibit different financial strategies, where between-household differences would influence the choice of portfolio. Empirical studies of household portfolios also confirm that, e.g., different age groups seem to prefer different portfolios (Börsch-Supan, 1993; Gunnarsson, 1996; Pålsson, 1991).

There should also be individual differences which may explain differences in financial strategies. In Burnett & Chonko's study (1984) variables such as information seeking, self-esteem and attitudes towards banks correlated with usage of certain types of financial services. The economic-psychological literature can provide more examples. For example, Wahlund (1991) and Wahlund & Wärneryd (1987) found different saver "types" exhibiting different saving and debt behaviours. Based on psychological and economic theories, Wahlund (1991) used the perceived importance of four different saving goals, life-cycle category, income and economic situation to cluster respondents into groups which exhibited different financial behaviours. The results showed that, according to these segmentation variables, there was a hierarchy of four saver "types" in Sweden called "wealth managers," "goal savers," "buffer savers" and "cash managers." These groups exhibited significant differences both in their portfolio behaviours and other characteristics.

Hence, differences in financial strategies seem to exist between groups of households and there are some theoretical and empirical findings pertaining to both general economic and household factors, as well as psychological factors, which may explain such differences. This study will pursue the concept of financial strategies in an exploratory, cross-sectional, study, while using some of the earlier findings to differentiate between groups with different financial strategies.

Purpose

The purpose of this paper is to present and discuss some results from an exploratory, cross-sectional study of Swedish households' portfolio choice. The main questions that we attempt to answer are if financial strategies can be found in Sweden, which are meaningful for business or public policy-making. If so, what behavioural patterns – or portfolio compositions – do they consist of? Which seem to be the main differentiating variables between the financial strategies?

Theoretical Background

Financial strategies can also be referred to as different portfolio behaviours. In this section we discuss portfolio theory and its relevance for the present study, and briefly touch upon the life-cycle hypothesis of saving and consumption, which is the standard framework applied by economists in studies of saving behaviour. The gist of our argument is that although both theories are useful, the restrictiveness of assumptions about human behaviour may be obstacles to a better understanding and explanation of household financial strategies.

Household Portfolio Behaviour and Risk Taking

According to theory, the only relevant decision criteria for rational investors are *risk* – usually measured in terms of the portfolio's standard deviation – and *expected return* – measured as for example the interest rates on government bonds. This assumes perfect information among all actors, non-binding credit constraints with risk free borrowing and lending at fixed interest rates, as well as homogenous expectations about asset return co-variances (cf. Levy & Sarnat, 1993). The trick is to combine a portfolio of different financial instruments that gives the investor the desired level of risk and return. In equilibrium, all investors hold the same assets from the market portfolio.

Ordinary households show considerable deviation from the expectation of rational behaviour implied by financial models that focus on the relationship between risk and return as the relevant decision parameters. In fact, empirical studies show that households hold very diverse portfolios and few different types of assets (Hochgürtel, Alessie, & van Soest, 1994).

Pålsson (1988) reported that most Swedish households from a risk hedging point of view did not hold an optimal mix of assets (real saving and stocks) during the studied period, 1975 – 84. Only the top decile of households in the wealth distribution did in fact possess an efficient portfolio as evaluated by the Capital Asset Pricing Model (CAPM). Holding an inefficient portfolio means that the household has not utilised its investment opportunities to their utmost in order to maximise expected return and minimise risk (i.e. the variance of return). Efficient portfolios usually contain a certain number of risky assets, such as shares or options, where the exact allocation of funds in each asset is determined by the household's risk -proneness.

The financial markets have a price for risky assets called the risk premium. The large number of inefficient portfolios thus indicate that most Swedish households demand risk premiums that are considerably higher than the market price for risk. The same conclusion was reached about American households by Bertaut & Haliassos (1992) in a study of the US Survey of Consumer Finances from 1983.

Hochgürtel et al. (1994) mention some of the explanations proposed to deal with these deviations from theory. Among the more important factors are differential tax rates on assets (Leape, 1987); incomplete information and information-intensive assets (King & Leape, 1987); income risk and uncertainty (Guiso, Jappelli, & Terlizzese, 1994) and borrowing and liquidity constraints (Paxson, 1990).

To conclude, classical portfolio theory is largely normative, with some fairly restrictive assumptions and is not sufficient to give a satisfactory explanation of the reasons *why* households practice certain financial strategies. Instead, we argue that it may be fruitful to apply a framework with less stringent assumptions about human behaviour and that incorporates economic as well as psychological factors. The importance of risk attitudes in portfolio selection will, however, be incorporated as an explanatory factor in between-group analysis.

The Life-Cycle Hypothesis

The most elegant and widely acclaimed economic theories of saving behaviour are the permanent-income and life-cycle hypotheses (Friedman, 1957; Modigliani & Brumberg, 1954). Although the theories were originally put forth separately, they are now usually part of the same conceptual framework.

The life-cycle hypothesis predicts that households want to avoid fluctuations in consumption levels over their lifetimes by saving and dissaving when income increases and decreases, respectively. Young households will have negative net saving after debts have been accounted for and gradually build up positive net savings later in life. At the time of their retirement, individuals in households will begin to dissave and draw upon their savings (assuming that assets are fungible, it does not matter whether these be in the form of housing, pension plans or bank funds), which will be completely expended by the time they pass away.

The life-cycle hypothesis is hence focused on the development of savings and consumption and the accumulation and decumulation of assets over the life-cycle. Scant attention has been given to the distribution of assets and debts in different life-cycle categories, i.e., portfolio behaviour. As mentioned in the introduction, there is, however, some evidence that portfolio structure is also affected by the life-cycle category. Life-cycle category is a variable that has also been comparatively easy to obtain concurrently with, e.g., national surveys on household wealth and income.

Stanley, Ford, & Richards (1985) attempted to segment bank customers by age group, arguing that research has shown that usage of specific financial services to a great extent is determined by the customer's age – consistent with the life-cycle hypothesis. A random sample of a total of 4,514 bank customers was drawn from the internal customer records of 17 American banks. Cross-tabulations by age group – seven groups ranging from 18 years of age to 63-plus – and type of service – 31 different services, classified as "chequing," "loan services," "trust services" and "miscellaneous services" – were made and tested with chi-square statistics. The results indicated that there in fact was a relationship between product usage and customer age. Time deposit usage was much more common in the upper age groups, while loan usage was frequent among the middle age groups, for example for home improvement. Safe deposit boxes were more utilised in the older age groups. There were further indications that only about a third of the total number of services were heavily used by the sample. 22 services were used by less than 10 percent of the respondents.

Over the years the ability of the life-cycle hypothesis to explain financial behaviours has been increasingly challenged (e.g., Burbidge & Robb, 1985; Danziger, van der Gaag, Smolensky, & Taussig, 1982; Shefrin & Thaler, 1988). The life-cycle would nonetheless still seem to be one important explanatory factor with regards to portfolio behaviour. Its influence is therefore studied separately in this paper.

As life-cycle "stages" often are more or less arbitrary divisions (and not pre-determined natural stages in life), we will follow Schaninger & Danko's (1993) suggestion that the term "category" be used instead. There are a number of definitions of life-cycle categories. It is difficult to find a general model or operationalisation of the life-cycle concept. According to Schaninger & Danko (1993, p. 581) a practically useful model should capture the demands that are put on households during the different phases of the life-cycle while avoiding categories that are too broad or too narrow. In the section 'Life-Cycle Effects on Financial Strategies' we describe the five categories used in this study.

Method

Research Design and Data Collection

The main data gathering instrument was postal questionnaires. 1,000 Swedish households were randomly sampled from an official census database with complete national coverage (the DAFA/SPAR database) to produce a representative sample of Swedish households where the head of the household (as defined by DAFA) was between 20 and 75 years of age. The respondent (addressee) was, in the case of married households, in every other household the male, and in every other household the female. The respondents were given the chance of winning a small lottery ticket if they returned the questionnaires.

The addressees were asked to fill in all questions pertaining to individual opinions and attitudes themselves, while being strongly encouraged to fill in all questions about the household investments together with the spouse. In common with similar studies, the addressees' answers are used as *proxies* for all household members' attitudes or opinions, although those answers only reflect the view of those individuals who are sampled, and not necessarily the views of the entire decision-making unit – the family (Gunnarsson, 1996; Lindqvist, 1981; Plank, Greene Jr., & Greene, 1994).

A scale running from 0 percent (completely separate economies) to 100 percent (completely shared economies), measuring the degree of shared economy within married and cohabiting households (N=242), showed that 59.3 percent of the households reported that they had completely shared economies, and only 2.2 percent that they had totally separate economies. A similar scale measuring the degree of co-operation in filling out the questionnaire showed that 27.8 percent had answered the questionnaire together, in equal measure. In 8.9 percent of the households the spouse had answered most or all parts of the questionnaire instead of the original addressee. This indicates 1) that the knowledge of the household's finances may be fairly equally shared between the spouses, and that 2) in case of inadequate knowledge about household's investments, the spouse's knowledge was utilised as well.

In a first wave pre-test, questionnaires were sent to 100 randomly sampled Swedish households, drawn from the random sample of 1,000 households. The response rate was 59.0% (59 households). After modifying the 23-page questionnaire, the main mail survey was carried out to the remaining 900 randomly sampled households. The response rate was in that case 49.3% (444 households). Since the questionnaires were identical in most respects, the two databases were combined where no modifications of questions had been made. This resulted in a final response rate of 50.3% (503 households).

Questionnaire

The greater part of the 23-page questionnaire was devoted to measuring financial behaviours, i.e., which saving, debt and credit forms that the households reported that they possessed. These data were later used as input in cluster analyses.

The rest of the questionnaire contained measures drawn from previous economic-psychological research on saving behaviour. These included socio-economic and demographic characteristics of the household, expectations about the future development of the national and household economy, attitudes toward financial risk taking, measures of time preference and planning behaviour. It also asked for the importance of reasons for saving and borrowing and measured the level of subjective and actual knowledge about making investments. For a complete variable list, please refer to Gunnarsson & Wahlund (1995).

Variables in the Cluster Analysis

Only behavioural variables were used in the cluster analysis. Three measures of the utilisation of financial savings, debts and credits were collected: dichotomous (a total of 35 variables), amounts saved or borrowed (31 variables) and share of each saving form of the total financial portfolio (24 variables). The cluster analysis in this paper is based *solely on the 35 dichotomous variables*, i.e., reported possession (accorded a value of 1) or non-possession (accorded a value of 0) of a certain type of asset or debt, which was the measure that provided the most complete information about financial behaviours. For a complete listing of all input variables, refer to Tables 3 through 6 (where two categories are collapsed for presentation purposes), also see Gunnarsson & Wahlund (1995) for more detail.

We have elected to exclude home ownership as an input variable in the analyses. In the present context, buying an apartment or a house in many instances represents an act of consumption (of a good housing standard for a family or an individual) and is not primarily a financial investment. Home ownership will be regarded as an explanatory factor in the analysis, influencing financial strategies. The same argument is applied to capital goods as we have let the households themselves determine which of "other savings" they consider being mainly a financial investment.

Data Weighting

Despite the 50.3 percent response rate, a check of the representativeness of the sample revealed that it deviated from the national population's demographic characteristics. Data were therefore weighted by employing Swedish national statistics (Statistics Sweden, 1993) on age groups and the distribution of household types (single or married/cohabiting) within the age groups.

One drawback with the random sample used was that cohabiting individuals were classified as being single, thus making it twice as likely that cohabiting households were drawn from the population. Considering the prevalence of cohabitation in Sweden, it was essential to weight the database to reduce the influence of the over-sampling of cohabiting households.

Cluster and Factor Analysis Techniques Employed

Cluster Analysis

For the cluster analysis, a k-means clustering technique in SPSS (Norusis, 1992) using nearest centroid sorting was employed. All variables were before analysis and customised pairwise deletion of missing variables was used (a maximum of two missing variables allowed per case). 474 cases of the 503 originally available were thus used in the final cluster analysis.

In *post-hoc* segmentation using cluster analysis, deciding upon feasible solutions and number of clusters is a crucial yet difficult task. In this study, cluster solutions ranging from 2 to 20 clusters were generated. Then, a graphical representation of average within-cluster distances to the cluster centroids in the different cluster solutions showed a marked "dent" at the 12-cluster solution, where an additional larger cluster was formed, breaking up the until that point largest cluster. A similar method was successfully applied by Wahlund (1991). An examination of financial behaviours and some explanatory variables showed significant and easily interpretable differences between the clusters. Significance tests on external variables as a method of validation is also recommended by Aldenderfer & Blashfield (1985). After examining other similar "dents" in the graph the 12-cluster solution was finally selected.

The SPSS k-means cluster analysis was not the ideal way of using the technique, although Punj & Stewart (1983) cite it as the most robust clustering technique in a review of different clustering applications. It is quite sensitive to how the observations are ordered in the raw data matrix, and it does not have any facilities for handling different types of data. When randomly re-ordering the data matrix and comparing the results with the original solution, it was found that the three largest clusters were fairly stable in size and behavioural patterns, while the three smallest were difficult to identify in the different analyses.

However, the interpretability and operationalisability of the results by researchers and practitioners should also provide a test of the validity and usefulness of the clustering results. As Punj & Stewart (1983, p. 146) contend: "classification is only useful if it assists in furthering an understanding of the phenomena of interest. The ultimate test of a set of clusters is its usefulness." The clusters have been quite readily interpretable. The interest in the results that has been shown by both government policy makers and financial institutions is also an encouraging sign of the utility of the classification.

Another starting point could have been to use hierarchical clustering to determine the centroids of the clusters for the k-means analysis, as suggested by Punj & Stewart (1983). However, because of a lack of appropriate software and in particular powerful enough hardware, this options was not available. In addition, the hierarchical cluster facility in SPSS made it impossible to weigh the database before analysis.

Factor Analysis

Factor analysis was also performed using SPSS. The aim was to reduce a set of 42 attitudinal variables measured in the questionnaire (see section 0), 29 of which were statements measured on the same seven-point scale Likert scale (1, completely disagree; 7, completely agree). A principal components analysis with Varimax orthogonal rotation resulted in 13 factors with an Eigenvalue greater than one (N=308, total explained variance 61.8 percent). The factors have been used in the study to examine differences and similarities between the different financial strategies.

Results

The input in the cluster analysis were the 35 dichotomous variables described above. In the 12-cluster solution, four clusters were "large" (containing 215 down to 44 households), one cluster "small" (15 households) and seven clusters "very small" (7 down to 1 household). Only the four largest clusters were seen to warrant close examination, although the 15-household cluster is presented separately below and the very small clusters are lumped together as "divergent strategies." The smallest clusters probably contain very interesting groups that in spite of their size can be quite influential relative to the larger clusters since their incomes and financial assets are very large. It was, however, not possible to perform any sort of reliable statistical analysis on such small groups.

Based on the results presented in the next section, we have labelled the clusters[2]:

1. **Residual savers** (215 respondents; 45.5% of the analysed households): practising *the residual saving strategy*. These households had on average

[2] Katona (1975) mentioned three types of saving: residual saving (saving without a plan), contractual saving (pre-committed saving) and discretionary saving (planned saving); all of which can be observed in the strategies found here.

few forms of savings or debts and relied heavily on liquid saving forms for transactional purposes. Saving forms requiring long- or medium-term commitment, or were risky, were rare in this group. The cluster's debt-to-asset ratio – total financial debts divided by total financial assets –was about 1.

2. **Contractual savers** (104 respondents; 22.0%): practising *the contractual saving strategy.* These households relied on different types of loans and credits. They had large amounts of debt. Apart from loans they had mainly liquid financial instruments. The cluster's debt-to-asset ratio was about 4.2.
3. **Security savers** (66 respondents; 14.0%): practising *the security saving strategy.* On average the heaviest investor in retirement-related financial instruments such as private pension plans and other pension insurance. The households in the cluster also had investments in stocks and bonds, but largely tended to avoid riskier instruments. The cluster's debt-to-asset ratio was about 1.3.
4. **Risk hedgers** (44 respondents; 9.3%): practising *the risk hedging strategy.* This cluster's households possessed the most diversified financial portfolios. They appeared keen on investing in risky and long-term assets (stocks, mutual funds, options). Their financial wealth was large. The cluster's debt-to-asset ratio was about 0.52. The cluster's debt-to-asset ratio was about 0.28.
5. **Prudent investors** (15 respondents; 3.2%): practising *the prudent investing strategy.* These households had behaved similarly to the risk hedging cluster in that they had investments in many different forms of saving, but they were more reluctant to use risky assets such as shares. Instead they preferred bonds. The cluster's debt-to-asset ratio was about 0.28.

6. **"Divergent" strategies** (30 respondents; 6.0%): practising *"divergent" financial strategies.* On average, these households invested in risky, complex and unusual assets such as options and had well diversified portfolios. The cluster's debt-to-asset ratio was about 0.50.

Summary of Results

To structure the analysis, the different saving and debt forms were *a priori* split into four general groups: *liquid or transactional saving forms, pension-related saving forms, "other" financial investment forms* (primarily shares, bonds and different types of mutual funds) and finally *mortgages, loans and credits.*

This split is similar to others employed by, e.g., Hochgürtel et al.(1994) who use stocks and bonds, saving accounts, life insurance and housing wealth. Burnett & Chonko's (1984) study, which used usage frequency and factor analysis, also found four groups of financial services: traditional bank products (e.g., checking accounts), convenience products (e.g., ATMs, bank-by-mail), investment products (e.g., bonds, trusts) and debt products (e.g., instalment loans, home mortgages). The percentage of households within each of the clusters utilising any one saving or debt form is presented in Table 1.

	Residual savers' strategy	Con-tractual savers' strategy	Security savers' strategy	Risk hedgers' strategy	Prudent investors' strategy	"Diver-gent" strate-gies	% OF ALL HOUSE HOLDS
Percent possessing any kind of liquid or transactional saving form	92%	95%	100%	100%	100%	100%	95% NS
Percent possessing any kind of pension saving form	2%	22%	86%	21%	36%	64%	25%***
Percent possessing any kind of other financial investment	36%	42%	81%	100%	100%	95%	55%***
Percent possessing any kind of loan or credit	56%	100%	77%	81%	61%	89%	74%***
N =	215	104	66	44	15	30	474

Table 1: Percentage possessing different saving and loan forms in the clusters.
****: Differences significant at p $\chi 2$(Pearson, Chi-square) < 0.01.*
NS: not significant at $p < 0.05$.

Already at this aggregated level some patterns can be discerned. Pension-related saving forms can be found among 86% of the security-savers, while the share of all households is 25%. Similarly, the households in the contractual-saving cluster *all* possess some kind of loan(s) or credit(s). The third standout is the risk-hedging cluster, in which *all* households possess some kind of "other" financial investment (usually meaning more risky, long-term and/or complicated than e.g. bank saving). Not surprisingly, liquid or transactional saving forms can be found in almost all households. What seems to characterise the residual savers, however, is the low frequency of both non-liquid saving forms or loans and credits.

In Table 2 we can verify that such is the case: residual savers have much fewer saving and debt forms than the other clusters. Contractual savers have twice as many different debt forms than the average for all households. The risk hedgers, prudent investors and those with "divergent" strategies have the largest number of different saving forms.

	Residual savers' strategy	Contractual savers' strategy	Security savers' strategy	Risk hedgers' strategy	Prudent investors' strategy	"Divergent" strategies	ALL HOUSE-HOLDS
Total number of saving forms	3	4	7	9	9	9	5***
Total number of forms of debts/credits	1	4	2	2	2	2	2***
Total number of saving- and credit forms	4	8	9	11	11	11	7***
N =	215	104	66	44	15	30	474

Table 2: Number of different saving- and debt-forms in the households.
****: Differences significant at pF(means, ANOVA) < 0.01.*

Detailed Results

Liquid or Transactional Saving Forms

The liquid or transactional saving forms all offer a low but safe return on savings and are more or less easily converted into cash on short notice. The checking accounts (usually connected to a bank cash card) are used in daily transactions, for shopping, etc. The accounts require little in the form of involvement or financial knowledge. During the studied period, the real rate of return on bank deposits was zero or negative. However, as a complement to other financial assets, the liquid or transactional saving forms are an important part of any household's financial strategy.

Most households in the sample have at least one liquid or transactional saving form, see Table 3. This is for example where residual savers have concentrated their assets: 68 percent of the latter have checking accounts and 56 percent saving accounts. As noted previously, they hold very few assets outside the liquid or transactional saving forms. Most of the households in the security saving, risk hedging and "divergent" strategies have savings in almost all the different liquid or transactional saving forms. Between 84 and 98 percent of the households in the different groups possess a checking account and between 53 and 94 percent a savings account.

	Residual savers' strategy	**Contractual savers' Strategy**	**Security savers' strategy**	**Risk hedgers' strategy**	**Prudent investors' strategy**	**"Divergent" strategies**	**ALL HOUSEHOLDS**
Interest-bearing retailing cash-cards	21%	32%	52%	30%	54%	33%	30%***
Savings account	56%	53%	84%	82%	94%	68%	64%***
Checking account	68%	85%	86%	84%	96%	98%	79%***
Interest-bearing lottery account	42%	27%	72%	61%	67%	62%	47%***
Tax-preferred savings account	21%	8%	37%	61%	73%	47%	27%***
Building account	4%	8%	4%	18%	9%	15%	7%NS
Other bank account	14%	19%	8%	28%	29%	27%	17%***
Investment account	0%	0%	0%	0%	0%	11%	1%***
N =	215	104	66	44	15	30	474

Table 3: Percentage possessing liquid or transactional saving forms.
****: Differences significant at $p\chi 2$(Pearson, Chi-square) < 0.01. NS: not significant at $p < 0.05$.*

Pension-Related Saving Forms

While private pension saving is included to some extent in other financial strategies, it is among the security savers that we find by far the greatest share of households possessing these saving forms, see Table 4. 67 percent own private pension insurance compared with 20 percent among all households. The capital and unit linked pension insurance are not used at all by the security savers, but exclusively by the households practising divergent strategies (33% and 21% respectively). These are quite new saving forms, and especially unit linked mutual funds require a great deal of systematic personal involvement and knowledge to be utilised effectively in a financial strategy. Among clusters other than the security savers, the residual savers own the fewest pension saving forms, for example, a mere 1 percent holds a private pension insurance.

	Residual savers' strategy	Contractual savers' strategy	Security savers' strategy	Risk hedgers' strategy	Prudent investors' strategy	"Divergent" strategies	% OF ALL HOUSEHOLDS
Pension savings account	1%	3%	63%	3%	7%	19%	12%***
Pension insurance	1%	19%	67%	18%	36%	47%	20%***
Capital insurance	0%	0%	0%	0%	0%	33%	2%***
Unit linked mutual fund/pension insurance	0%	0%	0%	0%	0%	21%	1%***
N =	215	104	66	44	15	30	474

Table 4: Percentage possessing pension-related saving forms.
****: Differences significant at $p\chi 2$(Pearson, Chi-square) < 0.01.*

Other Financial Investments

The detailed breakdown in Table 5 shows that residual savers have very few saving forms such as shares (9%), bonds (8%, lottery bonds) or mutual funds (16%). They obviously favour keeping their funds as liquid as possible (and thus forego the chance of a better return). Risk hedgers have spread their investments over almost all kinds of instruments, including shares (54%), except for the risk-free but low-yielding government saving bonds (0%) and saving accounts (13%). In comparison, the prudent investor-cluster are keen to use saving bonds (100%) and government saving accounts (41%) and also invest in a number of other saving forms. However, fewer households own shares directly (38%) but seem to favour tax-preferred mutual funds (74%), i.e. their risk exposure is somewhat less than the risk hedgers'. In this respect their financial strategy resembles that of the security savers.

	Residual savers' strategy	Contractual savers' strategy	Security savers' strategy	Risk hedgers' strategy	Prudent investors' strategy	"Diver-gent" strategies	% OF ALL HOUSE-HOLDS
Private bonds (issued by commercial banks)	3%	0%	1%	25%	18%	29%	6%***
Lottery bonds (pre-mium)	8%	15%	22%	48%	31%	51%	18%***
Saving bonds	0%	0%	0%	0%	100%	6%	4%***
Government saving accounts	1%	0%	2%	13%	41%	15%	4%***
Tax-preferred mutual funds	16%	19%	63%	85%	74%	75%	35%***
Mutual funds (shares)	1%	4%	21%	54%	14%	32%	12%***
Mutual funds (curren-cies and /or bonds)	0%	0%	0%	20%	4%	8%	2%***
Directly owned shares	9%	21%	34%	54%	38%	47%	23%***
Convertible bonds	0%	3%	3%	18%	0%	13%	3%***
Options	0%	0%	0%	0%	0%	14%	2%***
Financial assets abroad	0%	1%	16%	2%	19%	6 %	4%***
N =	215	104	66	44	15	30	474

Table 5: Percentage possessing "other" financial investments.
****: Differences significant at $p\chi 2$(Pearson, Chi-square) < 0.01.*

It can also be noted that many security savers possess tax-preferred mutual funds (63%) as well as financial assets abroad (16%). Together with their pension-related assets, this might point to a preoccupation with lowering their tax burden, a behaviour that might have shaped these households' financial strategy.

Loans and Credits

A look at the different forms of loans and credits within the strategies in Table 6 confirms the earlier signs that the contractual-saving strategy is characterised by possession of debts (66% have bank loans and 36% use instalment payments) and to a large extent credits (20% have longer-term credit options on their credit cards). In contrast, the residual savers have few loans (15% have bank loans and 1% use instalment payments) and few even possess credit cards (1%).

	Residual savers' strategy	**Contractual savers' strategy**	**Security savers' strategy**	**Risk hedgers' strategy**	**Prudent investors' strategy**	**"Divergent" strategies**	**% OF ALL HOUSEHOLDS**
Bank loan (unspecified)	15%	66%	26%	39%	22%	23%	31%***
Mortgage	19%	57%	42%	41%	44%	59%	36%***
Other loan	2%	21%	6%	5%	0%	9%	8%***
Savings loan in bank	7%	20%	14%	0%	3%	0%	10%***
Study loan	16%	43%	17%	21%	14%	35%	24%***
Loan from relatives or friends	4%	29%	9%	0%	0%	7%	10%***
Instalment loan	1%	36%	12%	0%	10%	0%	10%***
Cash card	18%	47%	48%	47%	23%	54%	34%***
Extended credit on cash card	1%	20%	17%	2%	0%	5%	8%***
Other types of credit	6%	50%	8%	15%	16%	15%	18%***
N =	215	104	66	44	15	30	474

Table 6: Percentage possessing different types of debts and credits.
****: Differences significant at $p\chi 2$(Pearson, Chi-square) < 0.01.*

Differentiating Variables

Distribution of Total Financial Assets

It was solely information about held assets and debts that produced the cluster solution presented in the preceding section. The detailed analysis appears to point towards at least five different groups with quite distinct financial strategies. In Table 7 we can examine the actual portfolio compositions, i.e. how much each cluster has saved or borrowed in the different kinds of assets and debts. The allocation of assets within the portfolios is quite consistent with the patterns found in the previous analyses. For instance, the contractual savers have a very heavy debt burden while the risk hedgers have the largest financial assets. The residual savers have very small assets of any kind.

	Residual savers' strategy	**Contractual savers' strategy**	**Security Savers' Strategy**	**Risk hedgers' strategy**	**Prudent investors' strategy**	**"Divergent" strategies**	**ALL HOUSEHOLDS**
Total amount in liquid saving forms	12,000	9,517	23,000	80,664	210,000	160,000	17.000***
Total amount in pension saving forms	0	0	6,930	0	0	25,000	
Total amount in "other" financial saving forms	0	0	15,754	146,831	68,000	206,000	2,000***
Total debt burden	0	304,397	68,841	103,130	0	130,000	60,000***
N =	215	104	66	44	15	30	474

*Table 7: Distribution of assets, medians. Amounts in Swedish kronor (SEK). ***: significant at the 0.01-level in a general k-sample test of differences between medians (Norusis, 1992).*

Demographic and Socio-Economic Variables

The following sections examine demographic, socio-economic and psychological similarities and differences between the clusters' portfolio behaviours.

Table 8 shows that household gross income does not differ much between most of the clusters. One large exception is the residual saving cluster, which has a markedly lower income than the others. Using the number of household members to calculate income, however, leads to a somewhat different result. Residual savers have few dependants to take care of, while contractual savers have the largest number of children. Thus household incomes are more equalised in this respect, although security savers and risk hedgers still have notably larger household incomes.

	Residual savers' strategy	Contractual savers' Strategy	Security savers' strategy	Risk hedgers' strategy	Prudent investors' strategy	"Diver-gent" strategies	ALL HOUSE-HOLDS
Household gross monthly income (incl. Transfers and moon-lighting)	13,700	23,682	23,905	24,500	23,500	26,000	19,000***
Gross monthly in-come per family member	9,000	10,558	12,000	12,554	10,800	14,392	10,800***
Net monthly dispos-able income (HH es-timate)	1,149	1,500	2,000	3,000	4,500	3,000	2,000***
Net regular, monthly savings (household estimate)	100	250	908	1,461	1,900	1,000	400***
Mortgage payments 1993 (household es-timate)	0	59,455	15,396	17,998	11,570	19,901	8,674***
N =	215	104	66	44	15	30	474

*Table 8: Socio-economic variables. Medians, Swedish kronor (SEK). ***: significant at the 0.01-level in a general k-sample test of differences between medians.*

The contractual savers and the residual savers exhibit the lowest propensity to save out of their estimated monthly disposable income (defined as income after food and bills, i.e. mortgage payments, telephone, rent, energy, etc. have been paid). However, contractual savers also have substantial mortgage payments to meet (which is saving).

Table 9 shows that white-collar households comprise about half of all groups, except for among the residual savers, where blue-collar households dominate. The residual savers have the smallest share of households that own their housing, possible limiting their possibilities to take larger loans.

	Residual savers' strategy	Contractual savers' strategy	Security savers' strategy	Risk hedgers' strategy	Prudent investors' strategy	"Divergent" strategies	ALL HOUSE-HOLDS
Percent white-collar	16%	44%	53%	46%	41%	71%	34%***
Percent self-employed	6%	16%	12%	24%	14%	9%	11%***
Percent with own house or apartment	40%	72%	72%	84%	94%	69%	57%***
N =	215	104	66	44	15	30	474

*Table 9: Demographic variables. ***: $p\chi 2$(Pearson, Chi-square) < 0.01.*

Psychological Variables

Some of the more important psychological variables are presented in Table 10 and Table 11. The factors are represented by their factor scores.

Time preference reflects the propensity to consume out of income or assets in the present or to postpone consumption to some point in the future, i.e., saving. The respondents were asked what they preferred to do with money left over after all necessary expenses were paid for the following month, 0 indicated that they would prefer to spend all money, while 10 indicated that they preferred to save all money left over.

Table 10 suggests that the contractual savers are more apt to prefer immediate consumption of monthly disposable income over postponed consumption (i.e. saving), while the other groups are somewhat more prone to postpone consumption (the residual savers a little less so). However, all groups profess to preferring to save at least some part of their income. The table also shows an interesting correlation between the saving rate of the households and the measure used to calculate time preference (r=0.34, p < 0.01), indicating that time preference, at least as it was measured here, may influence the saving rate.

	Residual savers' strategy	Contractual savers' strategy	Security savers' strategy	Risk hedgers' strategy	Prudent investors' strategy	"Divergent" strategies	ALL HOUSEHOLDS
1. Time preference: (0: prefer to spend all disposable income now; 10: prefer to save all now)	5.5	4.7	6.2	6.4	6.7	6.5	5.6***
2. Saving rate: regular monthly savings/ monthly disposable income (savings excludes mortgage payments)	0.25	0.31	0.42	0.50	0.66	0.40	0.34***
N =	215	104	66	44	15	30	474

Table 10: Time preference and actual saving rates within clusters.
****: Significant at pF(means, ANOVA) < 0.01.*

Perceived economic situation in Table 11 measures to what extent households think that they have to borrow or try to get extra incomes in order to manage household finances, or if they think that they can save part of their disposable income. Risk hedgers and prudent investors seem to have the most positive view of their financial situation, while the contractual savers have the most negative attitudes.

Economic interest and innovativeness means to what extent households have an interest in and endeavour to acquire information about new forms of saving. The interest and activity is the least among residual savers and contractual savers, and the greatest among risk hedgers, households practising divergent strategies and prudent investors.

Confidence in financial institutions with regards to terms for lending, interest rates, yield on capital etc. also varies between the clusters. The greatest confidence is expressed by the security savers and the least by households practising divergent strategies. Since the security savers in many cases have contractual commitments with financial institutions which manage their pension funds, this fact may influence their attitudes as well, as they seem to have a need to feel financially secure. On the other hand their confidence in institutions may in itself result in their venturing to save for a secure future.

The factor measuring *financial risk taking* indicates that residual savers are the least prone to take financial risks, while households practising divergent strategies and risk hedgers are the most risk prone.

	Residual Savers' Strategy	**Contrac-tual savers' strategy**	**Security savers' strategy**	**Risk hedgers' strategy**	**Prudent investors' strategy**	**"Diver-gent" strategies**	**ALL HOUSE-HOLDS**
Perceived economic situation	0,05	-0,49	0,20	0,54	0,43	0,14	0,00***
Economic interest and innovativeness	-0,26	-0,13	0,32	0,50	0,38	0,41	0,00***
Confidence in financial institutions	0,10	-0,20	0,21	-0,04	0,05	-0,47	0,00**
Financial risk taking	-0,16	-0,14	0,11	0,29	-0,14	0,65	0,00***
Tax-planning	-0,25	0,33	0, 10	0,07	0,12	0,19	0,00***
Satisfaction with present financial situation	-0,24	0,22	0,09	0,33	0,36	0,14	0,00***
N =	215	104	6	44	15	30	474

Table 11: Psychological factors, factor scores.
****: Significant at pF(means, ANOVA) < 0.01.*

Tax planning refers to household's professed inclination to use, e.g., tax shelters. This is more common among contractual savers than among the other clusters of households. This is probably due to the possible deductions of mortgage expenses open to the contractual savers. It is also one of the few ways for these households to improve their finances since mortgage expenses should take a large chunk of the net income (see estimated mortgage payments in Table 8).

Satisfaction with present financial situation is greatest among the risk hedgers and prudent investors, and lowest among residual savers. If the level of satisfaction was estimated using objective indicators such as incomes from work and capital, the households practising divergent strategies should be expressing the highest level of satisfaction. However, they do not. It is possible that the dissatisfaction in itself creates a favourable attitude towards innovative saving forms and active financial planning.

Life-Cycle Effects on Financial Strategies

Definition of Life-Cycle Categories

-Category 1: single and younger households without dependent children (<45 years of age).

-Category 2: married or cohabiting younger households without dependent children (<45 years of age).

-Category 3: households with dependent children. Single, married or cohabiting households regardless of age.

-Category 4: households older than 45 years of age but not retired, without dependent children.

-Category 5: households in which at least one member is retired.

The major factors influencing saving and borrowing from a life-cycle perspective were considered to be age, marital status, the presence of dependent children and home ownership.

One has to be careful with base rates when examining life-cycle categories and financial strategies practised, therefore two tables giving different information are presented. For example, of those practising the prudent investment strategy, 48 percent are households with dependants. However, only 5 percent of these households practise the prudent investment strategy.

Financial Strategies and Life-Cycle Categories

Table 12 presents the distribution of different life-cycle categories among the different financial strategies. The residual saving strategy is characterised by two large blocks of households without dependants: single, young households and retired households. Almost half of the contractual savers and prudent investors are households with dependent children. The risk hedging strategy is mainly utilised by older households.

	Residual saving strategy	Contractual saving strategy	Security saving strategy	Risk hedging strategy	Prudent investment strategy	"Divergent" strategies	% OF ALL HOUSEHOLDS
Young, single without dependants	27%	20%	8%	12%	14%	27%	21%***
Married/ cohabiting without dependants	4%	7%	12%	9%	0%	0%	6%***
Households with dependants	23%	45%	41%	26%	48%	27%	32%***
Older households without dependants	9%	20%	20%	25%	7%	25%	16%***
Retired households	37%	7%	20%	28%	31%	21%	26%***
TOTAL:	100% (n=213)	100% (n=102)	100% (n=66)	100% (n=43)	100% (n=15)	100% (n=30)	100% (n=469)

Table 12: Different life-cycle categories in financial strategies.
****: Differences significant at $p\chi 2$(Pearson, Chi-square) < 0.01.*

Life-Cycle Categories and Financial Strategies

If we let columns and rows swap places in Table 12, we get a different picture, and other conclusions can be drawn. We now see what share in each life-cycle category practice a particular financial strategy. Table 13 shows that the residual saving strategy is practised by almost 60% of the young and single households. A majority of the households with dependent children and of the older households without dependants use either the residual saving strategy or the contractual saving strategy, while a majority of the retired households use the residual saving strategy. The most clear-cut cases of life-cycle categories dominated by a particular strategy are the first and last categories. It is more difficult to classify households in the middle phases of their life-cycles. To gain a more satisfactory understanding of why households practice a certain strategy, it becomes necessary to include other explanatory variables.

	Young, single without dependants	Married/ cohabiting without dependants	Households with dependent childre n	Older households without dependants	Retired households	% OF ALL HOUSEHOLDS
Residual saving strategy	59%	31%	33%	27%	64%	45%
Contractual saving strategy	20%	26%	31%	28%	6%	22%
Security saving strategy	5%	28%	18%	18%	11%	14%
Risk hedging strategy	5%	14%	7%	15%	10%	9%
Prudent investment strategy	2%	0%	5%	1%	4%	3%
"Divergent" strategies	8%	0%	5%	10%	5%	6%
TOTAL:	100% (n=99)	100% (n=27)	100% (n=148)	100% (n=73)	100% (n=122)	100% (n=469)

Table 13: Financial strategies in different life-cycle categories.

Conclusions and Discussion

The different financial strategies found in this study can be roughly divided into three categories in accordance with Katona's (1975) types of saving. *Discretionary saving* strategies are practised by security savers, risk hedgers, prudent investors and those practising "divergent" financial strategies. *Contractual saving* is practised by the contractual savers, and *residual saving* by the residual savers.

It should be emphasised that regular repeated cross-sectional or panel studies are essential to determine the stability and development of the classifications presented in this paper. Measures applied by decision-makers on the basis of a classification of types of savings and debts such as these will become increasingly unreliable as market conditions change over time.

Financial risk taking attitudes and behaviours differ substantially between clusters. Two-thirds of the households in the analysis had portfolios with a fairly low level of diversification and containing only a few risky assets, such as equity, if at all. This is consistent with theory and findings in other studies. Barely one-third had more diversified portfolios and had ventured to invest in assets such as shares, options and mutual funds. Attitudes towards financial risk taking also became more positive with a rising level of diversification and number of risky assets in the portfolio.

It seems that risk hedgers, security savers, contractual savers, prudent investors and those practising divergent strategies are, at least to some degree, involved in their financial management. They also have the longest financial planning horizons (not shown in tables). Risk hedgers and "divergent" strategies score highest on factors measuring active information search and openness to financial innovation. The professed innovativeness of the risk hedgers and "divergent" strategies' households, along with their portfolio compositions, make us believe that they are an example of the "innovators" or "early adopters" concepts of Rogers (1962). In contrast, residual savers seem to be quite uninvolved and could be viewed as "laggards" in accordance with the same theory. Contractual savers do not have much leeway to practice an active, discretionary financial strategy, but entering into a contract requires at least some involvement and active decision making. When mortgage payments become less of a burden however, many of these households can be expected to gradually start using a security saving or risk hedging strategy.

The results indicate a relationship between life-cycle categories and financial strategies practised. However, most strategies are practised by households from at least four (out of five) different life-cycle categories, and within each life-cycle category are practised by sizeable shares of the households. This indicates that there are other explanatory variables as to financial strategies practised. However, our findings indicate that a clear majority of both the young, single households without dependants and the retired households practise a residual saving strategy.

Why, finally, is "segmenting" into financial strategies of interest? Firstly, for financial institutions such as banks, insurance companies and other financial institutions, knowledge about different financial strategies may be of use for product development and for marketing financial instruments (market communication). It also gives hints as to reactions to changes in government policies, etc. All households may not react in the same – expected – manner, thus causing systematic deviations at the macro level from expected results of marketing activities or changes in government policies.

To illustrate, we can hypothesise that there is a rise in real disposable income for all Swedish households. If we look at time preferences and saving rates in the different financial strategies, we can see that the residual savers and the contractual savers (comprising 68 percent of all households) would tend to consume a substantially larger part of the increase in disposable income than the other groups. The household groups that have more negative time preferences and higher saving rates would tend to increase savings, with the *overall* effect being that consumption rises more than saving. In the reverse case, a decrease in real disposable income will lower consumption. The overall effect heavily depends on which groups of households receive the lion's share of the increase in income.

The consumption patterns in different groups will also conceivably play a role in determining the effect of policy changes. Groups such as the risk hedgers and prudent investors, who have already secured life's basic needs, such as housing, will consume different kinds of products than the residual savers and the contractual savers. The effect on retail sales and the distribution of consumption between, e.g., imported and domestically produced products may thus differ depending on how each group is affected. An issue such as this poses an interesting research problem: how do financial strategies relate to saving's flip side of the coin, namely consumption and patterns in consumption?

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Chapter 3:

"As Time Goes By…" Segmentation and Behavioral Stability Over Time

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Submitted

"As Time Goes By..." Segmentation and Behavioral Stability Over Time

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Abstract:

Despite its theoretical and empirical merits, segmentation may fall short of the mark in certain respects, especially with regards to the assumed temporal stability of a particular market segmentation. For example, competitive structures and customer competence and perceived needs have been rapidly changing in the retail financial services market in recent years. The household financial services market also forms the basis for the empirical example in the paper.

The two main purposes of the study were (1) to develop a conceptual model of segment stability and (2) to empirically determine how stable a clustering-based behavioral segmentation of the market for household retail financial services in the Netherlands was over a four-year period (1993-1996). To this end seven research hypotheses were formulated concerning segment stability in terms of size and discriminating characteristics such as financial behaviors, psychological variables, demographics and socioeconomic variables. An explanatory model was drawn up and applied in order to validate the segmentation and discriminate among behavioral groups. Finally, the research hypotheses were tested utilizing clustering-based analysis of portfolio behaviors.

A five-cluster solution was chosen for the 1993, 1995 and 1996 panels. Statistically significant differences among clusters on theoretically important background variables were found. While segment sizes, typologies and means for background descriptors were quite stable over time, household segment switching was in the order of 40-50 percent for each year, increasing with time. Predictive discriminant analyses based on significant segment descriptors from the explanatory model classified under 40 percent of all households correctly. This was significantly higher than could be expected from pure chance models.

Keywords: Portfolio behavior; segmentation; longitudinal studies

Introduction and Purpose

Households combine different forms of saving, debts and credits into different patterns, or portfolios. They do this, as on any consumer market, by choosing between a vast array of retail financial services marketed by different actors such as banks, insurance companies and the government. When composing their portfolios, they are affected by factors such as varying saving needs, motives, competence and ability as well as the supply available to them on their local market. This implies that portfolio compositions will vary across groups of households. In addition, as these factors change over time, behavioral patterns will also change and therefore market partitionings may become obsolete.

However, segmentation in financial services has, as in most other areas, been conducted on cross-sectional samples, while it is well-known that competitive structures, customer competence and perceived needs have been rapidly changing in the retail financial services market in recent years (c.f. Chang & Chen, 1995; Gunnarsson & Wahlund, 1995; Harrison, 1994; Harrison, 1995; McGoldrick & Greenland, 1994; Meadows & Dibb, 1998; Meidan, 1996; Economist Intelligence Unit, 1996). Many segmentation studies of this market also use *post-hoc* cluster analysis on a wide variety of data (Speed & Smith, 1992). Since cluster analysis is notoriously unstable, this emphasizes the need to rigorously estimate how stable any segments found are both in the cross-section and over time. Wind (1978) remarks that changing market conditions and customer characteristics will contribute to quickly making data obsolete and calls for monitoring changes in segment composition over time. Dibb & Stern (1995), finally, note that traditional segmentation efforts suffer from not being repeated over time. They argue that any changes in marketing activities made on the basis of segmentation results, such as the targeting of new customer groups or new product launches, will affect market conditions – regardless of whether competitors change their behaviors or not. No sea captain would willingly navigate by old charts of changing sand reefs – why would marketing management?

There is a lack of segmentation studies using longitudinal or pure panel data. In fact, in reviewing the literature, only one pure panel data study was found. This was Calantone & Sawyer's (1978) study of the stability of benefit segments in a U.S. retail banking market. Calantone & Sawyer studied their sample with an interval of two years, in 1972 and 1974, and found substantial segment switching, while the benefit segments as such were reasonably stable as to importance of benefits and size.

The lack of studies *per se* suggests that it is generally a rather neglected area in segmentation research. Lack of segment stability (non-stationarity) will violate one of the fundamental criteria for determining the effectiveness of a particular segmentation, namely the stability of identified segments at least over a time-period long enough to implement a successful marketing strategy based on the results of the segmentation analysis (Frank, Massy, & Wind, 1972; Mercer, 1996; Wedel, 1990; Wedel & Kamakura, 1998). For practitioners it is also imperative to know for how long a particular market partitioning can be used effectively and at what intervals new data collection is required. Several authors (cf. Calantone & Sawyer, 1978; Wedel & Kamakura, 1998; Wind, 1978; Wind, 1995) have identified temporal stability as one of the most important topics in segmentation research, with considerable practical implications, yet it remains largely unexplored.

The two main purposes of this study are (1) to develop a conceptual model of segment stability on the basis of previous findings and (2) to empirically determine how stable a clustering-based behavioral segmentation of the market for household retail financial services in the Netherlands is over a four-year period (1993-1996). We use a combination of pure panel data and semi-cross-sectional data from different cross-sections. Seven hypotheses are posited regarding segment stability in terms of size and discriminating characteristics such as financial behaviors, risk taking attitudes, demographics and socioeconomic profiles. A theoretical model is drawn up and applied in order to validate the segmentation and attempt to discriminate between the behavioral groups.

Theoretical Background

Market Segmentation in Retail Financial Services

As in the segmentation of other markets, a variety of approaches are used in market segmentation in financial services, both *a priori* (according to pre-determined criteria) and *post hoc* (empirically, clustering-based). However, much of the research lacks real depth and methodological rigor and does not build on preceding research to any great extent, but is instead of an ad hoc character (Speed & Smith, 1992).

Speed & Smith (1992) provide a comprehensive review of segmentation research in retail financial services during the 1970s and 1980s. They suggest that research can be divided into three groups depending on methodology used. One group merely describes approaches that in terms of products and features might be successful, i.e., are normative. It is qualitative work, and further research has to be made to validate the ideas generated.

A second part of the literature is more quantitative but concentrates on *a priori* segmentation, in terms of variables such as age, usage behavior, education, etc. Studies of this type include Stanley, Ford, & Richards (1985), with age group segmentation of financial services usage, Wahlund (1991; composite segmentation base including factors assumed to explain saving behaviors such as the life cycle, saving goals and economic situation) and Kamakura, Ramaswami, & Srivastava (1991), who examined the acquisition order of financial services based on position in the life cycle and the estimated latent difficulty of the financial services examined. Harrison (1994; 1995; 1996; 1997) used perceived knowledge and financial maturity to produce four useful and *a priori* determined segments in the UK.

The present study belongs to the third part of the literature, which primarily uses *post-hoc* segmentation. Here, "the number and characteristics of each segment are determined by the data and methodology used" (Wedel & Kamakura, 1998, p. 19). Studies of this nature include Calantone & Sawyer (1978; benefit segmentation), Chang & Chen (1995; benefit segmentation), Gunnarsson & Wahlund (1997; portfolio behavior) and Ramaswamy, Chatterjee, & Cohen (1996; financial goals and ownership of banking services).

The Concept of Market Segment Stability

Wind (1978, p 326) defines segment stability as "...given the assignment of individuals to segment *j*, how likely is it that the individual *i* will remain in the same segment over time and different situations?" This requires pure panel data on individuals (or households) on which repeated measurements are made over time. According to Wind, segment stability largely depends on three different factors:

1. *Generality* of the basis for segmentation. The more general, the more stable the segments.
2. *Marketplace volatility*. The less dynamic the marketplace conditions, the more stable the segments.
3. Changes in *consumer characteristics*, e.g., progression from one stage in the life cycle to another.

These factors may operate differently in different segments. Hence the weight and nature of the impact of the factors on each segment should also be assessed.

Calantone & Sawyer (1978), although not neglecting segment switchers, take a slightly different stance by focusing on "whether identified market segments remain similar over time in terms of distinguishing characteristics and size" (ibid., p 395). Note that this does *not* require the collection of pure panel data. On the contrary, if focus is on making market-wide generalizations, the researcher should draw a new sample for each time-period.

Wedel & Kamakura (1998) discuss what they label *dynamic segmentation*, which involves the assumption that segments are not stationary in time with regard to their structure and characteristics. According to the authors, violation of the stationary criterion for effective segmentation may invalidate model estimation when data collection spans a long period, such as in tracking studies. Two major sources of segment instability are identified and two types of models proposed to deal with each issue for fast-moving consumer goods (FMCG) (Wedel & Kamakura, 1998, p. 160):

1. *Manifest change*. Segment membership is stable, but changes may occur in the preference or choice structure of customers in a segment over time.
2. *Latent change*. The preference structure of segments is stable, but changes may occur in segment size and/or the segment membership of consumers over time.

Another important issue is raised by Dibb & Stern (1995), who strongly question the accepted practice of assuming market segments to be stable over time and situations. They note that any action taken by a business on the basis of a segmentation study – regardless of its internal validity – will invariably *affect the market on which they operate*; both in terms of customers and competitors. This may produce new segments on the market, or contribute to segment switching. Dibb & Stern conclude by asserting that "the more fundamental questions about market definition, stability and attitudinal reliability need to be addressed" (ibid., p 635). In line with this, Ramaswamy (1997) applies an approach for evolution of manifest preference segments over multiple time periods, before and after new product introductions, using scanner panel data. Ramaswamy tests three different models regarding whether (1) the new product has penetrated existing segments (the *stability* model), (2) it has increased the size of a segment (the *expansion* model) or (3) it has created an entirely new segment (the *evolution* model). An application on data from laundry detergent purchase behaviors showed that the evolution model dominated over the other two models, as the number of identifiable segments increased from three to four after the introduction of two new brands. Switching propensities differed substantially between segments.

Finally, one central stability issue concerns the "aging" of the data (Wind, 1978). Most market segmentations are based on cross-sectional data and cannot be expected to be a fair description of market structure for more than a limited amount of time (see also Wind, 1995). Repeated sampling and segmentation will give both researchers and practitioners an idea of what to expect in terms of segment stability and at what intervals to make new population samplings and analyses.

This author believes that examining both the stability of segments derived from repeated cross-sectional samples and those found in pure panel data is important. From a practitioner's point of view, pure panel data is difficult and costly to obtain and analyze and is rarely used by firms. Hence it makes sense to estimate segment stability based on cross-sectional data. However, for the marketing scientist, it may be more feasible and interesting to use pure panel data as well. This is because in using the two different samples we will examine two partly different issues. The first issue, which can be examined using only cross-sectional data, simply concerns whether, over time, the same segments can be found as to the consumers' behaviors or preferences. Like Ramaswamy (1997) we can also study the impact on the market of, e.g. new product introductions. Finally, in repeated cross-sections we avoid biasing the sample since we allow new consumers to enter the sample. The second issue, which can *only* be examined satisfactorily using pure panel data, concerns why and how individuals (or households) change their behaviors or preferences and thus segments over time. Is there latent and/or manifest change? However, the sample will be biased in the sense that no new consumers are allowed to enter it after time t_1, thus making it progressively deviant from the population at time t_i in terms of age-distribution, tastes, etc. In this paper we will consequently use both longitudinal (in fact semi-cross-sectional, see the section on Procedure) and pure panel data.

Empirical Evidence of Segment Stability in the Financial Services Market

It is worthwhile to review the most important aspects of Calantone & Sawyer's (1978) study, since it is the only study of segment stability in the financial services market. The hypotheses underlying the study were that: 1) benefit segments should be consistent in different independent samples from the same time-period. 2) Segments would be similar over time in terms of benefits sought, size and demographic characteristics. 3) Individual consumers would be classified in the same segment in the two time-periods.

Cross-section analysis on the 1972 dataset was made using cluster analysis on four benefit factors. Split-half sample tests confirmed that a five-cluster solution was appropriate for the data, which also validated hypothesis 1 concerning the internal consistency of the segments. A second, identical, analysis was then made on the 1974 dataset. Again, the segments were internally consistent and showed a close resemblance to the 1972 segments in terms of size and benefit weights, which partly confirmed hypothesis 2. However, demographic characteristics, such as ethnic minority status, age of head of household, household income and occupational status, had changed somewhat in the segments. The last hypothesis was rejected, as only 28.8% of the individuals remained in the same segment over the two-year period.

The results strongly indicated that it was worthwhile to monitor customer segments closely over time, especially since segment switching was very common. Marketing management might decide to rely on a self-selection strategy for example in marketing communication, since segments were consistent in terms of desired benefits. However, demographic characteristics appeared to change over time, which should affect the effectiveness of segment targeting and media decisions.

Calantone & Sawyer's hypotheses are fundamental for any study of segment stability. Hence, the present study will also ascertain the internal consistency of segments using replication analysis to attain maximum consistency and a minimum of random cluster assignments at the cross-sectional level. It will also assess the changes in segment descriptors and predictive models based on the descriptors, and finally track household segment switching between years.

Attitudinal vs. Behavioral Stability at the Aggregate and Individual Level

Calantone & Sawyer's (1978) segmentation was based on desired banking benefits, i.e. responses to attitudinal statements. The few studies of the temporal stability of attitudes that have been made have found that attitudes are highly variable at the individual level but stable at the aggregate level (see Dall-Olmo Riley, Ehrenberg, & Barnard, 1998). The attitudes vary seemingly at random. Hence any segmentation based on repeated attitude measurement should find individual segment switching whilst aggregate level measures should remain fairly stable. Dall-Olmo Riley et al. (1998) also note that neither the interval between measurements nor the type of measure affect this phenomenon.

Actual individual behavior, e.g., brand purchase, exhibits a similar variability, with aggregate market shares being constant over time. Although individual propensities to buy specific brands can be accurately modeled, the actual incidence of purchasing a brand is so irregular that it approaches random variation (Dall-Olmo Riley et al., 1998). This is a topic covered in the substantial body of literature on brand choice modeling, which, however, rarely studies segment change over time, but rather deals with predicting individual buying patterns over time (an exception is the study of Böckenholt & Langeheine, 1996, on tuna brand choice in latent classes). It is also almost exclusively restricted to fast-moving consumer goods.

Modes of Segment Instability

The discussion about segment instability or non-stationarity over time can be summarized in the matrix in Figure 1. The impact of segment instability will vary according to the speed of the change/s taking place in the marketplace and among consumers. Different markets and products will vary in the way they are affected by temporal instability and consequently the demands on the marketer. Of course, this is also dependent on the degree to which the firm's marketing strategy is based on segmentation.

The stability assumption puts a heavy burden on the quality of marketing research in terms of repetition, measurement, sampling, and knowledge and application of proper analysis techniques (Dibb & Stern 1995). For example, Wind (1978) argued that the choice of segmentation base and the generality of the segmentation base could be an important factor influencing stability. Blattberg & Sen 's (1976) and Ramaswamy's (1997) results also indicated that some segments might be more prone to switch than others, for example depending on the stability of buying patterns.

The upper left-hand cell in the matrix illustrates the common assumption that segments which are identified are stable, at least in the short run, both with regard to which individuals or households make up that segment and the specific benefits or behaviors which define that segment. In this case, it is conceivably quite easy to design a marketing strategy for a particular segment and be confident in its lasting qualities. The stability assumption should also form the basis for a successful relationship and database marketing strategy.

As has been discussed previously, however, this assumption may easily be violated, see the lower left-hand cell. For example, life-cycle segmentation, which is very common in the financial services industry, by definition leads to a steady stream of individuals leaving one segment and entering another. Thus, in spite of each segment exhibiting stable characteristics over time in terms of financial services needs, the influx and outflow of individuals will cause segment behaviors and descriptors to change over time. In addition, cohort differences in values, lifestyles, media habits, goals and financial means will gradually render segment descriptors obsolete. In Wedel & Kamakura 's terminology, this cell represents the case of latent change.

The lower right-hand cell shows how the joint circumstances of changing individuals and changing segment characteristics may wreak havoc on any "rational" marketing strategy. Since segmentation and targeting become impossible over time, in this case distribution becomes the only tool left to the marketer, making a strong positioning strategy important. However, changing segment characteristics, regardless of segmentation base, would signal the emergence of a new segmentation structure on the market and thus the firm itself may have imposed that structure on the market.

The upper right-hand cell's combination of events seems difficult to exemplify. However, in the case of a cohort-based market restructuring entire groups of consumers may adopt a new behavior over the course of a relatively short time-span and thus redefine the previous market structure. This cell illustrates the case of manifest change mentioned by Wedel & Kamakura (1998).

One possibility of market structure change that cannot be adequately represented in the matrix was illustrated by Ramaswamy's (1997) study of new product introductions related earlier. The original market structure may in such cases be further subdivided into one or more new segments in an evolutionary manner.

In any of the three cells indicating instability in segment typologies or consumer segment membership, as well as any evolutionary tendencies, frequent segment switching or changing segment descriptors may create serious problems for any long-term marketing strategy. Hence, it would also put substantial stress on any database marketing and relationship marketing strategy.

Segment Characteristics

		Stable over time in terms of behavior or desired benefits	*Behavior or desired benefits not stable over time*
Individuals in segments	*Individuals stable over time*	Makes marketing strategies built on segmentation results viable. The normal assumption in marketing.	Previously identified target groups must be monitored over time for changes in needs and desired benefits.
	Individuals switch segments over time	Target marketing becomes difficult.	Restricts marketing to distribution (mass marketing).

Figure 1: Four scenarios relating to segment instability.[i] *The implications of these scenarios will vary from market to market.*

Hypotheses Regarding the Stability of Household Portfolio Behavior

Although acquiring financial services predominantly is quite different from buying an FMCG brand, the findings above indicate that a high variability can be expected especially if we repeatedly measure attitudes or preferences towards such services and use those responses for segmentation purposes. Such was also clearly the case in the Calantone & Sawyer (1978) study.

In this paper we assume that portfolio behavior measured at the household level will provide a segmentation base that is relatively stable over time-period measured, but nonetheless will exhibit signs of change. We also assume that investment behavior is not affected by situational factors such as out of stock or in-store marketing communication, nor should it be greatly affected by variety seeking behavior. It is instead factors such as household saving and consumption objectives and household income and wealth that will affect behavior.

Also, the predictive models in this paper only partly take into account external shocks, which may affect portfolio composition as measured in shares of the total portfolio. Examples of such shocks are strong stock market fluctuations or changes in asset tax legislation. Such factors may, during the studied time-period

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[i] I am indebted to John R. Rossiter, the Australian Graduate School of Management, for conceptualizing the matrix during discussions with the author.

of four years, create changes in households' portfolio behaviors large enough to produce the types of segment instability measured here. Further, since the analysis is based on the share of total financial wealth allocated to different types of investments by a panel of Dutch households, the segmentation can be expected to be affected by the variability in liquid, transactional saving forms such as checking accounts. This is so because a large part of Dutch households have been identified in previous research as having undiversified and liquid portfolios (Alessie, Lusardi, & Aldershof, 1994; Alessie, Pradhan, & Zandvliet, 1993; Camphuis, 1993; Hochgürtel, Alessie, & van Soest, 1994). This should mean that the composition of their portfolios would be more susceptible to changes in holdings of liquid assets.

The first research hypothesis deals with the aggregate level-individual level stability problem and whether changes among sub-groups on the market can be substantial enough to be detected in market-wide behavioral changes. For example, according to Dall-Olmo Riley et al. (1998), individuals' segment-level switching may cancel each other out, and will not necessarily be reflected in changes at the aggregate market level.

H_1: Viewed at the aggregate market level, household portfolio behavior in terms of the allocation of financial wealth to different assets will not vary significantly over the studied time-period (four years).

Hypotheses 2 and 3 concern the stability of segments based on portfolio behavior, as well as the stability of segment sizes.

H_{2a}: At the micro (household) level, distinct portfolio behavioral patterns (segments) can be repeatedly found over the studied time-period.

H_{2b}: There will be significant changes in the portfolio behaviors of households over the studied time-period that will prompt reevaluation of the segments' typologies (manifest change).

H_{3a}: The segment assignment of individual households will vary significantly over the studied time-period (latent change).

H_{3b}: Any segments characterized by large amounts of assets allocated to shares or liquid assets will be more prone to suffer from segment switching.

H_{3c}: The segments will vary significantly in size over the studied time-period.

Factors Affecting Portfolio Behavior

In this section we will present the most important factors that decide why household portfolios may vary between groups. The factors affecting portfolio behavior that have been studied in the literature can be divided into two general groups: (a) socioeconomic and demographic, and (b) psychological. These factors are used later in the paper as segment descriptors and validation variables in univariate and multivariate analyses (see the Appendix for details on the variables and their operationalization).

Socioeconomic and Demographic Factors

The Life-Cycle. The concept of the life-cycle has been extensively used in analyzing saving behavior. The gist of the certainty equivalence life-cycle/permanent income model (CEQ) is that people strive to smooth consumption during their lifetimes and save so as to be able to keep that consumption profile during retirement years. In an extension of the model, funds that are not completely consumed before death are passed on to the descendants: intergenerational transfers. The certainty equivalence life-cycle model nicely illustrates how consumption and saving are two sides of the same coin, each dependent upon the other. However, empirical results from modern economic studies have shown that the CEQ-model alone is unable to provide more than a partial explanation of household consumption and saving behavior. This is not unexpected, since, increasingly, contemporary households do not conform to the expectations of the classical life-cycle hypothesis (McConocha, Tully, & Walther, 1993). We contend that the life-cycle has its impact on portfolio behavior in three ways:

- The ability to save varies over the traditional life cycle because of more or less stringent restrictions on available funds.
- The competence to save also varies as individuals and households gain experience in saving and investing.
- Saving needs will change as, e.g., family composition changes over the life cycle.

For example, Gunnarsson & Wahlund (1995; 1997) found that a household's current life-cycle stage exerted some influence on the financial strategy practiced. Gunnarsson (1996) found that age and an advanced stage in the life-cycle were significant predictors of the amount of risky savings in the portfolio.

Income, Wealth and Housing. Income and wealth are two variables that traditionally have been used as predictors of saving behavior.

In terms of portfolio behavior, empirical studies tend to show that the higher the household income and the higher the financial wealth, the more diversified and risky is the portfolio. This is in part due to the fact that some saving forms (and loans and credits) require a certain level of liquidity (cf. Hochgürtel, 1998) which imposes a constraint on some, probably not insignificant, groups of households, that limits their available choices of assets, debts and credits. Perceived credit constraints also affect the households' portfolio risk-level (Guiso, Jappelli, & Terlizzese, 1994).

Another important factor in deciding households' portfolios of savings and debts is the magnitude of *real saving* (housing). In many households' portfolios, housing is the single largest item of wealth. Wahlund, 1991, Pålsson (1992) and Skinner (1993) all observed that variations in housing wealth influenced household financial saving and consumption. Kamakura et al. (1991) found that incidence of rented residence was negatively related to investments in riskier and more complex types of financial services. In the same study, net worth and income were also found to significantly contribute towards explaining a measure of latent financial maturity. Hochgürtel & van Soest (1996), using Dutch Collective Bank Study (CBO) data from 1988 covering 3,077 households, found that "homeowners tend to hold significantly more types of financial assets than renters, even controlling for wealth and other characteristics" (ibid., p. 8). Homeowners' investments also seemed to be directed towards the long run.

Occupation. As will become evident, the tax-sheltered status of certain types of saving was strongly affected by occupational status in the Netherlands, specifically, being a salaried employee or not.

Variables Measuring Psychological Factors

Saving Motives (Needs). Motives for saving (needs) are also determinants of saving behavior. This argument is an old one that has received considerable attention in both economic (e.g., Keynes, 1936) and economic-psychological literature (Betts, 1994; Gasparski, 1990; Gunnarsson & Wahlund, 1995; Lindqvist, 1981; Wahlund, 1991; Wahlund & Wärneryd, 1987; Ölander & Seipel, 1970).

One of the crucial assumptions of the certainty equivalence life-cycle/permanent income hypothesis (CEQ) was that households are rational, forward-looking agents who keep a smooth level of consumption over their lifetimes and have amassed enough wealth at the age of retirement to keep that consumption level constant until they pass away. This should lead to a security-focused saving behavior in the long term, which will become more pronounced over the life-cycle as households, after the children have left the nest, can concentrate more or less exclusively on their own welfare as retirement comes closer. In an attempt to explain why many households do not completely dissave, inter-generational transfers, i.e., an altruistic motive has been suggested as an important factor for some households. In support of this, Alessie, Lusardi, & Kapteyn (1995) found that the bequest motive seemed to be especially important among the elderly well-to-do households.

Another example of the impact of saving motives on saving behavior is that the household may perceive that liquidity and the ability to meet financial obligations are the top priorities (e.g. young families). In fact, from the short and medium term perspective, recent empirical evidence points to the fact that many households do weight buffer saving motives heavily in order to compensate for random transitory shocks to income (e.g., Carroll, 1997). The household may then tend to concentrate resources in those kinds of liquid forms and forsake investments in, e.g., long-term assets such as stocks or private pension insurance. Perceived needs and the importance of different saving motives should thus be expected to vary in importance over the life cycle and between individuals (Wärneryd, 1996), which has also been empirically demonstrated (cf. Ramaswamy et al., 1996; Wahlund, 1991).

Perceived Product Class Knowledge. Saving and borrowing decisions are frequently seen as involving a tangible financial risk to the household. A higher level of knowledge, whether only subjectively perceived or actual, serves to lower the perceived risk. Households with a higher education level can conceivably learn to handle more complex and risky saving forms with more confidence than households with lower education, as is also indicated by Gunnarsson (1996). They may also be able to seek out and process relevant information more efficiently than other households. Gunnarsson & Wahlund (1995; 1997) found that households with better objective and subjective knowledge of matters pertaining directly to private investments more frequently owned complex and risky financial assets and felt more in control of their financial situation. Kamakura et al. (1991) and Harrison (1994; 1995; 1996; 1997) found similar results.

King and Leape (1987) and Guiso et al. (1994) found support for the supposition that households acquire information about "sophisticated" financial assets over the life cycle and/or become less liquidity-constrained, resulting in more complex and risky assets in the portfolio. Guiso et al. (ibid.) also found a positive impact of the level of education on the share of risky assets in the household portfolio, while the results of Kamakura et al. (1991) indicated a clear relationship between level of education and the probability of ownership of complex financial assets. Gunnarsson (1996) found a similar effect of the perceived knowledge of financial matters on portfolio behavior.

Financial Risk Taking. Due to the inherent riskiness of many financial assets, credits and loans as discussed earlier, households' attitudes towards financial risk taking are an important factor in explaining portfolio choice. Dahlbäck (1991) and Gunnarsson & Wahlund (1997) observe that the propensity to own risky assets correlates positively with the total amount of financial wealth and the level of household income. The attitude towards financial risk taking also becomes more negative with increasing age, according to Adelt (1992), Müller (1994) and Gunnarsson & Wahlund (1995). However, studies by Kreinin (1959), Claycamp (1963), Müller (1992; 1994) and Gunnarsson (1996) indicate that psychological factors, i.e. risk-taking attitudes, rather than socioeconomic ones may influence financial risk taking measured as the riskiness of the household's portfolio.

Hypothesis Regarding Changes in Explanatory Variables

The variables discussed in the preceding sections were said to be of either "psychological" or "socioeconomic or demographic" character. These variables also illustrate the household's ability and willingness to save (Katona, 1975; Lindqvist, 1983). Variables such as economic situation and household composition will affect the ability to behave in a certain way, while, e.g., attitudes and experiences will affect the willingness to engage in certain behaviors (Lindqvist, 1983). Willingness can also be translated as the propensity to engage in certain financial behaviors, for example, ability factors being equal, otherwise similar households will not engage in identical behaviors. In this study, this simple model will suffice (details and operationalization of the variables can be found in Appendix 2).

After we have assessed the stability of the behavioral segmentation and tested the first hypotheses, we will proceed to determine the stability and discriminatory power of the explanatory variables. The last hypothesis therefore concerns the stability of background descriptors commonly used to target and validate segments, explain their behaviors as well as evaluate their value to the firm.

> H_4: The explanatory factors derived from the model will change significantly in segments over time. The application of and interpretation of the explanatory model will consequently also not be consistent over time.

Method

Questionnaires and Sampling

The data were taken from the Dutch VSB-CentER Savings Project panel databases. Initiated in 1993, this annual panel survey covers five areas, which are 1) accommodation and mortgages, 2) economic psychology, 3) health and income, 4) household and work and 5) assets and debts. Surveys are administered by modem to respondents' homes, where questionnaires are completed using a computerized survey form and returned by modem to a central database.

Respondents were initially sampled using random digit dialing to ensure an equal probability for households in smaller communities of being included in the sample. Quota sampling was then applied on households willing to participate in the panel to make them correspond as closely as possible to the respective populations. There are two different panels in the project. One is a nationally representative panel of households consisting of between 2,000 and 2,500 households, while the other has randomly sampled about 1,000 households in the uppermost decile in the Dutch income distribution. Households with similar socioeconomic and demographic characteristics continuously replace households that drop out in order to preserve the profile of the panel (see Nyhus, 1996 for more details). Panel attrition is estimated to about thirty percent per year for the representative panel.

Sample Used in this Study

The present analysis was restricted to the representative panel. Fourteen variables measuring the nominal value of different saving forms constituted the original segmentation variables, but these were further collapsed into seven different categories. No missing data or unknowns were allowed, and for married or cohabiting households both spouses must be present in the dataset and have given complete data regarding the nominal value of all their assets. The 1994 wave was omitted due to a lack of a full range of psychological variables measured that year.

In the fourth wave (1996), only 290 households, or 31 percent, were still left in the net usable pure panel sample from wave one (1993). This was out of a gross sample of 767 households that had participated in all four waves (after panel attrition had been accounted for). Apart from the effects of panel attrition, a major reason for this was the substantial risk that one or the other of the household members sampled would fail to give complete information on all assets over the four waves, and hence disqualify the household from further analysis.

The somewhat disappointing number of households left in the net pure panel sample over time jeopardized the stability of any cluster solutions and the resulting behavioral typologies, due to potential over-fitting of data. The typologies were therefore developed using the full cross-section sample from each wave of the representative panel. Switching patterns and changes in segment size were however analyzed using both the cross-section data and the longitudinal data, which helped to assess the sensitivity of the results in the different samples, even if they were not totally independent.

	Wave 1 (1993)	**Wave 3 (1995)**	**Wave 4 (1996)**	**Households participating in Waves 1, 3 and 4**
Households in the cross-section with complete wealth data and reported data from both spouses (when applicable)	922	1,021	824	
Households with complete wealth data left from previous wave (gross number of households left from 1993 panel)		409 (1,004)	481 (1,416)	290 (767)

Table 1: Households participating in the first four waves of the representative panel, and the samples available for analysis in this study. Figures in parentheses indicate the gross number of households remaining in the dataset.

Variable Set and Asset Type Aggregation Level

The analyses in this paper use the shares of financial assets in the total financial portfolio as segmentation variables, i.e., which assets to include in the household's portfolio and in what proportions. Appendix 1 provides details of the fourteen types of savings, which were subsequently aggregated into seven larger categories of investments.

In the original variable set, a total of 30 types of financial services were measured for all members of the household aged 16 years or over. The fourteen saving forms detailed in Appendix 1 provide a large amount of possible variations in portfolio behaviors. Although there will be variations in reasons for usage between households, keeping this in mind it is still worth the simplification in terms of choice of cluster solutions and ease of interpretation.

It has been empirically demonstrated that there is a relationship between past financial behavior and present portfolio behavior, where the household is likely to acquire financial services in a certain order (Kamakura et al., 1991). It can consequently be assumed that there are a finite number of more or less common household portfolio structures. It is thus also reasonable to expect to find nested portfolio structures, where the cut-off point for the number of segments has to be made on the basis of statistical criteria and ease of interpretation.

It should again be stressed that the selection of segmentation variables is a highly critical one, and that the results hinge upon that selection. On the basis of the earlier aggregations of different types of financial services made in the literature, what earlier literature stresses as important determinants of household portfolio behavior, and considering the financial services measured in the VSB data, the author made the aggregation shown in Table 2.

This approach could be usefully applied to six of the seven asset categories. The seventh, employer-sponsored savings plans, could not be easily incorporated into any of the remaining categories. Leaving it in a single category of its own may unduly weight it in the subsequent analysis. It is therefore important to stress that this decision was not made at random. The employer-sponsored savings plan is to some degree a fixed-rate time deposit since there generally is a requirement that the money saved is held in a special account, or, in the case of stock options, not be cashed in for at least four years. Different types of employer-sponsored savings plans can also be combined at will, with the total amount saved per year not exceeding DFL 2,633 (te Spenke, 1995). There are hence also limitations on the amount saved, making this form of saving a complement at best for wealthier portfolio holders. Finally, there may also exist an ulterior motive for this type of saving; ultimately, investments in, e.g., company stock option plans or profit sharing plans may benefit the individual in ways other than purely monetary.

1. **Foundation products**; liquid, transactional saving forms: checking accounts and deposit books.	2. **Foundation products**; non-risky time deposits: Postbank savings & giro accounts, savings and deposit accounts.
3. **Emergency cash and fixed-rate growth assets**: Bonds, savings certificates.	4. **Risk management and cash reserve services**: private pension plans, single-premium annuity insurance, savings- or endowment insurance and combined life insurance.
5. **Growth assets managed by financial institutions**: mutual funds and growth funds.	6. **Personally managed, growth assets**: shares.
7. **Employer-sponsored** savings plans and company profit-sharing plans.	

Table 2: The seven asset categories of which shares of the total financial portfolio were used as segmentation variables.

Procedure for Cluster Analysis

The procedure was utilized by Singh (1990) and involves replication analysis of the sample(s). It is recommended by Milligan (1996) and Hair, Anderson, Tatham, & Black (1995). For each wave, the sample was randomly split into two halves (D_1, test sample and D_2, replication sample). The households reporting having no financial assets were a priori designated Non-savers and excluded from the cluster analysis since they had no variance in their behaviors. The shares of the seven asset categories described in Table 2 in the total financial portfolio, i.e., the ratio of the reported value of asset j for household i divided by total financial assets for household i, were then computed. The shares were finally input into a hierarchical cluster analysis on D_1 using Ward's Method and Squared Euclidean distances. Each wave was analyzed separately. The resulting agglomeration schedules were then examined in order to judge how many clusters would be feasible (Hair et al., 1995; Norusis, 1992).

The analysis then proceeded by conducting a classification-only k-means analysis on D_2 using the centroids obtained from the Ward's Method and D_1 (constrained analysis), and one k-means analysis without pre-specified centroids (unconstrained analysis) using the normal iterative procedure. Cohen's *kappa* chance-corrected coefficient of agreement (Liebetrau, 1983) between the constrained and unconstrained solutions was then computed for each number of clusters. The most important decision rule adopted was that the number of clusters where *kappa* was largest was selected as appropriate for further analysis, the sample pooled and iterative k-means analysis conducted on the entire sample based on the centroids obtained from a Ward's analysis. Since *kappa* values were high in most cases, secondary decision rules for the numbers of clusters included the relative increase of within-cluster variance from one step to another, and the substantiality and interpretability of the clusters.

Finally, validation using behaviors and external variables was made. In this longitudinal analysis, validation of the typologies found could also be made using the different datasets (Aldenderfer & Blashfield, 1985).

As explained above, two sets of analyses were made in order to make the most of the data. (1) The primary analysis was made on the respective years' full cross-sectional sample, but this sample also contained 30-50 percent households that furnished complete data over the entire time-period. It can hence best be characterized as "semi-cross-sectional." (2) The secondary analysis was made on pure panel data, using the households which were left with full data for each year while keeping centroids constant from 1993 in keeping with the assumption of partitioning stability. This analysis was hence made according to Wind's (1978) stability definition. The pure panel, longitudinal results are presented after the semi-cross-sectional results in the following sections and are elaborated upon when substantially diverging from the primary results, or when the primary results fail to give adequate information.

Results

Behavioral Stability at the Aggregate Level: H_1

Some summary statistics on portfolio behavior are presented in Table 3. As was argued, such aggregate statistics may be deceptive if behavior varies significantly among groups of households. At the aggregate level, only superficial changes may be observed, while at the group level significant changes may be obvious.

However, H_1 concerning aggregate level stability could not be accepted. Table 3 indicates that aggregate-level behavior does fluctuate noticeably even during a relatively short time-span such as four years. Although most changes appear small at a cursory examination, they may have substantial impact on an analysis of the complete portfolios. The most obvious change in behavior is that of the share of employer-sponsored savings plans and company profit-sharing plans in the financial portfolio. These plans became tax-preferred for salaried employees in 1994 (te Spenke, 1995, pp. 115-117), accounting for this change in behavior, which also seems to spill over into 1996 financial behaviors, although at a decelerating pace.

ASSET CATEGORY	VSB 1993 n = 820	VSB 1995 n = 964	VSB 1996 n = 824	Sig. F
Liquid, transactional saving forms (checking accounts, Postbank giro account, deposit books)	42.0%	38.6%	36.9%	$F = 5.5; p < 0.01$
Savings or deposit accounts	35.0%	32.6%	30.1%	*n.s.*
Bonds, savings certificates,	2.3%	1.7%	1.4%	*n.s.*
Funds (mutual funds, growth funds)	2.7%	3.6%	4.5%	$F = 5.5; p < 0.05$
Personally managed, growth assets (shares)	1.7%	2.1%	2.2%	*n.s.*
Risk management and cash reserve services (private pension plans, single-premium annuity insurance, savings- or endowment insurance, combined life insurance)	13.2%	13.9%	15.2%	*n.s.*
Employer-sponsored savings plans, company profit sharing plans	3.0%	7.5%	9.7%	$F = 33.8; p < 0.01$
Total:	100 %	100 %	100 %	

Table 3: Mean financial portfolio shares at the aggregate level for the sampled households in the 1993, 1995 and 1996 VSB panels. Conditional means for households reporting positive financial savings, ANOVA F-tests.

Behavioral Segments and Segment Sizes: H_{2a}, H_{2b} and H_{3c}

The 1993 Sample

For the 1993 survey wave, with behaviors measured as of December 31, 1992, a total of 922 households had furnished complete data on the fourteen different assets used in the analysis. 102 of these households reported possessing no wealth at all and were hence a priori classified as Non-savers.

Following the procedure described earlier, a hierarchical cluster analysis using the Ward method of a test sample (n = 415) showed that the within-cluster Euclidean distances showed pronounced jumps in the region between three and five clusters. Using replication analysis on the second split sample (n = 405), the kappa chance corrected coefficients of agreement between the constrained, i.e., *k*-

means cluster analysis using centroids from the test sample, and unconstrained analyses, a Ward's hierarchical cluster analysis without pre-specified centroids, were computed, see Table 4.

No of clusters	**6**	**5**	**4**	**3**
Kappa 1993 n = 405	**0.93** ($p < 0.001$)	0.92 ($p < 0.001$)	0.97 ($p < 0.001$)	0.92 ($p < 0.001$)
1995 n = 468	0.87 ($p < 0.001$)	0.82 ($p < 0.001$)	0.92 ($p < 0.001$)	0.92 ($p < 0.001$)
1996 n = 392	0.81 ($p < 0.001$)	0.94 ($p < 0.001$)	0.97 ($p < 0.001$)	0.93 ($p < 0.001$)

Table 4: Kappa values for agreement between unconstrained and constrained cluster solutions, replication split samples. Households that did not report any financial savings were excluded from the analyses.

The four-cluster solution was chosen as the most stable, easily interpretable and internally homogenous solution across split samples and methods, and *k*-means cluster analysis was applied on the entire sample (n = 820) using cluster centroids from a Ward's hierarchical analysis based on squared Euclidean distances. The result of the analysis is shown in Table 5 below, which contains the results from all three survey waves analyzed. Since the households that did not report any financial savings at all were excluded from the cluster analysis, these were now post-analysis added as a fifth, behaviorally pre-determined group, bringing the number of households analyzed up to 922. It should be noted that very similar solutions were chosen when the analysis was based on the pure longitudinal data, both in terms of the number of clusters and their behavioral profiles.

The results thus indicated that on December 31, 1992, there were five distinct segments according to Dutch households' self-reported financial behaviors. The first segment was labeled *"Diversifiers"* as, on average, their allocation of financial savings showed by far the largest diversification across types of financial services. They were also on average the most prone to invest in more risky, non-liquid and information-intensive assets such as mutual funds and shares.

The second segment was called *"Liquid Savers"* and had allocated their assets into liquid and transactional saving forms such as checking accounts. On average, this group had only a small fraction of their assets invested in bonds, mutual funds, insurance or shares. The segment consisted of 26.8% of the sample and was hence the second largest behavioral group.

The third segment was labeled *"Security-focused"* due to the fact that the average share of assets being invested in different types of insurance approached 80 percent of total financial assets. The remaining part was mostly held in liquid and transactional savings forms.

The fourth segment, *"Risk-minimizers,"* had invested more than 80 percent of their financial assets in saving or deposit accounts at fixed interest rates. The remainder of this group's savings was almost exclusively allocated to liquid and transactional saving forms.

The fifth and last segment consisted of *"Non-savers"* which, obviously, had reported having no savings at all at the time of measurement. Behavioral variability over time will almost certainly bring these households into one or the other of the other four segments.

The 1995 Sample

For the 1995 survey wave, with behaviors as of December 31, 1994, a total of 1,021 households had given complete data on the fourteen different assets. 57 households reported possessing no wealth at all and were a priori classified as Non-savers. The results of the cluster analysis are reported in Table 5 below.

Although five segments were again identified as the most homogenous on the Dutch market in terms of portfolio allocation on December 31, 1994, there were indeed some differences compared to the classifications made on the basis of December 31, 1992 behaviors. Principal of these was the seeming impact of the changed tax-status of the employer-sponsored savings and stock option plans which provided for tax-shelter opportunities and more incentives to invest in the company in which one was employed (te Spenke 1995). Although noticeable and statistically significant among all behavioral groups except the Non-savers, nowhere was this impact more evident than in the changed portfolio allocation of the Diversifiers. In 1993 the Diversifiers allocated 8.6% of their financial assets to employer-sponsored saving plans, compared to 28.9% in 1995 (n = 298, d.f. =

296, $t = 5.78$, $p < 0.001$). The Diversifiers also exhibited significantly larger allocations to mutual funds and shares than in 1993, all this at the expense of decreased allocations into liquid, transactional saving forms and savings or deposit accounts. The size of the Diversifier group was smaller by some six percentage points.

In the other segments, there were some behavioral changes, and although they were in most cases statistically significant, they were not large enough to warrant re-labeling the segments. Size-wise, the proportion of Non-savers was significantly smaller than in 1993, while some may have been classified as Liquid savers in 1995. The reason a household was classified as being Non-saver was dependent on its state of having no financial savings at all. It was hence easy to cross the border into the Liquid saver segment if any capital at all were accumulated.

The 1996 Sample

For the 1996 survey wave, with behaviors as of December 31, 1995, a total of 824 households had furnished complete data on the fourteen different assets. 50 of these were classified as Non-savers a priori. The test sample analysis showed that between five and three clusters seemed acceptable (n = 380).

The segments largely retained their behavioral profiles from the previous year's analysis. For the Diversifiers, the only large change in portfolio allocation was in liquid, transactional forms of saving ($t = 3.07$, $p < 0.001$), whose share increased at the expense of bonds and saving certificates ($t = 2.26$, $p < 0.05$). Further analysis showed that while the nominal level of financial savings was fairly stable otherwise, the largest decrease came in savings or deposit accounts followed by mutual funds and shares, thus boosting allocation into other saving forms.

Portfolio allocation among the Liquid savers had not changed significantly at all, while among the Security-focused, there was a significant decrease in the share allocated to different types of insurance ($t = 2.71$, $p < 0.001$), however not enough to prompt any reevaluation of that segment's general typology. In the Risk-minimizing segment, there were no significant changes in portfolio allocation. A final comparison between the 1993 segments and the 1996 segments, as expected, showed the same changes detected in the analysis of the 1993 and 1995 segments.

ASSET CATEGORY	Wave	Cluster 1 Diver-sifiers	Cluster 2 Liquid savers	Cluster 3 Security-focused	Cluster 4 Risk-minimizers	Cluster 5 Non-savers	*Total, mean households with positive financial savings*
Liquid, transactional saving forms (checking accounts, deposit books)	*1993*	33.7%*	94.4%*	9.8%	12.4%*	0.0%	42.0%
	1995	17.9%*	88.7%*	10.0%	18.1%*	0.0%	38.6%
	1996	20.5%*	87.9%*	12.5%	16.9%*	0.0%	36.9%
Savings or deposit accounts	*1993*	29.9%*	3.4%*	8.1%	80.6%*	0.0%	35.0%
	1995	15.0%*	5.7%*	7.7%	72.5%*	0.0%	32.6%
	1996	14.1%*	5.4%*	8.7%	72.0%*	0.0%	30.1%
Bonds, savings certificates	*1993*	7.9%	0.2%	0.2%	0.9%	0.0%	2.3%
	1995	7.2%	0.1%	0.4%	1.0%	0.0%	1.7%
	1996	3.5%	0.4%	1.0%	1.1%	0.0%	1.4%
Funds (mutual funds, growth funds)	*1993*	9.0%*	0.0%	0.7%	1.2%*	0.0%	2.7%
	1995	15.0%*	0.3%	1.1%	2.3%*	0.0%	3.6%
	1996	14.8%*	0.6%	1.6%	3.1%*	0.0%	4.5%
Personally managed, growth assets (shares)	*1993*	6.0%	0.1%	1.0%	0.2%	0.0%	1.7%
	1995	10.7%	0.4%	0.5%	0.4%	0.0%	2.1%
	1996	9.1%	0.3%	0.8%	0.6%	0.0%	2.2%
Risk management and cash reserve services (private pension plans, single-premium annuity insurance, savings- or endowment insurance, combined life insurance)	*1993*	5.0%	0.8%	79.1%*	3.2%	0.0%	13.2%
	1995	5.2%	1.2%	76.8%*	2.9%	0.0%	13.9%
	1996	4.5%	0.9%	71.3%*	3.1%	0.0%	15.2%
Employer-sponsored savings plans, company profit sharing plans	*1993*	8.6%*	1.0%*	1.0%*	1.5%*	0.0%	3.0%
	1995	28.9%*	3.4%*	3.6%*	2.9%*	0.0%	7.5%
	1996	33.4%*	4.5%*	4.0%*	3.0%*	0.0%	9.7%
Total:		100 %	100 %	100 %	100 %	0.0%	100 %

Table 5: Mean portfolio allocation in the five behavioral clusters based on semi-cross-sectional data. indicate variables which show significant changes in mean allocation in clusters between years in an ANOVA F-test. Clusters based on pure panel data showed approximately the same behavioral stability.*

Segment Sizes

The size of a segment will, among other things, affect the weight afforded it in managerial decisions. Table 6 shows that there were instances of quite large changes in segment sizes. It was difficult to find a pattern in the changes, but the mere fact of them may be unsettling to a decision-maker.

There were substantial differences in segment sizes between years for several of the clusters. There were also differences depending on whether cross-sectional data had been used to classify households, or whether centroids had been pre-specified using 1993 behavioral groups as a base. The longitudinal, pure panel data, analysis showed that keeping segment typologies constant did increase the stability in segment sizes, but only slightly so. Hence the switching behavior cannot be due solely to random variation in the cross-sectional data.

Survey Year	**Sample**	**Cluster 1 Diver-sifiers**	**Cluster 2 Liquid savers**	**Cluster 3 Security-focused**	**Cluster 4 Risk-minimizers**	**Cluster 5 Non-savers**	**Households w/ positive wealth (all HH)**
	Cross-	n = 202	n = 247	n = 111	n = 260	n = 102	n = 820
1993	*section*	21.9%	26.8%	12.0%	28.2%	11.1%	(922)
	Longi-	n = 83	n = 106	n = 43	n = 137	n = 40	n = 369
	tudinal	20.3%	25.9%	10.5%	33.5%	9.8%	(409)
	Cross-	n = 161	n = 296	n = 146	n = 361	n = 57	n = 964
	section	15.8%	29.0%	14.3%	35.3%	5.6%	(1,021)
1995	*Longi-*	n = 54	n = 138	n = 44	n = 147	n = 61	n = 395
	tudinal	13.2%	33.7%	11.2%	35.9%	5.9%	(409)
	Cross-	n = 154	n = 219	n = 141	n = 260	n = 50	n = 774
	section	18.7%	26.6%	17.1%	31.6%	6.1%	(824)
1996	*Longi-*	n = 57	n = 78	n = 424	n = 92	n = 21	n = 269
	tudinal	19.5%	26.7%	15.1%	31.5%	7.2%	(290)

Table 6: Segment sizes. Cross-sectional and longitudinal analyses on pure panel data. Each longitudinal analysis was based on the maximum amount of households left from 1993.Chi-square tests for size changes in pure panel data: 1993-95; $\chi 2 = 245.8; p < 0.001$; 1993-96 ; $\chi 2 = 214.2; p < 0.001$.

Summary of H_{2a}, H_{2b} and H_{3c}

H_{2a}, which stated that distinct portfolio behavior patterns could be repeatedly found was accepted. Segment behavioral patterns did not exhibit changes over time that warranted re-labeling the clusters, regardless of whether the analysis was based on semi-cross-sectional or longitudinal, pure panel, data. This in spite of the fact that there were statistically significant changes in behavior. H_{2b} was thus rejected, although not resoundingly so. Finally, H_{3c} concerning the stability of segment sizes was also rejected.

***Segment Switching:* H_{3a} *&* H_{3b}**

This section will present the results from the pure panel dataset analysis. This was based on classifications made using the 1993 centroids to passively classify respondents who participated in subsequent waves of the survey. This addressed the issue of how likely households were to switch segments even if the classifications were based on the same sample of households using the same classification system over time. This also made it easier to compare relative segment sizes over time since they were based on the same sample and method.

Keeping the same pre-specified centroids from 1993, that is, assuming total market stability over a period of four years, "forced" households to form almost identical clusters over the years. This was true at least in terms of their typology, not necessarily in terms of the individual households that made up the clusters, the relative sizes of the clusters or their background characteristics.

T-tests showed that there were indeed very small behavioral differences between segments formed during each year using the same households, with the exception of the Diversifiers, where employer-sponsored saving forms significantly increased their share of the financial portfolio. As can be seen from the lower right-hand boxes in Table 7 and Table 8, overall switching tended to increase over time.

Some of this behavior may however be due to exogenous factors in the guise of changed tax shelter status of the employer-sponsored saving forms. This is indicated by the number of switchers if we calculate switching percentages using 1993 as base year, compared to using 1995 as base year. In the 1995-96 case, the Diversifier segment is the most stable of all segments, while the opposite is true for 1993-95 and 1993-96. We should also note the large differences in segment stability and switching behavior.

Stable households/ 1993 (columns)	Year	Cluster 1 Diver-sifiers	Cluster 2 Liquid savers	Cluster 3 Security-focused	Cluster 4 Risk-minimizers	Cluster 5 Non-savers	Total of non-switchers
Cluster 1	*1995*	**30.1%**	26.5%	6.0%	33.7%	3.6%	
Diversifiers	*1996*	**36.9%**	16.9%	7.7%	36.9%	1.5%	
Cluster 2	*1995*	10.4%	**61.3%**	7.5%	10.4%	4.7%	
Liquid savers	*1996*	15.6%	**54.5%**	6.5%	18.2%	5.2%	
Cluster 3	*1995*	4.7%	20.9%	**53.5%**	4.7%	2.3%	
Security-focused	*1996*	20.0%	8.6%	**60.0%**	11.4%	0.0%	
Cluster 4	*1995*	9.5%	16.8%	5.1%	**66.4%**	2.2%	
Risk-minimizers	*1996*	17.0%	15.9%	11.4%	**53.4%**	2.3%	
Cluster 5	*1995*	7.5%	47.5%	7.5%	7.5%	**30.0%**	
Non-savers	*1996*	7.4%	29.6%	6.8%	0.0%	**51.9%**	
Total:	*1995*	100%	100%	100%	100%	100%	**54.7%**
	1996	100%	100%	100%	100%	100%	**50.7%**

Table 7: Segment switching 1993-1995 (n = 409) and 1993-1996 (n = 290). Off-diagonal percentages show to which clusters switchers have flowed. The lower right-hand box indicates the percentage total of non-switching households.

Stable households/ 1995 (columns) 1996 (rows)	Cluster 1 Diver-sifiers	Cluster 2 Liquid savers	Cluster 3 Security-focused	Cluster 4 Risk-minimizers	Cluster 5 Non-savers	Total of non-switchers
Cluster 1 Diversifiers	**77.8%**	11.1%	0.0%	11.1%	0.0%	
Cluster 2 Liquid savers	15.9%	**57.3%**	12.2%	6.1%	8.5%	
Cluster 3 Security-focused	2.9%	11.8%	**64.7%**	14.7%	5.9%	
Cluster 4 Risk-minimizers	13.5%	14.6%	4.5%	**67.4%**	0.0%	
Cluster 5 Non-savers	13.3%	40.0%	0.0%	0.0%	**46.7%**	
Total:	100%	100%	100%	100%	100%	**63.6%**

Table 8: Segment switching 1995-1996 (n = 247) of households left from 1993. Off-diagonal percentages show to which clusters switchers have flowed. The lower right-hand box indicates the percentage total of non-switching households.

Summary of Segment Switching and H_{3a} & H_{3b}

The amount of segment switching was not of the same magnitude as what was found by Calantone & Sawyer (1978), but was still surprisingly high. We had posited that changes in saving behavior would be slower in coming, i.e., that changes in financial strategies would tend to be more conservative over time than changes in desired benefits. This was found to be true, but nonetheless H_{3a} could not be rejected.

As for H_{3b}, some of the switching appeared to be caused by fluctuations in liquid balances, in particular among the Non-Savers and Liquid Savers. For example, if savings of long-term character were scarce (as they are for a large proportion of the households), short-term changes in, e.g., checking accounts, will cause a change in classification. This is a result that can be anticipated, however, and as shown some households will be more prone than others to be affected by this.

The Diversifiers were, as hypothesized for a group with investments in shares and mutual funds, also prone to switch, however, as noted above, another conceivably more important factor affecting the rate of switching was the changed tax status in 1994 of the employer-sponsored saving forms. H_{3b} was thus accepted.

Background Variables, External Validation and Changes Over Time: H_4

This section serves three important purposes. 1) To further validate the chosen cluster solution using the variables earlier posited to influence portfolio behavior. 2) To track whether there are significant changes in these variables in the individual clusters across time, which would have implications for targeting and marketing communication. 3) To pinpoint which variables may best serve to discriminate between the segments in a multivariate discriminant analysis.

The reason for the second analysis can again be found in the four-field matrix of segment switching modes. While we have previously determined the changes in segment characteristics; i.e., manifest change, and the rate of switching; i.e., latent change, we need to determine whether the background characteristics of the households in the segments also change significantly. This is of great practical importance to the marketer, as noted by Calantone & Sawyer (1978) and Wedel & Kamakura (1998).

The results are taken from the semi-cross-sectional analyses, which do not deviate markedly from those based on the pure panel data. If anything, the pure panel data show greater stability over time in background variables.

Univariate Analysis

Table 9 and Table 10 summarize the cross-section analyses concerning differences in background descriptors between the segments. More detailed results can be found in Appendix 3, 4 and 5. There are clear differences in both the sets of variables which measure "ability," and those which measure "willingness and propensity." These differences may serve to discriminate between the clusters. We will highlight some of the more interesting differences here.

As for the life cycle, single households made up a large portion (35.1–40.5%) of the Non-savers, while there were very few in the same group married without dependent children. Among the security-focused households there were significantly more married or single households with children as well as empty nesters (not significant). Diversifiers and Risk-minimizers had significantly more retired households than the other groups. Education levels do not seem to differ much between segments, except for a tendency for the Liquid savers and Non-savers to have a smaller proportion of university educated households, the Non-savers also having significantly more households with only a high school or lower education. The largest proportions of high-educated households could on average be found among the Diversifiers and Risk-minimizers.

The "ability" variables showed some interesting tendencies. Both household income and wealth were significantly lower for the Non-savers and the Liquid savers, which was expected in view of their high liquidity (and the Non-savers lack of any financial wealth at the time of the survey). These two groups on average also had the lowest number of saving forms. Risk-minimizers also had a significantly lower financial wealth than the Security-focused and Diversifiers. Disregarding the results for debts in 1993, the same pattern was repeated there, with the smallest average debts for the Non-savers and the Liquid savers. This was also reflected in their having the lowest average number of debt and credit forms, as well as the lowest proportion of households owning their housing. This last result should be one factor, which explains the comparatively low nominal debts.

Variable	Significant cross-section differences between clusters	Significant longitudinal changes in variable
Life-cycle Stage		
Single, no children*	**Yes**	No
Married, no children*	**Yes**, in two waves	**Yes**, for three clusters
Married or single with dependent children*	**Yes**	**Yes**, for one cluster
Married or single, empty nest	No	No
Retired*	**Yes**	**NO**
Education		
Primary schooling*	**Yes**, in two waves	**Yes**, for one cluster
Vocational training	No	No
Vocational college*	**Yes**, in two waves	No
University education or higher	**Yes**, in one wave	No
Socioeconomics		
Yearly net household income*	**Yes**	**Yes**, for three clusters
Gross financial wealth*	**Yes**	No
Percentage of home-owners*	**Yes**	**Yes**, for one cluster
Percentage of salaried employees*	**Yes**	**Yes**, for one cluster

*Table 9: Summary of univariate analyses. Demographic and socioeconomic characteristics. Differences among clusters on key variables, and significant changes over time on the same variables. * indicate variables entered in the discriminant analysis.*

Moving on to the psychological variables, they presented more clues as to why portfolio compositions may differ among the clusters. Security-focused households were, on average, significantly more interested in retirement security than all other segments, a logical result in view of their portfolio composition. Diversifiers and Risk-minimizers on average weighted earning capital income on their investments higher than the other clusters. Apart from the Non-savers (who had no investments to put on the line in any case), the results also indicated that the Diversifiers were the least concerned with having consistently secure returns on their investments. On the other hand, they were the most prone to take risks in investments to gain more return, together with the Security-focused. Interestingly, the Risk-minimizers on average stated that they were more concerned with securing risk-free returns than the other clusters. This was also a logical result.

The Non-savers and the Liquid savers were significantly less interested in savings and investments issues, while the Diversifiers were the most interested in such matters. There was a tendency that Non-savers perceive themselves as less competent in investments than the other clusters, but this difference is less than could be expected given the probably limited experience with investments of the Non-savers.

Variable	Significant cross-section differences between clusters	Significant longitudinal changes in variable
Weight of Saving Goals		
Buffer saving goal	**Yes**, in one wave	**Yes**, for two clusters
Retirement security saving goal*	**Yes**, in two waves	**Yes**, for one cluster
Long-term goal saving	No	**Yes**, for one cluster
Altruistic, saving for children	No	No
Shorter-term goal saving	**Yes**, in one wave	No
Capital income saving goal*	**Yes**, in two waves	No
Risk Attitudes		
Uncertainty/risk reduction orientation*	**Yes**	**Yes**, for one cluster
Consequence/yield orientation*	**Yes**	**Yes**, for one cluster
Investment Competence		
Interest in investments	**Yes**	No
Perceived investment competence	**Yes**	**Yes**, for one cluster
Perceived control of investments and their yield	**Yes**	No

*Table 10: Summary of univariate analyses on semi-cross-sectional data. Psychological characteristics. Differences among clusters on key variables, and significant changes over time on the same variables. * indicate variables entered in the discriminant analysis.*

Changes in Segment Descriptors over Time

Again turning to Table 9 and Table 10 we have indicated with an asterisk where there were significant ($p < 0.05$ in an F-test or a Chi-square test) changes in the means or proportions of segment descriptors between years.

The proportion of Diversifiers, Liquid savers and Risk-minimizers in the married, no-children stage of the life cycle significantly decreased between 1993 and 1996. The proportion of Diversifier households in the dependent children stage increased significantly. There were similar tendencies in the Risk-minimizing cluster. Other significant changes in the life cycle could not be found.

Educational levels remained fairly constant in the clusters, the reduction in the proportion of low educated households among the Diversifiers being the sole exception. The proportion of salaried employees increased significantly only among the Diversifiers, indicating that the change in behavior detected earlier also prompted significant changes in terms of occupational status variables due to the tax preferred status allotted the employer-sponsored saving forms.

Average net household income increased significantly among the Diversifiers, Liquid savers and Risk-minimizers, however, this is probably partly an effect of inflation, estimated at about 2-2.5 percent per year of the survey (Statistics Netherlands, 1995; 1996; 1997).

Changes in psychological descriptors were few and far between. Diversifiers and Liquid savers fluctuated significantly in the average weight they afforded the buffer saving goal. The Liquid savers also became significantly more interested in taking financial risks. Finally, the Non-savers came to perceive their investment competence much more positively.

Changes in Background Descriptors for Segments Based on Pure Panel Data

Identical analyses on the longitudinal data containing households that had participated in the panel for three or four years produced no large deviations from the cross-sectional results presented above. The year-to-year changes were, if anything, smaller using the constant-centroid produced solutions. This was most likely due to the fact that the households exhibited somewhat higher temporal segment stability in the pure panel data.

Stability of Predictive Multivariate Analysis

A multivariate discriminant analysis was made using a model based on the variables which had been found to differ significantly between segments in the univariate analyses (see Table 9 and Table 10). The predictive models entered were identical for each year.

In 1993, 36.7 percent of all valid cases (n = 363; Press's $Q = 90.3$, $p < 0.001$) were correctly classified using Mahalanobis distances, the *U*-method leave-one-out cross-validation and prior group sizes. According to the proportional chance criterion (C_{PRO}; Hair et al., 1995, p. 104), which is used for unequal groups, this was 12.2 percentage points higher than could have been expected by chance. For 1995 (n = 675; Press's $Q = 168.8$, $p < 0.001$) and 1996 (n = 401; Press's $Q = 101.8$, $p < 0.001$), 40.0 percent and 39.9 percent respectively of all cross-validated valid cases were correctly classified, corresponding to 12.9 and 15.2 percentage points higher than the pure chance models. When adjusting these figures upward by 25 percent as suggested by Hair et al. (1995), the classification accuracy was still some seven percentage points higher than chance.

The Potency Index (Hair et al., 1995, p. 108), calculated for the significant discriminant functions in each survey wave, showed that household net income and net wealth were consistently the most important overall predictors of group membership. Being a homeowner, as well as the household's attitudes toward financial risk taking and the importance of safe savings were also important overall predictors, although their importance varied somewhat between waves. However, the significant discriminant functions differed between years, as well as the number of significant functions. Hence, the differences in discriminant functions would contribute to different interpretations as to which variables were important to discriminate between which segments in different years.

Summary of H_4

There were significant and interesting differences between clusters on theoretically important variables in the cross-section. In the univariate analyses, many of these differences were also stable over time, underscoring their importance as potential behavioral predictors. Also in the multivariate analyses, ability variables were found to be consistently important, even though the discriminant functions were found to differ between years. There were, however, few differences that were of a great magnitude. Although there were changes in all types of variables also over time, these were not very common and again of a small magnitude. However, it is very likely that even statistically insignificant changes in cluster proportions and means could lead to different managerial implications if examined separately, i.e., not relative to results from earlier years. Other dangers would be if marketing research were not conducted regularly and if the real statistical significance and magnitude of the changes were not properly assessed.

These results serve to even more strongly reject H_{2b} in that they strengthen the validity of the clusters found. However, we can, at least to some extent, reject H_4 concerning the instability of segment descriptors.

Discussion

The paper addresses the issue of segment stability in the cross-section and over time (1993-1996). Seven hypotheses concerning segment stability were formulated and tested.

In terms of the matrix illustrating different modes of segment stability (Figure 1) the results in this paper indicate that we have a situation best described by the lower left-hand cell, since households did switch segments over time, increasingly so with the length of time-period studied, but segment typologies in terms of behaviors remained fairly stable. This was the case even if we held segment centroids constant and used the same households for clustering in two different time-periods. The segment switching does have some implications for potential targeting of and communication to the segments, although the magnitude of change in segment descriptors was shown not to be very large in this instance. The degree of switching varied from segment to segment, showing that it is important to be aware of which segments are more prone to switch than others, e.g., affected by benefits which can vary in their importance seasonally or because of variety seeking buying patterns. Switchers can also switch back to their original segments. All this underscores the importance of making repeated surveys of the market and of assessing the stability of market segments at least in terms of typologies and characteristics.

We could also see the benefits of dividing the market into more or less homogeneous segments, as we could more clearly see where in the market behavioral changes noticed already at the aggregate level emanated from. This makes it easier to track the reasons for such changes. Business and government institutions may benefit from knowing that they are best served by creating a strategy which attempts to change the behavior of a certain behavioral group rather than applying wasteful market-wide measures.

One of the hypotheses concerned the validity of the segments with regard to differences in background descriptors, and whether a predictive model based on these descriptors would have any validity. In univariate analyses, there were differences particularly in the ability to save that should create different portfolio behaviors, especially in terms of diversification and the content of risky saving forms (shares, etc.). The psychological variables were more successful in distinguishing between the segments such as the Security-focused and Risk-minimizers. Occupational status (salaried employee or not) showed significant changes in the clusters which also had the largest proportion of tax-preferred assets. The multivariate predictive model was moderately successful in distinguishing between the clusters. There were some differences in the importance of predictors and the number of significant discriminant functions over the different survey waves. However, the consistently most important predictors were net household income and net wealth.

Another interesting observation concerns the impact of market-external events, such as changes in tax legislation. These may serve to induce increased switching or create entirely new segments. In this case, we are referring to the change in holdings of employer-sponsored saving forms. This was an event that impacted significantly on the portfolio behaviors of all segments, but especially the Diversifiers, which shifted their mean portfolios to include significantly more employer-sponsored assets. This also triggered a significant amount of switching. An analogous development affecting benefit segmentation would be a new product feature, which could cause a segment of consumers to splinter off, i.e., those who weight that particular feature differently than other groups of consumers. In Ramaswamy's (1997) terms, this would be a case of market evolution. Wind (1995) also underscored the importance of exploring sub-segments in already accepted and utilized segments as these may hold the clue to future changes in market structure.

The analyses in this paper were performed on two different types of samples; one semi-cross-sectional (45 to 65 percent of the samples each year consisting of new households) and one consisting of pure panel data. The results showed that analyses on the samples with a large share of freshly sampled households (1) somewhat increased the propensity for households to switch segments and (2) somewhat increased the volatility of segment descriptors over time. This indicates that objects classified from pure panel data will exhibit more consistent behavior, less segment switching and less change in descriptive variables.

Concluding Remarks

It is clear that using the VSB panel data entails compromises with regard to measurement of important variables and effects of non-response. The VSB panel was not designed specifically with this type of marketing research in mind and a tailor-made survey may have served to produce more clear-cut results. In addition, the representativeness of the sample from the panel is questionable, and panel attrition as well significant amounts of non-response have served to make the results difficult to project onto the Dutch general population.

However, the rather unique character of the data with regard to financial and psychological data gathered simultaneously and from the same households during consecutive years was thought to make up for such drawbacks.

There are two broad avenues of research that may be explored further. One is the stability of cross-sectional segmentations, for which data should be easier to come by. The other is to concentrate on pure panel data and follow a sample over time, i.e., a form of life cycle or cohort study. This puts more demand on the resources allocated to the research, as well as a sustained research effort over time.

Further research should also attempt to use a wide variety of segmentation bases for different industries and products. As was pointed out in the literature review, attitudes can vary seemingly at random when measured at different points in time. What are the consequences of this for segmentation attempts using psychological variables? Similarly, as buying behaviors also can vary seemingly at random, what are the consequences in terms of cross-sectional segmentation attempts? How will these consequences vary with type of product and length of purchase cycle?

Finally, this problem should also be studied with the help of new data-gathering methods. The Dutch VSB panels use a computer-based survey from the respondents' home PCs, and this appears be a good vehicle for gathering detailed periodic self-reported data on consumption and savings in the household.

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Appendices

Appendix 1: Description of original variable set. Segmentation variables for the cluster analysis before aggregation to seven categories. Sources: VSB Variable Documentation (Camphuis & Ketelaars, 1995) which consists of the actual information shown to VSB-panel respondents, and te Spenke (1995).

Variables in VSB Database

Type of Asset	*Description*
1. Checking account	Checking accounts are private accounts with bank or giro to which, for example, salary or benefits-payments are transferred, and from which the individual can make payments.
2. Employer-sponsored savings plan	An employer-sponsored savings plan is an arrangement through which part of an individual's salary is withheld and saved in a special account. It could also consist of a stock option plan or arrangement of company profit sharing or any combination thereof up to a maximum of DFL 2,633 ($1,400) per year.
3. Giro bank savings account	With a giro bank savings account at the Dutch Postbank, money is transferred and withdrawn by giro bank transfer forms.
4. Deposit book account	Book for recording savings interests and transactions on this account.
5. Savings or deposit account	Savings accounts yield interest from the day of the first deposit. With deposit accounts, a sum of money is locked up for a set term with a fixed interest rate.
6. Savings certificates	Savings certificates are securities with a set date and a set sum of repayment. The interest is often not paid annually, but in one single payment included in the sum of repayment.
7. Single-premium annuity insurance policy	The SPA insurance policy is a life insurance policy taken out by paying a single premium. At the end of the term an individual may, for instance, buy, an annuity. The premium is deductible, while the payment (the annuity) is not.

Variables in VSB Database

Type of Asset	*Description*
8. Savings or endorsement insurance policy	This policy is a life insurance that pays out an agreed sum at the end of the term or at the time of death. The premiums are taxable, but not the repayment up to a certain limit and if the premiums are paid for at least 12 years.
9. Combined life insurance	This policy is a life insurance that pays out at the time of death or at a certain age.
10. Individual pension scheme	Pension scheme not partly paid for by employer.
11. Growth funds	Growth funds are investment funds, which do not pay out interest or dividends, but invest the returns in the fund itself. These types of funds have a greater variance in yield and are more long-term in character than most mutual funds.
12. Mutual funds or mutual funds accounts	Mutual funds invest money from individual savers in joint programs. It is thus possible to take advantages of the joint sum invested without running a large personal risk.
13. Bonds and/or mortgage bonds	Bonds are issued as part of a loan by the government or private companies, which yield a fixed rate of interest for a set period of time.
14. Shares	Owning shares is a way to directly participate in the capital of a company.

Appendix 2: Measurement summary for the psychological constructs.

	Construct/Dimension	Conceptual Definition/Approach	No of items	Cronbach's Alpha 1993/95/96
1	**Perceived importance of saving goals:** *Raw sum scores derived from 7-point Likert scales. "People have many different reasons for saving money for a short or for a long time. Please indicate your opinion about eachstatement mentioned below. Is it to you personally of much or of little importance?"*			
	(a) *Buffer savings (sum scale 3-21)* 1) To have some savings to cover unforeseen expenses as a consequence of illness or accidents 2) As a reserve to cover unforeseen expenses 3) To have enough money in my bank account to be sure I will be able to meet my financial liabilities	Higher score indicates greater importance of saving to cover unforeseen expenses or illness, or cover financial liabilities	3	0.74 (n = 826) 0.70 (n = 931) 0.69 (n = 756)
	(b) *Retirement security (sum scale 2-14)* 1) To supplement (in future possibly lower) general old-age pension 2) To supplement my retirement pension, and to have some extra money to spend when I'm retired	Higher score indicates greater importance of supplementing old-age pension	2	0.89 (n = 818) 0.90 (n = 904) 0.90 (n = 745)
	(c) *Long-term goal saving (sum scale 2-14)* 1) To buy a house in the future 2) To set up my own business	Higher score indicates greater importance of buying a house or setting up own business	2	0.69 (n = 808) 0.64 (n = 906) 0.67 (n = 737)
	(d) *Altruistic, for children's well-being (sum scale 2-14)* 1) To leave money to my children (or other relatives) 2) To give presents or other gifts to my (grand)children	Higher score indicates greater importance of leaving money or buying presents for children	2	0.67 (n = 799) 0.71 (n = 909) 0.65 (n = 734)
	(e) *Shorter-term goal saving for durable goods acquisition (1-7)* 1) To buy durable goods such as furniture, electric appliances, or bicycles in the future		1	–
	(f) *Capital income – saving for its own sake (1-7)* 1) To generate income from interests or dividends		1	–

	Construct/Dimension	Conceptual Definition/Approach	No of items	Cronbach's Alpha 1993/95/96
2	**Attitudes toward financial risk taking:** *"The following statements concern saving and risk. Please indicate for each statement to what extent you agree or disagree, on the basis of personal opinion or experience totally disagree or agree"*	*Raw sum scores derived from 7-point Likert scales*		
	1. **Uncertainty/risk reduction orientation** (sum scale 3-21) a) I think it is more important to have safe investments and guaranteed returns, than to take a risk to have a chance to get the highest possible returns. b) I would never consider investments in shares because I find this too risky c) I want to be certain that my investments are safe	Higher score indicates stronger preference for safe investments	3	0.61 (n = 613) 0.63 (n = 737) 0.66 (n = 589)
	2. **Consequence/yield orientation** (sum scale 3-21) a) If I think an investment will be profitable, I am prepared to borrow money to make this investment b) I get more and more convinced that I should take greater financial risks to improve my financial position c) I am prepared to take the risk to lose money, when there is also a chance to gain money	Higher score indicates stronger preference for aggressive/risky investment behavior	3	0.67 (n = 636) 0.68 (n = 741) 0.69 (n = 611)
3	**Perceived investment competence** Measured in 1995 and 1996	4-item ordinal scale indicating "Not at all competent" to "Very competent".	1	-
4	**Interest in investments** Measured in 1993 and 1996	7-point Likert scale. A higher score means greater expressed interest.	1	-
5	**Perceived control of investments and their yield**	7-point Likert scale indicating perceived control of investments and their yield ranging from "Very bad" to "Very good" control of finances.	1	-

*Appendix 3: Differences between survey waves and between the five clusters. Demographic characteristics. Figures in **bold** indicate variables where there were significant changes between the three years in an ANOVA F-test. * indicate variables which were used in the discriminant analysis.*

	Variable	Wave	Cluster 1 Diversifiers	Cluster 2 Liquid savers	Cluster 3 Security-focused	Cluster 4 Risk-minimizers	Cluster 5 Non-savers	Sig. $\chi2$, F
1	*Life cycle stage*							
		1993	15.1%	23.0%	12.3%	24.0%	40.5%	$\chi2 = 28.5; p < 0.001$
	(1) Single*	*1995*	15.5%	22.6%	15.1%	19.7%	35.1%	$\chi2 = 13.6; p < 0.01$
		1996	19.9%	21.1%	11.3%	19.1%	36.4%	$\chi2 = 13.6; p < 0.01$
		1993	**22.6%**	**11.7%**	13.2%	**16.7%**	9.5%	$\chi2 = 12.6; p < 0.05$
	(2) Married, no children*	*1995*	**11.1%**	**9.3%**	14.8%	**14.2%**	5.9%	$\chi2 = 6.4$; n.s.
		1996	**10.3%**	**4.3%**	12.1%	**6.7%**	2.3%	$\chi2 = 10.4; p < 0.05$
		1993	**23.7%**	34.8%	45.3%	23.6%	25.0%	$\chi2 = 23.8; p < 0.001$
	(3) Married or single with dependent children*	*1995*	**43.1%**	37.0%	46.7%	29.9%	33.3%	$\chi2 = 15.5; p < 0.01$
		1996	**32.4%**	44.9%	47.6%	32.4%	31.8%	$\chi2 = 13.4; p < 0.01$
		1993	9.1%	9.1%	17.0%	8.9%	7.1%	$\chi2 = 7.2$; n.s.
	(4) Married or single, empty nest	*1995*	7.8%	8.5%	13.3%	9.2%	2.0%	$\chi2 = 6.5$; n.s
		1996	14.7%	8.4%	14.5%	9.8%	4.5%	$\chi2 = 7.0$; n.s.
		1993	29.6%	21.3%	12.3%	26.8%	17.9%	$\chi2 = 15.0; p < 0.01$
	(5) Retired*	*1995*	21.6%	20.4%	8.9%	25.7%	19.6%	$\chi2 = 16.8; p < 0.01$
		1996	22.8%	22.1%	14.5%	32.0%	25.0%	$\chi2 = 14.5; p < 0.01$
2	*Education, head of household*	*1993*	**38.2%**	39.0%	33.3%	34.7%	49.1%	$\chi2 = 4.5$; n.s.
	(1) Primary schooling*	*1995*	**27.8%**	40.4%	33.1%	30.4%	58.8%	$\chi2 = 23.4; p < 0.001$
		1996	**24.7%**	35.1%	29.3%	31.0%	54.8%	$\chi2 = 15.2; p < 0.01$
		1993	27.1%	33.3%	27.5%	26.1%	28.1%	$\chi2 = 2.5$; n.s.
	(2) Vocational training	*1995*	32.1%	33.1%	33.1%	27.8%	31.4%	$\chi2 = 2.6$; n.s.
		1996	35.3%	32.7%	33.8%	24.2%	26.2%	$\chi2 = 7.6$; n.s.
		1993	24.3%	22.0%	27.5%	28.4%	14.0%	$\chi2 = 5.7$; n.s.
	(3) Vocational college*	*1995*	28.8%	21.1%	20.1%	30.7%	5.9%	$\chi2 = 21.2; p < 0.001$
		1996	27.3%	22.6%	25.6%	34.7%	16.7%	$\chi2 = 11.6; p < 0.05$
		1993	10.4%	5.7%	11.6%	10.8%	8.8%	$\chi2 = 3.6$; n.s.
	(4) University education or higher	*1995*	11.5%	5.5%	13.7%	11.1%	3.9%	$\chi2 = 11.6; p < 0.05$
		1996	12.7%	9.6%	11.3%	10.1%	2.4%	$\chi2 = 4.0$; n.s.

*Appendix 4: Socioeconomic characteristics. Figures in **bold** indicate variables where there were significant changes between the three years in an ANOVA F-test. * indicate variables which were used in the discriminant analysis.*

	Variable	Wave	Cluster 1 Diversifiers	Cluster 2 Liquid savers	Cluster 3 Security-focused	Cluster 4 Risk-minimizers	Cluster 5 Non-savers	Sig. $\chi2$, F
1	Yearly net household income (DFL)*	1993	**50,226**	**37,584**	54,167	**44,619**	28,519	$F = 14.9; p < 0.001$
			(47,355)	**(36,694)**	(52,176)	**(41,718)**	(24,615)	
		1995	**52,555**	**42,283**	59,676	**50,459**	25,914	$F = 15.5; p < 0.001$
			(50,803)	**(41,292)**	(54,421)	**(48,979)**	(24,521)	
		1996	**59,075**	**44,023**	53,497	**48,670**	24,950	$F = 15.0; p < 0.001$
			(49,000)	**(38,500)**	(49,000)	**(49,000)**	(22,375)	
2	Gross financial wealth (DFL)*	1993	56,867	12,930	100,123	37,326	0	$F = 31.8; p < 0.001$
			(19,640)	(4,540)	(50,138)	(16,384)	(0)	
		1995	75,813	18,266	91,034	45,145	0	$F = 18.0; p < 0.001$
			(15,139)	(5,225)	(40,446)	(20,298)	(0)	
		1996	73,512	16,234	88,937	48,693	0	$F = 16.0; p < 0.001$
			(16,850)	(6,867)	(48,615)	(23,791)	(0)	
3	Percentage of home-owners*	1993	61.9%	49.0%	68.5%	**51.9%**	28.4%	$\chi2 = 43.4; p < 0.001$
		1995	68.9%	49.8%	67.8%	**62.0%**	22.8%	$\chi2 = 53.2; p < 0.001$
		1996	72.1%	49.8%	73.0%	**58.5%**	28.0%	$\chi2 = 50.1; p < 0.001$
4	Percentage of salaried employees*	1993	**43.6%**	54.5%	58.4%	47.8%	33.3%	$\chi2 = 13.0; p < 0.05$
		1995	**67.1%**	53.7%	68.5%	55.4%	29.8%	$\chi2 = 33.4; p < 0.001$
		1996	**72.7%**	49.8%	70.9%	48.1%	22.0%	$\chi2 = 63.5; p < 0.001$

Appendix 5: Psychological characteristics. Figures in ***bold*** *indicate variables where there were significant changes between the three years in an ANOVA F-test. * indicate variables which were used in the discriminant analysis.*

Construct/Dimension	Wave	Cluster 1 Diversifiers	Cluster 2 Liquid savers	Cluster 3 Security-focused	Cluster 4 Risk-minimizers	Cluster 5 Non-savers	Sig. $\chi 2$, F
1 *Saving goals*	1993	**15.2 (16)**	**15.1 (16)**	15.1 (15)	15.2 (16)	13.2 (14)	$F = 3.9; p < 0.01$
(a) Buffer savings (sum scale 3-21)	1995	**14.1 (15)**	**14.5(15)**	14.2 (15)	14.8 (15)	13.7 (15)	$F = 1.5$; n.s.
	1996	**14.7 (15)**	**15.2 (16)**	15.2 (16)	15.2 (16)	13.9 (15)	$F = 1.4$; n.s.
	1993	8.2 (8)	**7.8 (8)**	9.0 (10)	8.0 (8)	7.6 (8)	$F = 1.9$; n.s.
(b) Retirement security (sum scale 2-14)*	1995	8.1 (8)	**8.1 (8)**	9.1 (10)	7.8 (8)	7.5 (8)	$F = 2.9; p < 0.05$
	1996	8.5 (8)	**8.7 (9)**	9.9 (10.5)	8.2 (8)	8.3 (9)	$F = 4.2; p < 0.01$
	1993	4.4 (2.5)	4.3 (3)	4.4 (3)	**4.5 (3)**	4.2 (2)	$F = 0.3$; n.s.
(c) Long-term goal saving (sum scale 2-14)	1995	4.5 (4)	4.3 (3)	3.9 (3)	**4.1 (2)**	3.8 (2)	$F = 1.0$; n.s
	1996	4.3 (3)	4.4 (3)	4.2 (3)	**3.8 (2)**	3.8 (2)	$F = 1.9$; n.s.
	1993	5.4 (5)	5.1 (4)	4.9 (4)	5.0 (4)	5.0 (4)	$F = 0.6$; n.s.
(d) Altruistic, for children's well-being (sum scale 2-14)	1995	5.3 (4)	5.4 (5)	5.1 (5)	5.1 (4)	4.8 (4)	$F = 0.6$; n.s.
	1996	5.0 (5)	5.3 (5)	5.4 (5)	5.0 (5)	5.5 (5.5)	$F = 0.6$; n.s.
	1993	3.8 (4)	3.8 (4)	3.9 (4)	3.9 (4)	3.8 (4)	$F = 0.2$; n.s.
(e) Shorter-term goal saving for durable goods acquisition (1-7)	1995	3.6 (4)	3.9 (4)	3.9 (4)	4.2 (4)	3.5 (4)	$F = 3.1; p < 0.01$
	1996	4.0 (4)	4.0 (4)	3.7 (4)	3.9 (4)	4.0 (4)	$F = 0.5$; n.s.
	1993	3.3 (3)	2.6 (2)	2.8 (3)	3.2 (3)	2.4 (2)	$F = 6.8; p < 0.001$
(f) Capital income – saving for its own sake to generate income from dividends and interest (1-7)*	1995	3.3 (3)	2.7 (2)	2.9 (3)	3.1 (3)	2.4 (2)	$F = 4.9; p < 0.01$
	1996	**3.3 (3)**	2.9 (2)	3.2 (3)	3.0 (2)	2.6 (2)	$F = 1.9$; n.s.

Construct/Dimension	Wave	Cluster 1 Diversifiers	Cluster 2 Liquid savers	Cluster 3 Security-focused	Cluster 4 Risk-minimizers	Cluster 5 Non-savers	Sig. $\chi2$, F
2 *Attitudes toward financial risk taking*	1993	14.3 (15)	**13.4 (14)**	14.4 (15)	14.6 (15)	12.2 (13)	$F = 4.7; p < 0.05$
– Uncertainty, risk reduction orientation	1995	13.6 (13)	**14.1 (15)**	14.3 (14)	15.0 (15)	13.1 (13.5)	$F = 3.4; p < 0.05$
(sum scale 3-21)*	1996	13.3 (13)	**14.3 (15)**	13.6 (14)	15.2 (15)	13.0 (13)	$F = 5.4; p < 0.001$
– Consequence, yield orientation	1993	8.9 (9)	**7.8 (8)**	9.1 (9)	8.0 (8)	7.5 (7)	$F = 5.1; p < 0.01$
(sum scale 3-21)*	1995	8.9 (9)	**7.8 (8)**	9.3 (9)	8.0 (8)	6.3 (6)	$F = 8.6; p < 0.001$
	1996	9.6 (10)	**8.8 (8)**	9.4 (9)	7.3 (7)	8.0 (7.5)	$F = 9.1; p < 0.001$
	1993	3.6 (3)	2.6 (2)	3.3 (3)	3.1 (3)	2.7 (2)	$F = 9.1; p < 0.001$
3 Interest in investments	1995	-	-	-	-	-	-
	1996	3.8 (4)	2.9 (2)	3.5 (3)	3.0 (3)	2.3 (2)	$F = 8.6; p < 0.001$
4 Perceived investment competence	1993	-	-	-	-	-	-
	1995	2.2 (2)	**2.0 (2)**	2.1 (2)	2.0 (2)	**1.6 (1)**	$F = 6.3; p < 0.001$
	1996	2.2 (2)	**1.9 (2)**	2.0 (2)	1.9 (2)	**2.0 (2)**	$F = 3.5; p < 0.01$
5 Perceived control of investments and their yield	1993	-	-	-	-	-	-
	1995	5.1 (5)	**5.0 (5)**	5.0 (5)	5.5 (6)	**4.1 (4)**	$F = 9.3; p < 0.001$
	1996	5.2 (6)	**4.9 (5)**	5.0 (5)	5.3 (6)	**4.5 (4)**	$F = 3.2; p < 0.05$

Chapter 4:

Cherchez la Femme? Differential Validity in Models of Risky Household Financial Behavior

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Cherchez la Femme? Differential Validity in Models of Risky Household Financial Behavior

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Abstract:

The purpose of this paper is to investigate whether the choice of household informant for psychological variables included in models of risky household financial behavior matters to the empirical researcher. Five research hypotheses are posited in relation to this purpose, which concentrate on evaluating results from different correlation and regression analyses based on behavior measured at the household level, but with psychological data drawn from either the family financial officer (FFO) or the spouse in family households (N = 807). A sample of one-person households from the same database was used as control group (N = 211).

It could not be shown directly that the amount of explained variance differed significantly between multiple regression analyses, in which the psychological data were drawn from different informants. However, other tests and analyses strongly indicate that including FFO data increased the validity of the model, while the inclusion of spouse data gave a marginally positive, albeit statistically significant, effect. The interpretation of the model also differs when different informants' data are used. One-person household data used to estimate an identical model seemed to produce a better fit than family household data. Finally, measures of "couple" variables showed stronger agreement between spouses than "individual" variables. Zero-order correlations between psychological variables and measures of risky financial behavior differed significantly between spouses in a few cases.

The implication is that in this behavioral domain, psychological data must be collected from the family financial officer, while the spouse can be excluded without any severe consequences. This will also reduce the need to eliminate households from the analysis because of partial non-response.

Introduction

Among the key problems that confront the researcher in household surveys are (a) sampling error, (b) data quality (non-sampling error), and (c) the marginal cost of reaching both spouses in a marital dyad. A fourth and practical problem is how to use data that have actually been collected from both spouses in the most efficient way, e.g., when there is substantial non-response. This paper attempts to provide an answer to the question of whether data from only one spouse can adequately represent the principal agents of household financial decision-making behavior, thus limiting the cost as well as the potential for sampling and non-sampling errors.

It is usually thought that approaching both spouses in the family requires additional expenditure of time and money (Safilios-Rothschild, 1969), and increases the risk of non-response or incomplete responses. However, many studies have come to the conclusion that survey research data collected from one spouse only – effectively a household "proxy" – may be insufficient if the objective is to obtain an accurate picture of the determinants of household behavior (Douglas & Wind, 1978; Plank, Greene, & Greene, 1994; Safilios-Rothschild, 1969).

Early studies of household decision making and buying behavior were made in the belief that gender and dominance in family decision-making with regard to different product or service categories had a one-to-one relationship (Qualls, 1987). Later studies in household decision-making point to substantial heterogeneity in decision-making strategies (Douglas & Wind, 1978). In some areas, spouse task specialization (*dominance*) is indeed quite common, in other areas *jointness* is very frequent, while infrequently the spouses decide *separately*, e.g., with respect to their savings. Such heterogeneity makes it difficult to predict which strategy will prevail in the individual household and to make generalizations concerning the best data collection and analysis strategy, i.e., whether to collect and/or analyze data from a household proxy or from both spouses, although attempts to do so have been made (e.g., Rosen & Granbois, 1983).

Savings and asset management decisions lend themselves particularly well to illustrating the heterogeneity of decision strategies and the difficulties of collecting and analyzing data about household behavior and its determinants. Decisions about financial matters: money management, amount and frequency of saving behavior, and asset management, have a substantial impact on household wealth and consumption power in the long term. According to economic theory, savings and asset management will determine consumption opportunities during taxing life cycle stages such as nest building and child rearing, as well as during retirement (Gaspinski, 1993). Douglas & Wind (1978), Hopper (1995), McConocha, Tully, & Walther (1993), and Robertson (1991) found that there were differences in degree of spousal influence between various financial decisions and tasks in the household. Jointness was most common for asset management, but with husband dominance as a strong secondary style.

In this study, household financial decisions are viewed as a function of not only the household's socioeconomic and demographic characteristics, but also of the spouses' individual characteristics, goals, attitudes, etc., as well as the inter-spouse decision-making process. This, together with the studies quoted earlier, would indicate that collecting data from both spouses is the optimal strategy for the consumer researcher studying household behavior. However, as noted above, the choice of informant/s also depends on which area of household decision making is under scrutiny as well as how difficult, expensive and time consuming it would be to obtain data of good quality from both spouses.

The concept of a household proxy, the family financial officer (FFO), was introduced in a seminal article by Ferber & Lee (1974). The FFO concept recognizes who is responsible for payment of bills and keeps track of expenditures and the use of the remaining money. The definition is quite broad (Rosen & Granbois, 1983) and not quite cognizant of the important area of asset and investment decisions. Nevertheless, in many surveys of household financial behavior the FFO concept is used to pinpoint the respondent who is to act as household proxy in the survey (Lindqvist, 1981, 1983; Nyhus, 1996). In this case, the FFO will furnish information on household behavior as well as give answers to attitudinal questions, which will represent all household members' attitudes and opinions. It is assumed that the FFO makes most of the financial decisions in the family, and therefore polling other family members is not necessary (Krampf, Burns, & Rayman, 1993).

In this study, we wish to examine the impact of drawing psychological data from different informants in the household by focusing on the specific area of risky financial behavior, e.g., investments in stocks, options, and mutual funds, an area crucial to long-term household wealth (Pålsson, 1996). Such investments are by their very nature viewed as rather risky and as requiring certain knowledge and skills to be successfully managed. The risk aspect should lead to a higher level of joint spousal involvement, whereas the skills aspect should lead to task specialization and dominance, the ultimate strategy being indeterminate. Since there are several decision strategies, it is usually not possible to foresee the outcome in any one household and thus to collect and/or analyze data accordingly. Although many previous studies have used correlations to study family decision-making patterns, they have failed to show how the findings affect explanatory models of household behavior. Although zero-order correlations may indicate that including the spouse's data will be fruitful, it is uncertain whether, in practice, such data will contribute any unique information.

A large new database, describing Dutch households' financial behavior will be utilized. It offers socioeconomic and demographic as well as psychological data collected from both spouses at the same point in time. This makes it possible to compare the results of analyses made using information either from the FFO's only, the other spouse only, or both spouses jointly, while keeping household level variables constant. To this end a simple model explaining risky financial behavior has been developed. A number of hypotheses concerning correlation with and explained variance of household risky financial behavior have been posited and tested.

The results have implications for research methodology in the household financial behavior area and for the design and targeting of information as well as for the general theory concerning family financial decision-making.[1]

Theoretical Framework

Household Decision-Making

Decision-making in the family and the household – usually equivalent to the husband-wife dyad – has been the subject of a fair amount of research in the consumer behavior and marketing fields since the 1940's. Davis (1976), Kirchler (1988), Qualls (1987) and, most recently, Lackman & Lanasa (1993) have published useful reviews of this research. Many studies have attempted to determine the pattern of decision-making, i.e., how influential the two spouses are at different stages of the decision process. In doing so, they also attempt to measure the level of joint decision-making in different product and service categories (Davis, 1970; Davis & Rigaux, 1974; Granbois & Summers, 1975; Krampf et al., 1993; McConocha et al., 1993; Plank et al., 1994; Shuptrine & Samuelson, 1976; Summers, 1975). A second area concerns the factors which determine which member of the family will make the decision (Qualls, 1987).

[1] The terms 'family' and 'household' will be used interchangeably in this article, while the differences between the terms as detailed in Kirchler (1988) are acknowledged.

Examples of variables used in the second type of studies are the socioeconomic characteristics of the household and spousal characteristics such as education and occupational status (Booth & Welch, 1974; Ferber, 1974; Robertson, 1991; Rosen & Granbois, 1983).

Results of household decision-making studies often indicate how the marketing of different products and services can be tailored to accommodate the decision-making patterns within the households. It has been established that in many cases one spouse is dominant in a certain area of decision-making, that some decisions are made separately, and that some decisions are made more or less jointly. As in any study of organizational buying, however, several different phases of decision-making can also be discerned in the family. Those most frequently mentioned are the problem recognition, information search, and final decision phases (e.g., Davis & Rigaux, 1974). To these phases can be added a fourth, the implementation phase. Within a single object of decision, therefore, the spouses can play different roles. One spouse, for example, can totally dominate the information search phase, which effectively allows him or her to create a consideration set for the final decision phase.

Davis (1976), Kirchler (1988), and Qualls (1987) mention three general reasons why there may be variation in which family member decides and performs tasks. These are *society's norms and sex role expectations, the household's sex role orientation (e.g., "traditional" vs. "modern"), comparative resources* (the potential to exert influence, e.g., education, experiences, financial resources) and *relative investment* (the motivation to exert influence can depend on the economic or other investment in the product or service in question). Societal sex role expectations and the spouses' sex role orientation are given attention in a number of studies (see Qualls, 1987, for an overview). The reason for this is that "...sex role preferences are conceptualized as the underlying force driving decision behavior within the household" (Qualls, 1987, p. 266). Qualls also proposes that spousal preference conflict can be resolved in two ways: by bargaining or by concession. Bargaining means that after discussion the spouses reach a compromise, which satisfies both parties' preferences, whereas in concession, the conflict is resolved unilaterally, i.e., one spouse concedes the decision to the partner.

Although not expressly explored in this study, it is worthwhile noting that, e.g., sex role expectations may cause the results of this study to differ markedly from results obtained from data collected outside the Netherlands. Similarly, comparative financial resources and educational level as well as the proportion of household assets held by the two spouses will naturally influence their involvement and influence in household investment activities.

Financial Management Decision Styles

According to the life cycle hypothesis (LCH), the most common tool in economics for studying consumption and saving behavior, the household responds to external shocks during the life cycle, such as the birth of children, retirement, etc., by drawing on liquid reserves (dissaving) or credit (negative saving). The household will thus strive to smooth its consumption trajectory over the course of the life cycle by creating and managing a financial portfolio which will adapt to changing circumstances and objectives (Kamakura, Ramaswami, & Srivastava, 1991). Hence, saving decisions are of extraordinary importance to the household. However, financial decisions are not only constrained to asset management but also encompass a wide range of day-to-day activities such as household budgeting and payments of bills.

If we look upon the household as a buying center, it might be tempting to say that task specialization is the most rational way for the household to manage its financial activities. Findings in studies of household financial decision-making also make it clear that specialization does occur, but that it is not nearly as prevalent as one would expect from theory. In fact, most households seem to make joint decisions about the household economy using some sort of bargaining strategy.

In a study by McConocha et al. (1993) it was found that household decision styles regarding financial matters varied by task. Although jointness was the overall dominant style, strong secondary styles existed. The wife dominated in areas such as managing checking accounts (42 percent of surveyed households, N = 164), bank cards (36 percent), and store cards (37 percent). The husband dominated in developing investments (in 35 percent of households) and arranging mortgages (45 percent). Separate decisions were very unusual, never exceeding ten percent of the surveyed households.

Hopper (1995) found much the same in a larger study of nine different financial decisions, encompassing a convenience sample of 446 U.S. households. For example, 58 percent of the households reported that the husband was dominant in choosing the type of investments. Douglas & Wind (1978), Gunnarsson & Wahlund (1997), and Robertson (1991) also found joint decision making in a large portion of households, but with a high frequency of husband dominance. Wife dominance was unusual in these studies.

Plank et al. (1994) approached the problem from a slightly different angle by comparing the similarity of the two spouses' perceptions and attitudes with regard to different components of a retail bank's offers. Not surprisingly, the spouses differed markedly in the weights they afforded different benefits.

Treatment of Spousal Disagreement in Survey Data Analysis and Differential Validity

In household surveys, financial services constitute a particularly difficult problem as data on household saving behavior are usually collected and analyzed at the household level, despite the fact that the assets or debts may belong to different household members. All assets do not necessarily have to be a part of the overall household financial strategy, and therefore the "household portfolio" may be a somewhat artificial construction.

Sometimes the FFO is asked for information about the entire household's assets and debts. Surveys of financial behavior are normally prone to contain non-sampling errors (Ferber, 1966; Hess & Vonk, 1988; Mandell & Lundsten, 1978), and there is the risk of serious misreporting concerning the other spouse's behavior. Behavioral data may be collected from both partners, but information concerning joint assets from the FFO, as is the case in the Dutch VSB Bank-CentER for Economic Research longitudinal study of household saving behavior (Nyhus, 1996). Regardless of how behavioral data are collected, the question remains of how to record the family's psychological profile (the "psychographics"). Do we need to study the psychographics of both spouses?

Neal & Groat (1976) propose dividing the variables that are measured in household surveys into two types, "couple" and "individual." Examples of the former are product usage and ownership, i.e., behavior, while examples of the latter are preferences. Krampf et al. (1993) cite a few studies which put the existence of "couple" and "individual" variables into doubt. However, studies of financial behavior by Webley (1994), Nyhus, Kvitastein, & Grønhaug (1995) and Gunnarsson (1996) indicate that measures of overall household economic well-being and household income, i.e., "couple" variables, show much stronger correlation between spouses than "individual" variables such as importance of saving goals and risk attitudes. Nuckols & Mayer (1970) also found that spouses tended to agree on "factual" questions concerning financial behavior, but had more individual "opinions" about, e.g., financial services.

Krampf et al. (1993) note that although it is generally recognized that spousal discrepancies in answers to survey questions present serious validity problems, there has been no unified approach to resolving the matter. Some researchers recommend using averages of the spouses' answers (Bagozzi & van Loo, 1978) while other authors advocate incorporating them as separate constructs (Neal & Groat, 1976; Thomson & Williams, 1982).

Nyhus et al. (1995) experimented with varying the weight afforded the head of household's data in a regression model containing both spouses' data. The higher the weight afforded the head of household, the larger the amount of explained variance of the dependent variable, household liquid savings. Nyhus et al. (1995) argue in favor of assigning individual weights to each marital dyad. However, it is not clear how this should be accomplished in practice.

Thomson & Williams (1982) studied the measurement properties and variable structure of spouses' reports of family life. The authors argue that both "couple" and "individual" variables are ridden with measurement error. Such errors can be caused by different ways of interpreting questions, and can lead the researcher to a wrong interpretation of the results. Using structural equations analysis the authors attempted to compare measurement errors in spousal reports of expected fertility, finding that:

1. The spouses appeared to be equally reliable reporters of the measured individual attitudes. This means that even though there was measurement error, estimates of the effect that the spouses' respective attitudes have on family behavior would not be biased in either spouse's direction.
2. The best model specification was a "couple" model specifying the wife's attitudes as distinct from the husband's attitudes.

Hence, unless there are strong theoretical reasons to suspect that measures used in household surveys are liable to have significantly different amounts of error variance depending on which spouse is approached, the researcher need not be wary of using regression analysis, for example, to estimate spousal decision influence. Although a number of studies indicate that both spouses' data should be included as separate constructs in such models, it is also evident that decision strategies are difficult to generalize even within an individual household. The weight of each spouse's influence will depend on which specific decision area is being studied. Thus, the results of the present study cannot easily be generalized to include other decision areas.

A Model of Risky Financial Behavior

The area investigated in this study is risky financial behavior. According to Levy & Sarnat (1993, p. 216), in financial economics the term risk can be used interchangeably with uncertainty, "to describe an investment whose profit is not known in advance with absolute certainty but for which an array of alternative outcomes and their probabilities are known." In theory then, the consumer can estimate the probability distribution of outcomes. In practice, individuals have feelings of what may be called uncertainty or discomfort (risk) when making investment decisions, and react by striving to lower the amount of perceived risk connected to each decision.

The investor often utilizes external information resources and expertise in the form of bank staff, family, friends, and media in order to minimize the perceived risk (Mitchell & McGoldrick, 1996). One way to lessen risk and make information search more efficient is to allocate different roles to different household members.

Dowling & Staelin (1994) and Mitchell & McGoldrick (1996) divide risk perception into two components, namely the *degree of uncertainty* and the *extent of consequences* of a decision. Mitchell & McGoldrick (1996) assert that risk-reduction strategies usually aim at reducing the uncertainty connected to a decision, although they can also be used to reduce the risks connected to the outcome. Hence individuals in a household may perceive risk differently, and, more importantly, place different weights on the two components that make up perceived risk, i.e., outcome uncertainty and consequences.

Dependent Variables: Definitions of Risk Taking Behavior

Research on portfolio behavior in economics has generally focused on behavior – the outcome of household decisions and non-decisions – and the utility of a portfolio as evaluated for example by normative models such as the Capital Asset Pricing Model (CAPM). Empirical studies have shown that few households hold portfolios that are efficient from a normative point of view (e.g., Bertaut & Haliassos, 1992; Pålsson, 1988) and most possess only a few different types of financial assets (Stanley, Ford, & Richards, 1985). At most, households' financial portfolios contain only a small share of risky assets (e.g., Börsch-Supan, 1993; Guiso et al., 1994; Gunnarsson & Wahlund, 1997; Hochgürtel, 1997).

The dependent variables used in the study were three different behavioral variables measuring the risk of the household's portfolio.

The first dependent variable measured the *number of different types of "risky" assets*, eight in all. These were (a) growth funds, investment funds which reinvest returns in the fund itself instead of paying out interest or dividends and which result in a tax-free rise of shares; (b) mutual funds or mutual fund accounts, (c) bonds or mortgage bonds, (d) shares, and, (e-h), four different types of options: bought put-options, written put-options, bought call-options, and written call-options. None of these assets were held by 62.7 percent of the sampled households, while 20.7 percent held one type of asset. Only 0.9 percent held more than five different types of assets.

Guiso, Jappelli, & Terlizzese (1994), who used a similar definition of risky assets, suggested that long-term government bonds could carry some (small) amount of risk since there was the possibility that the government would default on them. King & Leape (1987) identify bonds as one of the "information-intensive" financial assets – together with corporate equity, money market funds and instruments, and single-premium annuities – where knowledge supposedly is acquired over the life cycle. To many households bonds may be seen as a liquidity risk, i.e., as a risk in real terms regarding the yield as well as an "information risk" – or knowledge risk. These factors increase the household's uncertainty about the outcome of the investment.

The second dependent variable measured the *share of the risky asset components in the total value of the financial portfolio* (value of risky assets/value of total financial portfolio). This figure excluded options, which had a very large amount of missing values for the amounts invested. The mean share for the sampled households (N = 807) was 10.2 percent (median 0, standard deviation 0.22).

The third dependent variable was discrete, measuring *possession of any of the eight "risky" asset components*.

Independent variables

The model used in this study contains three general independent variable groups: socioeconomic, demographic, and psychological variables.

In most empirical studies of portfolio behavior, the larger the *financial resources*, the more diversified and larger the share of risky assets in the portfolio. However, Pålsson (1996) found that relative risk aversion among Swedish households increased with *age* and had no significant correlation with household income or wealth. Gunnarsson & Wahlund (1997) also reported a positive relationship between risk attitudes and age. Another important factor is *knowledge* about information intensive assets such as different of kinds of equity, and the relationship between education level and usage of such assets. For example, Kamakura et al. (1991) found a positive correlation between *education* and a measure of financial maturity, i.e., a portfolio with more complex assets. Further, according to Mitchell & McGoldrick (1996) and Brucks (1991), the extent of prior information and perceived domain knowledge impacts on the level of perceived risk and on information search behavior.

Saving motives were found by Wahlund (1991) to discriminate between different groups of households that held different portfolios. A group of households called the "wealth managers" had much larger investments in shares and bonds than any other group, while 90 percent of these households held some kind of assets besides saving accounts. The "wealth managers" were significantly more motivated to save in order to receive interest and dividends than all other groups of households. Kamakura et al. (1991) also found that saving motives impacted on portfolio behavior and that the importance of different motives varied over the life cycle.

Descriptions of all the independent variables and their measurement can be found in Appendix I.

The research model

The overall model is shown in Figure 1. Note that this is a simple model including only *some* of the possible explanatory factors of household portfolio behavior. It also refrains from modeling some of the other relationships, such as the feedback between behavior and psychological make-up.

Two factors, uncertainty reduction and consequence or outcome orientation, measure attitude towards financial risk taking. However, there are three more variables that indirectly measure attitudes toward risk taking in investments. These are: whether the respondent tries to "pick saving plans that yield high profits," whether "being careful with money is an important character trait," and whether the saving goal "to generate income from interests or dividends" is important. The variable "I am very interested in financial matters (insurance, investments, etc.)" is used to measure the level of interest and involvement in household savings and investments. Education level is hypothesized to affect knowledge and search behavior, as is an advanced stage in the life cycle, as measured by age. Net household income and gross household financial wealth represent the socioeconomic variables.

To reiterate, the model assumes that psychological variables have an impact on portfolio behavior over and beyond the by economists traditionally studied socioeconomic and demographic variables. Hence, the types of behavior of, e.g., households with high incomes and large gross financial wealth will be mediated by their attitudes toward financial risk taking and other psychological variables that have been included in the model.

It should again be emphasized, however, that the primary purpose of this study was *not* to provide an exhaustive examination of risky financial behavior *per se*. Rather, it was to use a simple but well-founded model to test what differences there were in the strength of correlations between the dependent and independent variables, and the amount of explained variance in regression analyses.

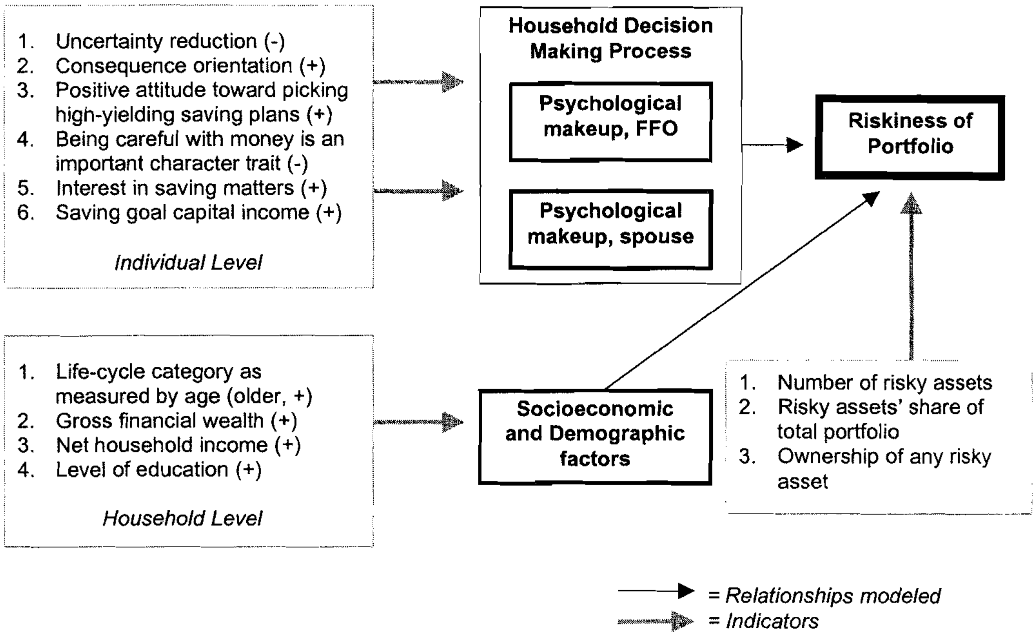

Figure 1: The research model. The hypothesized influence of each variable on the level of risk in the household's portfolio is shown in parenthesis.

Hypotheses

H_1. Measures of *couple* variables, e.g., household financial situation and income, will show stronger agreement between spouses than measures of *individual* variables, e.g., psychographics such as risk attitudes and expectations of changes in the price of assets (Gunnarsson, 1996; Neal & Groat 1976, Webley, 1994).

H_2. Zero-order correlations between psychological variables and measures of risky financial behavior will differ significantly for data drawn from the different spouses.

H_3. Data on psychological variables from the family financial officer only – together with general socioeconomic and demographic variables – will explain

more of the variance in risky household portfolio behavior than such data culled from the other spouse only.

H_4. Inclusion of data on psychological variables from both spouses will significantly increase the explanatory power of the model.

H_5. Estimating the model on one-person households will yield a better fit than estimating it on family data. There are two reasons for this: (a) including a psychological variable twice in the model will compound measurement error (Thomson & Williams, 1982); (b) individual data will not accurately reflect the bargaining between the spouses which precedes behavior. This should lead to more unexplained variance.

Methodology

The Data

In this paper, use is made of data being collected under the VSB-CentER savings project, currently underway in the Netherlands. These data are commonly referred to as the VSB-panel. The survey has so far been conducted over a five-year period (1993-1997) on two different panels: one consisting of a representative sample of Dutch households (the representative sample, 2,000 households) and one consisting of a sample of wealthy households (the high income sample, 1,000 households). The survey is carried out by of computerized interviewing, via a modem connecting the households to a central computer at the company responsible for the fieldwork. The questionnaire is split up into five smaller sections to avoid extensive computer sessions for the respondents.

The data used in this study are drawn from the first wave in 1993 and can be considered of good quality, having been thoroughly cleaned over a period of several years. This applies also to those parts of the assets and wealth, income, and economic-psychological databases that are used here. Both the FFO (own and common assets) and the spouse (own assets only) have supplied data on financial assets. Cases of double reporting have been removed and missing data imputed as far as possible. Household income data and psychological data have also been supplied by each spouse. For more details about sampling and other aspects of the VSB-panel data, see Camphuis and Ketelaars (1995), Ketelaars (1996), and Nyhus (1996).

The Sample

Since the objective was to compare data collected from the FFO and the spouse/partner in family households, data from both spouses were copied onto the FFO's case in a datafile in SPSS for Windows, excluding all other family members, e.g., children. The decision rule to include a household was whether or not both spouses had provided complete answers for all psychological variables included in the research model. This file (N = 807 households) formed the basis for all analyses.

Of the 807 FFO's, 729 (90.3 percent) were male and 78 (9.7 percent) were female. 42.5 percent (343 households) of the sampled households came from the representative panel, while the high income panel was over-represented with 57.5 percent (464 households). 659 marital dyads from both panels provided complete answers for all variables in the research model, and are hence included in the regression analyses. In the single variable analyses, however, the number of households may vary and reach 807.

211 one-person households interviewed in 1993 with complete psychological data were saved in a separate datafile. Of these, 72 (34.1 percent) were female, 139 (65.9 percent) were male, and 184 (87.2 percent) belonged to the high income panel, while 27 (12.8 percent) belonged to the representative panel. A to-

tal of 1,018 of the 2,790 sampled households in the 1993 wave of the VSB-CentER survey were hence used in the analyses.

Main Analysis Techniques

The main analysis techniques used to test Hypotheses H_1, H_2, and H_3 were correlation analysis, multiple linear regression analysis, and logistic regression analysis.

H_3, H_4, and H_5 were tested using multiple linear regression analysis and logistic regression analysis (for the discrete dependent variable possession/non-possession). All multiple linear regression analyses were performed using hierarchical regression in order to estimate the change in R^2 for different subsets of variables (socioeconomic, demographic, and psychological). All variables in the subsets were entered simultaneously. However, it was not possible to stringently test H_3 to H_5 (although we tried to work our way around this restriction), which really hinges on measuring the significance of the differences in the explained variance of different multiple linear regressions using data from different informants. This is an important reason to use several measures of "risky household financial behavior" to avoid spurious differences and gain some confirmation of the patterns which are found within the behavioral domain.

For H_2, Fisher's *z'* transformation allows testing for the significance of the difference of correlation coefficients obtained from different samples (Cohen & Cohen, 1975, p. 51). The variables correlated with the psychological variables are number of risky assets and share of risky assets in the financial portfolio, i.e., identical to those employed in the regression models.

H_4 could be tested more stringently using an *F*-test of the significance of the difference between an unconstrained model (FFO combined with spouse data) and a constrained model (FFO or spouse data only) (Gujarati, 1988, pp. 230-233). The null hypothesis here is that the constrained model in fact does not improve significantly when the other spouse's data are added. H_3 and H_5 are also tested by using Fisher's z' transformation and differences between the multiple *Rs* (see Howell, 1992, p. 496). The modified $\widetilde{R}^2$ (Amemiya, 1985, p. 51) imposes a more severe penalty on adding more regressors in order to inflate R^2 than the adjusted $\overline{R}^2$ (Theil, 1961, p. 213), i.e., when forfeiting degrees of freedom. It is therefore also used in the test of H_4.

The discrete dependent variable was tested using logistic regression analyses. In this case there were no tests for the significance of the difference in, e.g., classification rates. Hence the logistic regressions should be viewed as confirmation of the patterns discovered and tested in the linear regression models.

Results

Hypothesis 1

H_1 posited that measures of couple variables would show stronger agreement between spouses than measures of individual variables. Table 1 shows the results of correlation analyses of three "couple" variables and seven "individual" variables.

FFO and spouse perceptions of the state of household financial resources seem to be very similar, as indicated by the correlation coefficients and paired-spouses *t*-tests of mean differences in scores. Estimates of the level of household income show a strong correlation, and although the mean difference between spouses answers as measured in Dutch Guilders is significant, the absolute difference is not large and may be due to how this item was measured (by taking the mid-point of a fairly wide income-bracket). These results support the first part of H_1.

When it comes to individual expectations, perceptions, preferences, and attitudes, the second part of the first hypothesis is partly supported. Expectations of how the value of selected investments will change over the next five-year period show medium-sized correlations between the spouses. The mean difference between the spouses' scores is also significant, although if we scrutinize the absolute differences, they are in general not very large. The other variables also show medium-sized correlations. We can see that some of the other differences between the spouses' scores also are significant, such as the weight afforded safe investments. However, again, the absolute differences are not very large.

The relatively modest correlations between the individual variables would hence indicate that multicollinearity is not a major concern if we choose to include data from both spouses in a multiple regression analysis. Also, the apparently small absolute differences in mean scores would suggest that substituting one spouse's scores for the other usually will be unproblematic. This conclusion will, however, be qualified later.

Variable	Correlation between spouses' scores	Paired-spouses *t*-test
Couple Variables:		
Estimate of total net HH income over the past 12 months	0.88*** (N = 807)	$t = 2.58$**
Estimate of household financial resources	0.81*** (N = 807)	$t = 0.30$ n.s.
Individual Variables:		
Uncertainty reduction orientation	0.30*** (N = 807)	$t = 2.64$***
Outcome orientation	0.35*** (N = 807)	$t = 0.30$ n.s.
Importance of high yield	0.40*** (N = 807)	$t = 1.64$ n.s.
Interested in financial matters	0.39*** (N = 807)	$t = 10.79$***
Importance of prudence with money	0.40*** (N = 807)	$t = 1.11$ n.s.
Saving goal capital income	0.48*** (N = 807)	$t = 0.45$ n.s.
Fall or increase in share value over a five-year period	0.37*** (N = 522)	$t = 2.24$*
Fall or increase in investment fund value over a five-year period	0.32*** (N = 532)	$t = 2.18$*
Fall or increase in savings or deposit account value over a five-year period	0.33*** (N = 676)	$t = 0.02$ n.s.

*Table 1: Pearson product moment correlations and differences between spouses' mean scores on selected items. ***: significant at $p < 0.001$. **: significant at $p < 0.01$. * = significant at $p < 0.05$. N.S.: not significant at any of the indicated significance levels.*

Hypothesis 2

H_2 posited that zero-order correlations between psychological variables and measures of risky household financial behavior would differ significantly between the FFO and the spouse. Table 2 and Table 3 provide partial support for this hypothesis.

Fisher's z' transformation indicates that three out of six correlations are significantly different when correlated with the number of different types of risky assets held. For the share of risky assets, outcome orientation and interest in financial matters are significant. It is also interesting to see that the FFO's correlations are stronger than the spouse's, which are fairly weak. Hence, the differences are not between two strong correlations, but between weak and medium-sized correlations. These results would seem to indicate that the FFO's data should be the only ones having any appreciable effect on the variance in the dependent variable. Whether this is true or not after partialling out the spouse's correlations remains to be seen.

Variable	***r*, spouse**	***r*, FFO**	z	***r* difference, *p* two-tail**
Uncertainty reduction orientation	-0.09	-0.15	1.28	n.s.
Outcome orientation	-0.00	0.17	3.44	< 0.001
Saving goal capital income	0.15	0.27	2.55	< 0.01
Very interested in financial matters	0.11	0.33	4.68	< 0.001
Always trying to pick saving plans that yield high profits	0.12	0.13	0.08	n.s.
Being careful with money is an important character trait	0.07	0.12	1.07	n.s.

Table 2: Zero-order correlations (Pearson) with the number of different types of risky assets in the financial portfolio. N = 807.

Variable	r, spouse	r, FFO	z	r difference, p two-tail
Uncertainty reduction orientation	-0.06	-0.15	1.82	n.s.
Outcome orientation	-0.03	0.13	2.02	< 0.05
Saving goal capital income	0.17	0.24	1.55	n.s.
Very interested in financial matters	0.05	0.32	5.54	< 0.001
Always trying to pick saving plans that yield high profits	0.12	0.14	0.47	n.s.
Being careful with money is an important character trait	0.10	0.09	-0.10	n.s.

Table 3: Zero-order correlations (Pearson) with the share of risky assets in the total financial portfolio. N = 807.

Hypotheses 3, 4, and 5

H_3 and H_4 posited that data on psychological variables taken from the FFO would – together with the other socioeconomic and demographic variables – explain more of the variance in risky household portfolio behavior than such data culled from only the spouse. H_4 posited that inclusion of data on psychological variables from both spouses would significantly increase the explanatory power of the model. H_5 posited that identical models such as those above, and tested on one-person household data, would explain more of the variance in risky portfolio behavior.

Multiple linear regressions performed on FFO, spouse and one-person household data are reported in Table 4 and Table 5. The first two rows of the Tables show that despite there being large absolute differences in adjusted R^2, these differences in explained variance are not significant, as measured by the multiple R, between the models estimated on FFO data and the models estimated on spouse data. This prompts us to reject H_3 at this stage, but other results will show that the answer is not so clear-cut.

Model	R	R Square	Adjusted R Square	Std error of estimate	N	Significance of R difference FFO model – current model
A. FFO data	0.61	0.37	0.36	0.94	659	-
B. Spouse data	0.55	0.30	0.29	0.99	659	$z = 1.63$; n.s.
C. One-person household data	0.58	0.33	0.29	0.98	210	$z = 0.47$; n.s.

Table 4: Results of the three full models. Dependent variable: number of different types of risky assets.

Model	R	R Square	Adjusted R Square	Std error of estimate	N	Significance of R difference FFO model – current model
A. FFO data	0.52	0.27	0.26	0.19	659	-
B. Spouse data	0.45	0.20	0.19	0.19	659	$z = 1.64$; n.s.
C. One-person household data	0.65	0.42	0.38	0.20	210	$z = 1.99$; $p < 0.05$

Table 5: Results of the three full models. Dependent variable: share of risky assets in financial portfolio.

H_4 is investigated in Table 6 and Table 7, which report the results of a hierarchical regression run on both spouses' data. Variables were entered in four different subsets; socioeconomic variables, demographics, FFO psychological variables and finally spouse psychological variables. Changes in Rs, R^2s and F are shown for each model.

The results in Table 6 show that all variable sets contribute significantly in terms of explained variance, with the exception of the spouse data. Or to be more precise, the coefficients of the variables included in the fourth variable subset are marginally non-significant (p = 0.055). The modified $\tilde{R}^2$ supports these results by showing that the change in R^2 from the subset containing FFO psychological variables is a mere 0.001.

Hence, this would lead us to reject H_4. In fact, including spouse data does not make a significant contribution towards explaining a household's risky financial behavior. It also puts the rejection of H_3 above into doubt. Exchanging places between the FFO and spouse variable subsets showed that R^2 improves by 0.08 (F = 13.99; p < 0.001) if FFO data are entered at the last step, while spouse data again only improves the model by 0.03 (F = 4.28; p < 0.001), although this is a statistically significant improvement. To exclude FFO data would mean ignoring a substantial amount of unique information and would lead to significant specification error. Table 7 shows basically the same pattern for the share of risky assets in the financial portfolio.

Model, variable subset	***R***	***R²***	**Adj. *R²***	**Modified *R²***	**Std error**	***R²* change**	***F* change**	**df1**	**df2**	**Sig. of *F* Change**
(1) Socio-economics	0.48	0.23	0.23	-	1.03	0.23	100.23	2	657	< 0.001
(2) Demo-graphics	0.52	0.27	0.26	-	1.01	0.04	8.33	4	653	< 0.001
(3) Psycho-logical variables FFO	0.61	0.37	0.36	0.34	0.94	0.10	16.56	6	647	< 0.001
(4) Psycho-logical variables spouse	0.62	0.38	0.36	0.35	0.94	0.01	2.07	6	641	p = 0.055

Table 6: Hierarchical multiple linear regression model summary with change in R^2. Dependent variable: number of types of risky assets. N = 659.

Model, variable subset	R	R^2	Adj. R^2	Mod. R^2	Std error	R^2 change	F change	df1	df2	Sig. of F Change
(1) Socio-economics	0.34	0.11	0.11	-	0.20	0.11	41.92	2	657	< 0.001
(2) Demo-graphics	0.40	0.16	0.16	-	0.20	0.05	9.73	4	653	< 0.001
(3) Psychological variables FFO	0.52	0.27	0.26	0.24	0.19	0.11	15.73	6	647	< 0.001
(4) Psychological variables spouse	0.54	0.29	0.27	0.25	0.18	0.02	2.80	6	641	$p = 0.011$

Table 7: Hierarchical multiple linear regression model summary with change in R^2. Dependent variable: share of risky assets in the financial portfolio. N = 659.

As presented in Table 8, the logistic regression analyses of the discrete variable ownership of any risky asset shows that the models are highly significant. The rate of correctly classified households overall, and of households owning risky assets, is higher when psychological FFO data are used rather than spouse data. Using spouse data produces a classification rate barely above the 50 percent that could be expected by chance. The FFO data exceeds this figure by a much wider margin. The Cox & Snell R^2 is also higher for FFO data than for spouse data. These observations provide some additional support for the argument that H_3 can be accepted.

Model	Percent correctly classified overall	Percent correctly classified of those with risky assets	-2 Log Likeli-hood	Good-ness of Fit	Model Chi-Square	Cox & Snell R^2
A. FFO data N = 659	76.8%	60.3%	643.77	722.27	222.76 $p < 0.001$	0.29
B. Spouse data N = 659	75.0%	52.9%	687.20	721.31	179.34 $p < 0.001$	0.24
C. Both spouses N = 659	77.1%	60.3%	620.20	722.82	246.33 $p < 0.001$	0.31
D. One-person household data N = 211	84.4%	63.8%	145.56	180.27	102.60 $p < 0.001$	0.38

Table 8: Results of logistic regression analyses using the research model. Dependent variable: ownership of any of the risky assets.

Including spouse data does not improve the classification rate for households owning risky assets, which would lead us to reject H_4, again keeping in mind that there is no statistical evidence as to the significance of this increase in classification rate.

H_5 posited that estimating the model on one-person household data would yield the best fit.

Table 4, Table 5 and Table 8 can be used to investigate this hypothesis. On the one hand, the difference in R^2 as measured by the Fisher z test, for the number of types of risky assets, is not significant. For the share of risky assets in the portfolio, though, the difference is of a high magnitude (0.14) and it is statistically significant (z = 1.99; p < 0.05). Table 8 shows that the overall classification rate of households is 7.3 percentage points higher for the one-person household model than for the best FFO–spouse model. The prediction rate for those households holding one or more risky assets is also higher than in the unconstrained FFO–spouse model, and the Cox & Snell R^2 is higher as well.

The results hence provide some support for accepting H_5, but also indicate that the choice of dependent variable can make the results vary somewhat. If we assume that the degree of portfolio risk exposure (as measured in the share of total financial wealth allocated to "risky" saving forms) to a large extent is dependent on individual characteristics and their interaction, the results from the analysis of spouse – spouse correlations show that the risk of incurring more error variance increases in this case. This is also illustrated by the fact that spouse data contribute slightly more unique variance to the model that explains share of risky assets in the family portfolio than they do in the case of the number of types of risky assets (two different types of decisions).

Determinants of Risky Household Financial Behavior – Regression Results

A comparison of the results of three different regressions with data drawn from the FFO and the spouse is presented in Table 9. The differing amounts of explained variance have already been commented upon. The object of interest here is whether the interpretation of the regression model will differ as well.

The socioeconomic and demographic variable sets offer almost identical interpretations, as they should considering that they are constant over the three equations. Household financial wealth is the strongest predictor, while household net income surprisingly contributes nothing towards explaining the variance in the dependent variable. However, each successive higher level of FFO education contributes significant amounts of unique variance, as does higher age (a more advanced stage in the life cycle).

Variable in Equation	Family Financial Officer	Spouse	Both spouses
Variable set 1:			
Household financial wealth as of Dec. 31, 1992	0.35***	0.40***	0.35***
Household net income for the 1992 calendar year	0.02 n.s	0.03 n.s.	0.02 n.s.
Variable set 2:			
Household stage in the life cycle (age of the FFO)	0.19***	0.16***	0.19***
Highest education, FFO			
1. Low	0.02 n.s.	0.04 n.s.	0.02 n.s.
2. High middle	0.11*	0.14*	0.11**
3. High	0.16**	0.21**	0.15***
Variable set 3:			
Uncertainty reduction orientation factor, FFO	-0.19***		-0.17***
Outcome orientation factor, FFO	0.08*		0.11***
Importance of high yield, FFO	-0.02 n.s.		-0.02 n.s.
Importance of prudence with money, FFO	0.05 n.s.		0.04 n.s.
Interest in investments, FFO	0.14***		0.13***
Saving goal capital income, FFO	0.13***		0.12**
Variable set 4 (3):			
Uncertainty reduction orientation, spouse		-0.12**	-0.07*
Outcome orientation factor, spouse		-0.04 n.s.	-0.09**
Importance of high yield, spouse		0.03 n.s.	0.02 n.s.
Importance of prudence with money, spouse		0.02 n.s.	0.02 n.s.
Interest in investments, spouse		0.04 n.s.	0.04 n.s.
Saving goal capital income, spouse		0.08*	0.02 n.s.
Constant	-1.54***	-1.32***	-1.66***
R Squared (adjusted R Squared)	0.37 (0.36)	0.30 (0.29)	0.38 (0.36)
Model significance	$F = 31.40$; $p < 0.001$	$F = 22.70$; $p < 0.001$	$F = 1.83$; $p < 0.001$

*Table 9: Hierarchical regression analyses using data from different informants. Dependent variable, number of different types of risky financial assets. N = 659. ***: significant at p < 0.001. **: significant at p < 0.01. * = significant at p < 0.05. N.S.: not significant at any of the indicated significance levels.*

As was evident in the preceding analyses (see Table 4 and Table 7), the psychological variables contributed twice as much of the amount of explained variance as the demographic variables. But this is only the case if we draw data from the FFO. If we use spouse data, this contribution would be reduced to 80 percent. In Table 9 it is evident that, with FFO data, four of the six psychological variables are significant, three of which are at very high significance levels. If only spouse data had been used, the conclusion would have been that only uncertainty-reduction orientation and the capital income saving goal would have had any appreciable effect on behavior. When the full, unconstrained model is estimated, all significant FFO variables are retained, while the importance attached by the spouse to the capital income saving goal becomes non-significant.

It would thus seem that the choice of informant is important not only for the validity of the regression, as expressed in amount of variance explained, but also for the interpretation of the model. Similar results were obtained with the two other measures of risky household financial behavior.

Conclusions and Discussion

This paper investigated whether the choice of household informant for psychological variables included in models of risky household financial behavior mattered to the empirical researcher. Five research hypotheses were posited in relation to this purpose, concentrating on evaluating results from different correlation and regression analyses based on household level behavior, socioeconomic and demographic data, but with psychological data drawn from either the family financial officer or the spouse in family households. A sample of one-person households from the same database was used as control group.

It could not be shown that the amount of explained variance differed significantly between multiple regression analyses, as measured in terms of the multiple *R*, when the psychological data were drawn from different informants. However, other tests and analyses strongly indicated that including FFO data increased the validity of the model, while the inclusion of spouse data gave only a marginally positive, albeit statistically significant, effect. The interpretation of the model also differs when different informants' data are used. Exclusion of FFO data would hence lead to significant specification error. Another positive effect of relying on only the FFO's psychological data would be that the number of households available for analysis, i.e., with complete data on all variables, would increase from 659 to 885 in the regression analyses, an increase of 34 percent. Fewer cases lost to analysis because of partial non-response may be crucial for many researchers.

The results also showed that measures of "couple" variables indeed had stronger agreement between spouses than "individual" variables. Zero-order correlations between psychological variables and measures of risky financial behavior differed significantly between spouses in a few cases.

Does this mean that it is safe to assume that we can forget about collecting and/or using spouses' psychological data with impunity? Unfortunately, there is no clear-cut answer to this question. It is probably highly domain-dependent. This particular study indicates that for the domain of risky financial behavior, using spouse psychological data may not be crucial for our understanding of household behavior. On the other hand, one should keep in mind that due to problems with self-reports of household behavior of this kind, it may be prudent to approach both spouses at least in order to gain satisfactorily valid information regarding aggregate household financial behavior.

The collection of psychological data used in analyzing household behavior could, however, be limited to the FFO. Furthermore, instead of trying to use, e.g., the mean of the spouses' answers, or attempting to weight the answers, the spouse data could be excluded altogether without losing too much unique information. The results also indicate that the more dependent the specific analysis is on "individual" variables, the lower the correlation between the spouses' data, and the more important it will be to gather data either from both spouses or identify which are the more important decision maker.

The results indicate that the problem investigated here is not trivial. We have used a moderately successful method to investigate differential validity of identical regression models with data drawn from different household informants, which can be applied to other domains. However, there is clearly a need to develop better instruments for this purpose. Further research should also attempt to cover more domains of household financial behavior or other areas in order to test how sensitive and domain-specific the results are.

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Appendix I: Independent Variables and Their Measurement

	Variable/factor	Operationalization	No of items
1	*Household stage in the life cycle* Data taken from FFO	Age (1993 – year of birth)	
2	*Gross household financial wealth as of Dec. 31, 1992* Dutch Guilders (DFL)	The sum of both partners' financial assets, excluding housing wealth and capital goods.	
3	*Household net income for the 1992 calendar year* Measured in Dutch Guilders (DFL)	The sum of both partners' incomes from wages, transfers, capital income, mortgage interest payments and imputed rent, alimony; less income and wealth taxes and social security fees.	
4	*Highest education* Ordinal variable, data taken from family financial officer	1. Low education (Kleuter/basisunderwijs, speciaal onderwijs, VG speciaal onderwijs) 2. Middle education (LBO, HBS, VGIO, MAVO, LAVO and leerlingwezen) 3. High middle education (HAVO,VWO and MEAO) 4. High education (Hoger beroepsonderwijs, wetenschappelijk onderwijs)	
5	*Attitudes towards financial risk taking*	Factor analysis of six Likert-type statements, total explained variance 61.5%.	
a.	Uncertainty reduction orientation factor (Cronbach's Alpha = 0.66)	A higher score means more risk reduction orientation in investments.	3
b.	Outcome orientation factor (Alpha=0.66)	A higher score means that the outcome and yield of an investment decision are more highly weighted.	3
6	*Importance of high yield*	Seven-point Likert scale. "Always trying to pick saving plans that yield high profits."	1
7	*Importance of prudence with money*	Seven-point Likert-scale. "Being careful with money is an important character trait."	1
8	*Interest in investments*	Seven-point Likert scale. "I am very interested in financial matters (insurances, investments, etc.)."	1
9	*Saving goal capital income*	Seven-point Likert-type scale. "To me, generating income from interests and dividends is...Very unimportant...Very important."	1

	Variable/factor	Operationalization	No of items
A	*Estimate of total net HH income over the past 12 months* Measured in Dutch Guilders (DFL)	On an ordinal scale, each spouse had to indicate the approximate amount in six different brackets. The mid-point of the bracket is taken to represent the estimate.	1
B	*Estimate of household financial resources* Raw score sum scales.	On ordinal scales, each spouse had to indicate whether the household "...was in debt (1)...could save a lot of money (5)"; and "how well the household could manage on the present income...Very hard (1)...Very easy (5)."	2
C	*Fall or increase in share value over a five-year period*	Seven-point Likert-type scale indicating FALL in value very likely (1)...INCREASE in value very likely (7). The item was filled in regardless of whether the household owned shares or not.	1
D	*Fall or increase in investment fund value over a five-year period*	Seven-point Likert-type scale indicating FALL in value very likely (1)...INCREASE in value very likely (7). The item was filled in regardless of whether the household owned funds or not.	1
E	*Fall or increase in savings and deposit account value over a five-year period*	Seven-point Likert-type scale indicating FALL in value very likely (1)...INCREASE in value very likely (7). The item was filled in regardless of whether the household had such accounts or not.	1

Note: The variables which are indicated with the letters A., B., etc., are used exclusively to test Hypothesis 1.

Chapter 5:

Mental Discounting and Financial Strategies

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Mental Discounting and Financial Strategies

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Abstract:

Subjective discount rates have been used as measures of time preference to explain saving behavior, with varying results. There is also lack of agreement between different explanatory models of subjective discount rates. In this paper, it is argued that better understanding of subjective discount rates can be reached by using groups with different financial strategies as domains. It is shown by PLS and regression analyses that the mental discounting process differs between groups practicing different financial strategies and that the explained variance of subjective discount rates and thus the understanding of such rates are improved by using financial strategy groups as domains.

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Introduction

Subjective discount rates are often used by economists and psychologists as indicators of time preference in the analysis of intertemporal choice. Economists usually assume that the discounting function is exponential. In economic psychology, experiments have shown that subjective discount rates may vary between situations or different framings (see e.g., Loewenstein & Thaler, 1989; Nyhus, 1995; Thaler, 1981). Other studies have found some correlations between measures of time preference and individual factors (Daniel, 1994; Groenland & Nyhus, 1994; Ritzema, 1992).

In economic psychology, time preference has traditionally been measured empirically by questions about hypothetical choices (e.g., Loewenstein, 1988; Thaler, 1981 Benzion, Rapoport, & Yagil, 1989; Daniel, 1995; Loewenstein & Prelec, 1991; Loewenstein & Thaler, 1989; Nyhus, 1995). One way that subjective discount rates can be inferred is by asking subjects to make a judgment about how much they would require as compensation or be willing to pay in order to delay or speed up a win or a loss. Hence, this is in effect a judgment task to be solved by the subjects.

Nyhus (1995), however, expresses concern about the feasibility of measuring time preferences by way of subjective discount rates. In her study of 4,050 Dutch individuals, results were not clear-cut when it came to the correlation between the nine different subjective discount rates used to elicit time preference. Some of the measures, which varied in their framing of the intertemporal choice, were not highly correlated, and individuals' subjective discount rates did not rank in the same place among the respondents across the nine frames that were used. Nyhus argues that there is plenty of evidence to the effect that the traditional way of measuring time preference lacks specificity and that there is no reason to believe that, for each individual, there is a 'general' rate of time preference stable over all situations.

Before subjective discount rates measured in experiments or surveys can be used for explaining actual saving behavior, the concepts as such have to be understood and well defined. Until now, there seems to have been too little testing of the impact of alternative designs for the elicitation of subjective discount rates. Knetsch (1996, p. 17) also remarks that it "... may be that some variations among observations are due in part ... to the nature of the tests and demonstrations of varied time preferences." It appears that real life experiments are preferable to hypothetical choices. Regrettably, such experiments are very difficult to carry out in practice (e.g., Thaler, 1981).

We argue that a better understanding of subjective discount rates can be reached by making domain assumptions when attempting to explain subjective discount rates (see Katona, 1975; Musgrave, 1981; Wahlund, 1991; van Raaij & Verhallen, 1994, for discussions about domain assumptions), where the domains are related to differing cognitive capacities and saving decision-making styles affecting the *mental discounting process*. Mental discounting refers to the cognitive process of estimating the discount rates when the individual is faced with a certain frame in an experiment. If mental discounting is dependent on cognitive capacity and saving decision-making styles, the influence of situation or framing on subjective discount rates may differ depending on these factors. We contend that household financial strategies can be used as indicators of such factors and thus serve as *domains* when studying mental discounting.

Purpose

The purpose of this work is to examine mental discounting across individuals belonging to households with different financial strategies. The focus within the domains – or financial strategies – will be on subjective discount rates as a function of mental accounts (framings) and various individual characteristics.

Theoretical Framework

Subjective Discount Rates and Framing Effects

In economics, the discount rate is the marginal rate of substitution between current and future consumption. Under the assumption of perfect capital markets with free borrowing and lending, the subjective discount rate measured should be equal to the after-tax market interest rate. This is so because any discrepancy between the lending and borrowing rates will generate an arbitrage opportunity for the consumer (Loewenstein & Thaler, 1989). Empirical studies, however, have shown that the discount rate elicited generally is higher than the market rate (see e.g. Benzion et al., 1989; Nyhus, 1995; Thaler, 1981; Thaler, 1992). Individuals often request inflated compensations which have little relation to the current market interest rate.

Respondents have also been found to demand higher subjective discount rates to wait shorter time periods than for waiting longer time periods for the same outcome (op. cit.). Ainslie (1991) and Loewenstein & Prelec (Loewenstein & Prelec, 1992) argue that this is due to the discount curve's hyperbolic properties, which will produce a higher preference for gratification close in time at the expense of objectively greater gratification set farther in the future (dynamic inconsistency). Björkman (1984) suggests that it is more difficult for humans to imagine the consequences of present decisions for distant outcomes than for those in the immediate future, which makes outcomes not set in the close future seem less important and they are thus not discounted as heavily.

The framing tested in the present study is the time which the respondents have to wait to receive a gain. Other frames that have been tested in experiments are, for example, depicting the situation as a *loss* or a *gain* (Benzion et al., 1989; Loewenstein & Thaler, 1989; Nyhus, 1995; Thaler, 1981), *speeding up* or *postponing* the outcome of the choice (Benzion et al., 1989; Loewenstein, 1988; Nyhus, 1995), or the *magnitude* of the outcome (Benzion et al., 1989; Loewenstein & Prelec, 1991; Loewenstein & Prelec, 1992; Loewenstein & Thaler, 1989; Nyhus, 1995; Thaler, 1981).

Cognitive Limitations and Saving Decision-Making Styles

Bettman (1979), among others, has shown that people differ as to what information, heuristics, rules, etc., they use when making decisions. One reason for this is the limited cognitive capacity of humans (cf. Simon, 1955). Hogarth (1989, p 7) argues that "to understand a person's judgment, it is necessary to understand how that person conceptualizes the world and the meaning he or she gives to information." Hogarth also posits four consequences of the limitations of human information processing. Firstly, perception of information is selective due to the massive amounts of information humans regularly receive from the environment. Secondly, information processing is usually done sequentially. Thirdly, people use heuristics to calculate problems to reduce the mental effort. Lastly, humans have limited memory capacity, which may affect judgment negatively. Remember, the way we elicit subjective discount rates is through the hypothetical choice questions, a judgment task.

Smith, Benson, & Curley (1991, pp. 297-299) assert that humans use three general methods to reach conclusions: computation, reasoning and judgment. Computation is merely "the syntactic or procedural manipulation of symbols," while "a reasoned conclusion follows from the meanings of premises, not simply from their arrangement in a formal structure." Finally, "judgments are intrinsically quantitative or qualitative assessments of a stimulus along certain dimensions or against certain criteria." In the case of the questions used to elicit subjective discount rates, one can use any combination of reasoning and judgment. Since reasoning is based on some structural assumption about reality and background knowledge, the decision process is usually explicable. In contrast "judgment is mute" and "evaluations hinging on personal tastes largely judgmental." Smith et al. (1991) also assert that if the subject lacks data or understanding he or she can construct arguments with conflicting conclusions without any reasoned basis for which one is superior. Any task requiring probability assessments, for example, will essentially be a judgmental one, but also include some degree of reasoning.

Hence, people could be expected to differ in their decision-making styles, i.e. in how decisions or judgments are usually made by the persons (cf. Delmar, 1996; Janis & Mann, 1977). If people have different decision-making styles, the mental discounting process should also be expected to differ between people. Some people may, for example, not at all consider the time horizon or misjudge it, while others will consider it normatively correctly. We should thus expect people to differ in *how* they arrive at the amount they demand for postponing gratification, i.e. explanatory models of subjective discount rates – the β-coefficients and R^2:s in regression models – should differ between groups of people.

We argue that one way of measuring decision-making styles is to measure the behavior or rather the patterns of behavior that result from decisions made. Since decision-making styles may vary for an individual with the type of problem at hand, the behavior measured should be related to the problem at hand. For studying the mental discounting process, we suggest that the behavioral patterns found by Gunnarsson & Wahlund (1994; 1995) concerning saving could be useful. These can be seen as indicators of saving decision-making styles.

Household Financial Strategies as Domains

All households are financial actors, more or less active and acting more or less consciously. Households' financial behaviors may be viewed as expressing some sort of *financial strategy*, whether consciously or unconsciously practiced. Gunnarsson & Wahlund (1994) defined a financial strategy as "*the observed pattern within a group of households of different forms of financial assets, in-*

cluding types of debts and credits, utilized by the households" (which departs from the general notion of "strategy" implying structured decision making and well-informed portfolio decisions). They also found six groups with different such patterns in a sample of Swedish households (see below and Gunnarsson & Wahlund, 1994 and 1995, for more details of the study; cf. Livingstone & Lunt, 1993; Lunt & Livingstone, 1992). It should be emphasized that dichotomous variables (have or have not a saving or debt form) were used in the analysis, thus allowing for variation in the *amounts* of savings and debts within the groups.

The financial strategies found by Gunnarsson & Wahlund (1994; 1995) could be characterized in many dimensions, e.g. activity, risk taking, how elaborate the decision processes behind the strategies are, saving motives, and the experience and knowledge gained from the strategies utilized. Explanatory variables such as saving attitudes, financial knowledge, time preference and self-control, financial risk taking attitudes as well as standard socioeconomic variables (among them income and amounts of saving, savings and debts) and demographic characteristics were used to discriminate between the groups (for detailed statistics, see Gunnarsson & Wahlund, 1994; 1995). However, enough variance remained within the groups to allow for expecting and testing explanatory models within each group or domain.

The groups and their financial strategies were:

1. *Residual savers* (cf. Katona, 1975) using the "residual saving strategy" (46 percent of the analyzed households). These households had few forms of savings or debts and relied heavily on quite liquid forms of savings. In particular saving forms that required long- or medium-term commitment or were risky were rare in this group. The strategy was to be flexible with the few funds available and meet the needs of today.
2. *Contractual savers* (cf. Katona, 1975) using the "contract saving strategy" (22 percent). These households relied a great deal on using different types of

loans and credits. Thus they had large amounts of debt and mortgages and were bound by contract to pay these off at regular intervals. Apart from loans they had mainly liquid financial instruments.

3. *Security savers* using the "secure-future-strategy" (14 percent). This group of savers was the heaviest investor in retirement-related financial instruments such as private pension plans, etc. The security savers also had investments in stocks and bonds, but tended to avoid the riskier instruments.
4. *Risk hedgers* using the "risk hedging" or "risk spreading" strategy (9 percent). This cluster had the most diversified financial portfolio. The households were the most keen on investing in riskier and long-term assets. They had large financial assets and were quite knowledgeable about personal financial matters.
5. *Prudent investors* (3 percent) practicing the "prudent investing" strategy. These households had similar behaviors to the risk hedging cluster in that they had investments in many different kinds of savings, but they were more reluctant to use risky assets such as shares. Instead they preferred bonds.
6. *"Divergent" strategies* (6 percent). These households were quite keen on investing in risky, complex and unusual assets such as options and had well diversified portfolios.

A Model of Subjective Discount Rates

The variables assumed to have an impact on subjective discount rates were of two general categories: socioeconomic and demographic variables, or psychological variables.

The economic situation in the household has been found to influence subjective discount rates (Daniel, 1995; Groenland & Nyhus, 1994; Hausman, 1979; Nyhus, 1995) as was originally suggested by Fisher (1930). The better the economic circumstances, the easier to accept postponing immediate gratification (cf. Hausman, 1979). The function would exhibit diminishing marginal properties, i.e. the more wealth was available to the subject, the smaller the marginal utility of immediate gratification (Jungermann, 1988; Shefrin & Thaler, 1988). Thus asking for a compensatory sum in discounting experiments would be affected by the respondents' economic situation: the better the economic situation, the lower subjective discount rate.

A better economic situation should also lower the sense of risk experienced when postponing gratification to a later time period. This may also be prompted by loss aversion, i.e. resenting not being able to directly consume out of a lottery win, but rather having to wait. Attitude towards financial risk taking should then also influence how readily the respondents accept a delay in gratification (cf. Jungermann, 1988): the more positive the risk taking attitude, the lower the subjective discount rate.

Interest in financial matters reflects the interest to actively search for information about everyday investments, and financial knowledge indicates how correct the information used is. Financial knowledge may also reflect the ability to use financial information for decisions or judgments. Jungermann (1988) argued that interest and knowledge about financial matters should cause discount rates to conform to levels of interest closer to market rates. Since earlier findings indicate that subjective discount rates are, on average, higher than actual market rates, more interest and more knowledge should lead to lower subjective discount rates.

Impulsivity, self-control and impatience (Fisher, 1930; Shefrin & Thaler, 1988), as well as financial planning proneness and perceived control over household finances (Gunnarsson & Wahlund, 1995) are other individual characteristics which can be expected to affect time preference and portfolio behavior. The more planning or perceived control, the less impulsivity, the less impatience or the more self-control, the lower should the subjective discount rates be. In the following, we refer to all these variables as self-control.

One measure of time preference used by Gunnarsson and Wahlund (1994; 1995) was to ask the respondents to what extent their household preferred to spend or save what is left of their income after necessary expenses have been paid for, during the course of the month. It is reasonable to assume that people's time preferences concerning their household's discretionary income influence their time preferences in a hypothetical judgment task, here measured as subjective discount rates. The more negative the time preferences as to actual discretionary income, the lower the subjective discount rates.

Working status captures the difference in behavior between employees and both self-employed and unemployed. Self-employed were found by Gunnarsson & Wahlund (1995) to be more prone to own larger and more diversified portfolios with more long-term investments, which may reflect differences in time preference. The self-employed should thus be expected to have lower subjective discount rates than the employees. The unemployed could be expected to be more concerned with the needs of today, why they would be expected to have higher subjective discount rates.

It has already been hypothesized that the better the financial knowledge, the lower the subjective discount rates would be. Higher education in general may add to the ability of using financial information correctly and should thus be expected to correspond to lower subjective discount rates than lower education would.

As to gender and age, Daniel (1994) found that females tended to have lower subjective discount rates, and that subjective discount rates declined with increasing age. The latter indicates differences between generations. Having dependent children should mean a greater need for consumption at present than in the future and should thus result in higher discount rates than not having dependent children.

Figure 1 shows the hypothesized model for subjective discount rates. As to mental accounts, only the temporal dimension is taken into consideration (different time horizon framings).

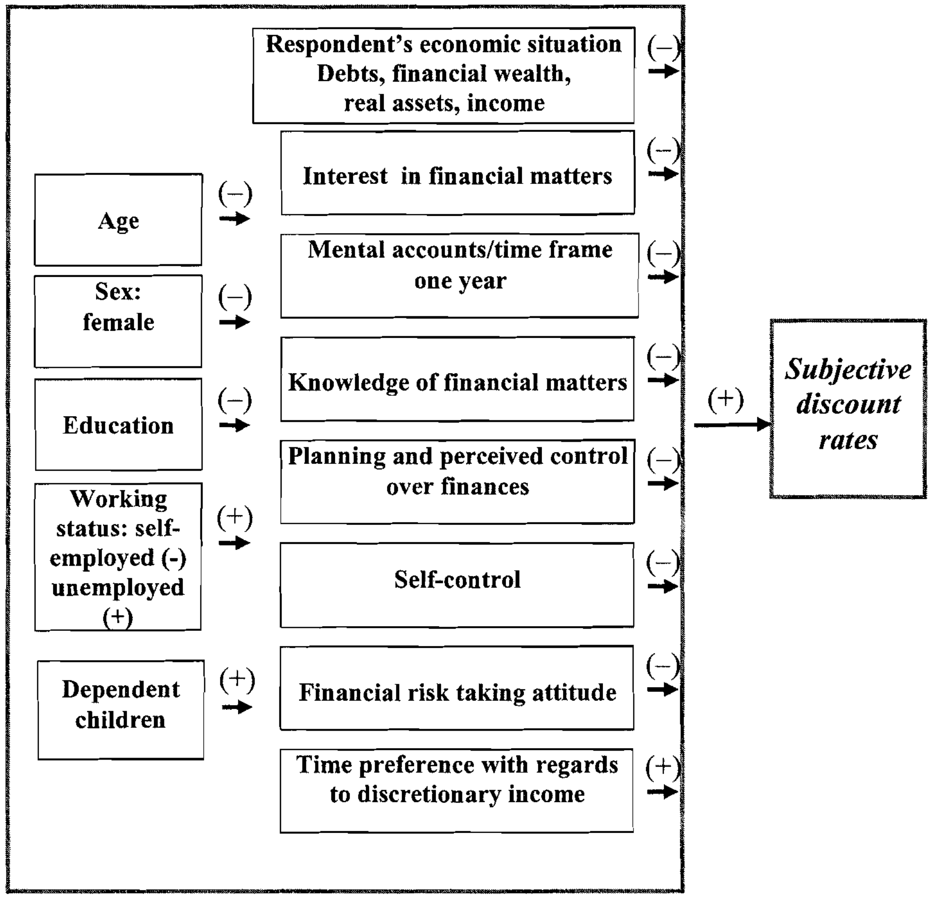

Figure 1: The hypothetical model for subjective discount rates. Plus- and minus signs indicate the expected influence of each variable on subjective discount rates.

Hypotheses Concerning Domain Dependence

It was argued above that differences between individuals' decision-making styles as expressed by their financial strategies may affect their mental discounting, i.e., *how* they make the calculations resulting in the subjective discount rates measured. If the way the calculations are made differs between groups, then not only the *level* of subjective discount rates but also the *variance* may differ between the groups.

In addition, what explains or determines the level of subjective discount rates should vary between the groups, partly because different factors or types of information are taken into consideration by the discounting individuals and partly because some factors are taken into consideration to different extent by the individuals in the different groups.

Considering the groups presented above and their financial strategies, the residual savers and contractual savers could be expected to make less elaborate or structured, and more random judgments concerning subjective discount rates than other groups. This is because their financial strategies indicate that they are less experienced as to complex financial decision making (contractual saving does not require continuous saving decisions). The residual savers also have a lower education level on average than the other groups (F=4.88, p<0.01). Thus a higher and less explained variance should be expected for these groups.

In addition, if the decisions to a lesser degree are based on knowledge or experience, the level of subjective discount rates within these groups could be expected to be further away from realistic, market interest rate-based levels than within the other groups. The security savers, risk hedgers, prudent investors and households with divergent strategies all have larger and more varied savings portfolios and should thus have more experience of more complex financial decision making (Gunnarsson & Wahlund, 1994; 1995). Their subjective discount rates should thus be closer to market rates (i.e. lower).

To summarize, the following hypotheses are examined in the paper:

H_1: The levels of subjective discount rates will differ between the financial strategy groups: the means of subjective discount rates will be further away from realistic levels among the residual savers and contractual savers than within the other groups.

H_2: The variances in subjective discount rates will differ between the financial strategy groups: the variances will be larger among the residual savers and contractual savers than within the other groups.

H_3: The explanatory models will differ between the financial strategy groups. No exact explanatory models are hypothesized for the different groups.

H_4: The explained variances will differ between the financial strategy groups: the explained variance will be less within the residual savers and contractual savers groups than within the other groups.

Method

Sample and Data Collection

Postal questionnaires were used to collect data. 1,000 Swedish households where the head of household was aged between 20 and 75 years of age were randomly sampled, and the final response rate was 50.3 percent (503 households). The database was weighted to correspond with the age and marital status distributions in Sweden at the time of the survey (1993).

The purpose of the study by Gunnarsson & Wahlund (1994; 1995) was exploratory, intending to determine if financial strategies (as defined above) existed at all. Thus the bulk of the questionnaire was devoted to measuring financial behaviors. There were also a number of questions measuring socioeconomic, demographic and psychological factors in order to examine possible differences between financial strategies.

Assessing Domains – Groups With Different Financial Strategies – By Cluster Analysis

To find groups with different financial strategies, 35 dichotomous variables of forms of savings and debts were used as input in K-means cluster analyses. First, the mean Euclidean distances to the cluster centroids for 19 analyses –

from 2 to 20 clusters – were plotted. The cluster solutions were analyzed and interpreted where the mean distance plot showed marked drops. A twelve-cluster solution was chosen from among these points on the basis of interpretability, simplification of underlying data and usefulness as to the purpose of the study. Seven of the smallest clusters were grouped together as "divergent strategies" for theoretical reasons. These clusters had basic characteristics in common. They were retained because of their great importance to aggregated savings, see Gunnarsson & Wahlund (1995). This resulted in the final six financial strategy groups described above.

Since the K-means algorithm is quite sensitive to how observations are ordered in the data matrix, we randomly re-ordered the data matrix as a test of the robustness of the solution. The three largest groups (82 percent of the sampled households) were fairly stable in size and in their behavioral patterns, while the three smallest were less consistent across different analyses. Unfortunately, hierarchical clustering could not be performed due to lack of powerful enough hardware. In addition, the hierarchical cluster facility in SPSS for Windows could not weigh the database.

Punj & Stewart (1983, p. 146) argued that "classification is only useful if it assists in furthering an understanding of the phenomena of interest. The ultimate test of a set of clusters is its usefulness." We argue that the clusters found and used for this article are useful for the purpose of examining the domain dependence of mental discounting.

Measurement of Subjective Discount Rates and Different Mental Accounts

Two questions were asked to measure subjective discount rates for two different mental accounts with respect to the time frame (underlined):

"Imagine that your household wins SEK 10,000 on premium bonds [lottery bonds]. You get the following offer: if you wait to collect your win for <u>one month/one year</u> you will receive a compensation for your inconvenience. How

much would you demand to be compensated to wait one month/one year to collect your win? Answer: *About .... [SEK] in addition to the SEK 10,000."*

SEK 10,000 is roughly the equivalent of a normal Swedish monthly salary after taxes. Lottery bonds are well-known, risk-free and uncomplicated financial instruments that were held by one-fifth of all surveyed households.

Measurement of Independent Variables

Time preference concerning the household's discretionary income was measured by a question drawn from Ritzema (1992). The respondent was asked if he/she would consider the household as preferring to save or consume money that was left over during the month, after all necessary expenses were paid (rent, food, electricity, etc.). He/she then put a check mark anywhere on a ten centimeter long line with the poles "prefer to save all money" and "prefer to consume all money."

Age, sex, education, dependent children and mental accounts (time frames) were measured by one indicator for each, all but age and education dichotomous. Working status had unemployed and self-employed as two dichotomous formative indicators (the third category being employed). Respondents' economic situation was measured by indicators of real assets (dichotomous variables: ownership of summer house, apartment or house), debts, financial wealth and income (all formative indicators). The attitude variables had each between three and six measures as reflective indicators (see Appendix).

Analysis Techniques

The technique used to identify the financial strategy groups was mentioned above and is described in more detail in Gunnarsson & Wahlund (1994; 1995). As to the hypotheses stated above, H_1 and H_2 will be examined using common mean and variance analysis techniques. For examining H_3 and H_4, the PLS (Partial Least Square) technique developed by Wold (1965; 1975; 1984) and Lohmöller (1984) will be utilized (see also Dijkstra, 1985; Fornell, 1987; Fornell & Bookstein, 1982 and Wahlund, 1991), letting the latent variables be estimated by PLS. A stepwise backward regression technique was used for control purposes, using all manifest variables.

Since it is the mental discounting process that is of greatest interest, the model was first tested (for all respondents together and then for each financial strategy group) using PLS and only the following explanatory variables from the hypothesized model: respondents' economic situation, mental accounts (time framing), interest and knowledge in financial matters, planning/perceived control over finances, self-control and attitude toward financial risk taking. Only if explained variance increased significantly by adding any of the other variables to the equation model – age, sex, education, working status or having/not having dependent children – were they added, thus avoiding also the problem of multicollinearity.

Since each respondent answered both questions measuring subjective discount rates, the database had to be doubled in order to create one variable of subjective discount rates for the two mental accounts/time frames.

Results

Hypothesis H_1: the Levels of Subjective Discount Rates and Financial Strategies

Figure 2 shows the mean subjective discount rates within the six financial strategy groups. The mean demanded discount rate for postponing the payment of the win one month was nine percent (108 percent *per annum*, not counting compound interest). Residual savers demanded 13 percent (158 percent *per annum*). All other financial strategy clusters demanded lower rates, with the prudent investors demanding the lowest: three percent (33 percent *per annum*). The one-year time frame resulted in 39 percent demanded on average. Here the spread between the financial strategy groups was from 46 percent for the residual savers down to 18 percent for the prudent investors.

Hypothesis H_1 thus received support from data. Lower and more "realistic" subjective discount rates were found among those strategy groups that were more financially active and thus should have more experience of complex financial decision making. There is also a high degree of intersubject consistency between the two frames as to subjective discount rates, r=0.64: $p_{\text{two-tail}}<0.01$.

Thaler (1981) reports discount rates ranging from 120 to 219 percent in an experiment using a sample of various types of university students, while Benzion et al. (1989), using a sample of only students specializing in finance obtained lower discount rates. In the study of Benzion et al., subjects demanded a 41 percent compounded yearly interest rate for postponing receiving a payment of $1,000 (SEK 7,000) for a six-month period, and 27 percent for a year. Our sample consisted of a cross-section of Swedish households and was larger than the previous studies. Our respondents have higher subjective discount rates for the one-year scenario, which might reflect their on average lower level of financial training.

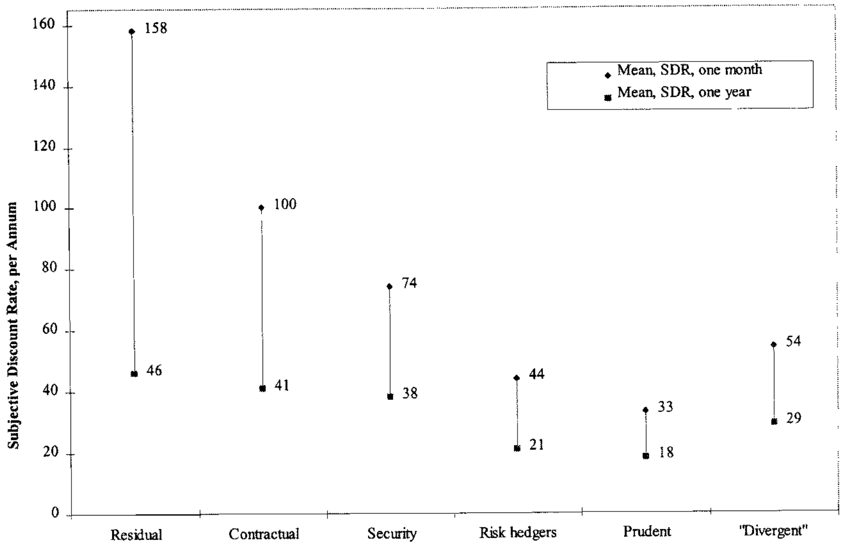

Figure 2: Mean subjective discount rates in the financial strategy groups. One-month and one-year scenarios calculated per annum (non-compounded).

Hypothesis H_2: the Variances of Subjective Discount Rates and Financial Strategies

Figure 3 and Figure 4 show the mean ± two standard deviations of the subjective discount rates in the one-month and one-year frames within the six financial strategy groups. For both time frames, the largest variance is found among the residual savers and the smallest variance among the prudent investors (which may partly, of course, depend on the sizes of the groups). For the one-month scenario, the variance is higher for both the residual savers and the contractual savers than for the other groups. In the one-year scenario the variances for the contractual savers, security savers and divergent strategies are about the same. *Hypothesis H_2 was thus partly supported by the data.*

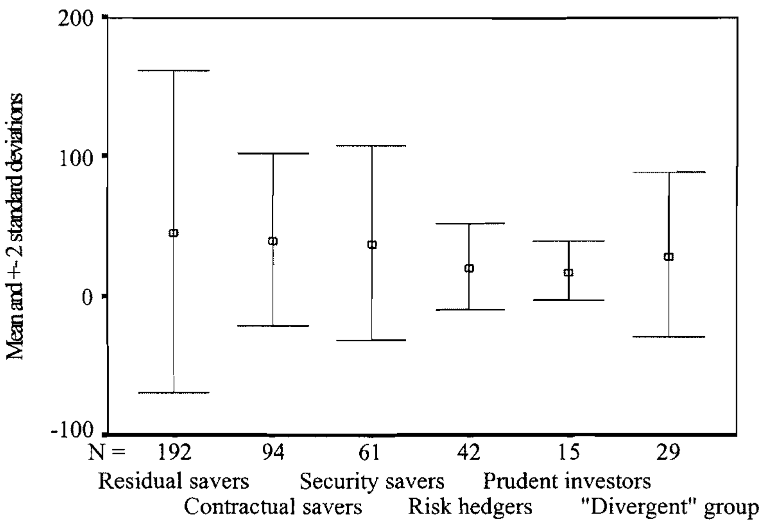

Figure 3: Means and standard deviations of subjective discount rates in the financial strategies, 1-month scenario. Rates computed per annum, non-compounded.

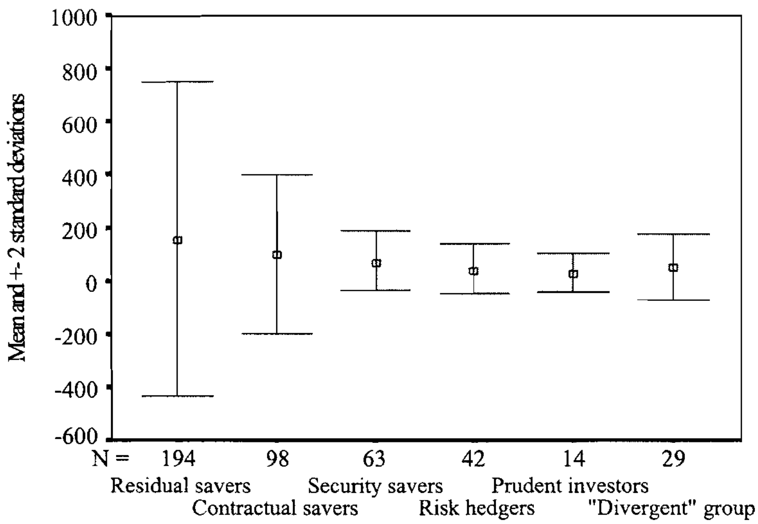

Figure 4: Means and standard deviations of subjective discount rates in the financial strategies, one-year scenario.

Hypothesis H_3 and H_4: Models of Subjective Discount Rates and Financial Strategies

Table 1 shows the results from the PLS analyses of the hypothesized model on each of the financial strategy groups (the domains). The first column also shows the results from a PLS analysis of the hypothesized model on the whole sample. For the latter, five of the hypothesized explanatory variables contributed with explanatory power to subjective discount rates: mental accounts (time frames), economic situation, financial knowledge, planning/perceived control over finances and self-control. The findings with regards to these variables are all in accordance with the hypotheses: the better the economic situation, the better financial knowledge, the more financial planning and control and the more self-control, the lower were the subjective discount rates. They were also lower in the one-year time framing than in the one-month framing (as was shown earlier). However, the percentage of variance explained was only 14 percent.

Testing the model for each of the financial strategy groups showed that the variables contributing with explanatory power and the magnitude of the coefficients of some of these variables varied substantially between the groups. The *household's economic situation* is much more important in explaining subjective discount rates for the risk hedgers and divergent strategies group than for the remaining four groups. The degree of *self-control* is a more important predictor of the prudent investors' and security savers' subjective discount rates than for the other groups, while the degree of *financial planning and control* is an important explanatory factor for all strategy groups except for the security savers.

Financial knowledge explains more of the variance of subjective discount rates in the divergent strategies group and for the risk hedgers than for the rest of the groups. Neither *interest in financial matters* nor *time preference* as to the household's discretionary income influence the contractual savers' mental discounting, but that of the other five groups. *Attitude toward financial risk taking* affects all groups', except the residual savers' mental discounting.

Having *dependent children* and *working status* only affect the security savers' judgment of discount rates, and *age* and *sex* matter only for the contractual savers. The influence of *mental accounts (time framing)* is, however, rather stable over the groups. This indicates that there is a basic human cognitive bias in effect. However, the variance of the dependent variables differ between the groups, and therefore the nominal effect differs between the groups.

The β-coefficients shown in Table 1 do not tell the whole story. The loadings and the weights of the indicators of the latent variables (not shown here) sometimes differ between the groups. This means that the influence of different aspects of the latent variables as measured by the manifest variables differ between the domains. For instance, for the contractual savers, the indicator measuring subjective knowledge of financial matters is much more important than the variable measuring objective knowledge, while the reverse is true for the residual savers. These differences are further enhanced by the results from stepwise backward regression analyses. *Hypothesis H_3 is thus also supported.*

Testing the model for each of the financial strategy groups resulted in more explained variance within each group than when the total sample was used, in some cases substantially more. The percentages of explained variances also differed quite substantially between the groups. The R^2:s for the residual savers and contractual savers were much lower than for the other groups. Stepwise backward regression analyses, using all manifest variables as independent variables, yielded similar R^2:s. *Hypothesis H_4 was thus supported by the data.*

Financial strategy groups:	Entire sample (N=436)	Residual savers (N=192)	Contractual savers (N=98)	Security savers (N=61)	Risk hedgers (N=42)	Prudent investors (N=14)	"Diver-gent" (N=29)
Latent variables							
Mental accounts	-0.23	-0.25	-0.26	-0.36	-0.33	-0.28	-0.25
Age			-0.23				
Sex			-0.16				
Education							
Working status				0.16		NA	NA
Dependent children				0.22			
Economic situation	-0.16	-0.29	-0.25	-0.26	-0.57	-0.22	-0.60
Time preference of discretionary income		-0.14		-0.20	-0.13	-0.28	-0.27
Interest in financial matters		-0.12		-0.26	-0.20	-0.08	-0.32
Financial knowledge	-0.13	-0.12	-0.21	-0.27	-0.35	-0.16	-0.56
Financial planning and control	-0.15	-0.21	-0.25	-0.16	-0.31	-0.28	-0.25
Self-control	-0.14	-0.24	-0.33	-0.41	-0.30	-0.54	-0.33
Financial risk taking attitude			0.23	0.30	0.26	0.22	0.31
R^2 (adjusted)	0.14	0.23	0.24	0.46	0.46	0.70	0.61

Table 1: The β-coefficients and R^2:s from PLS analyses on the whole sample and on each financial strategy group with subjective discount rates as the dependent variable.

Conclusions and Discussion

The results indicate that the process of mental discounting differs between different domains, the domains in this case being groups with different financial strategies. The latter are claimed to result at least partly from different decision-making styles and cognitive capacities, and resulting in different experiences and training in financial matters. Further, the amount of explained variance in subjective discount rates significantly improves when models of such rates are tested within domains of financial strategies.

The main conclusion of the paper is therefore that a better understanding of mental discounting processes and thus of subjective discount rates can be reached by using groups with different financial strategies as domains when studying subjective discount rates.

Following this conclusion, if subjective discount rates are used as explanatory variables in analyses of saving behavior, the results from such studies should also be expected to be improved and easier to interpret if financial strategy groups are used as domains. Also, if mental discounting processes differ between groups with different financial strategies, it seems reasonable to assume that (saving) decision-making processes also differ between such groups.

A practical implication of the findings is that saving or sales promotions involving the use of interest or discount rates must consider the different abilities or proneness of different groups of people to use or include such rates in their decision making. The results indicate that different groups of people would arrive at different conclusions from such promotions and thus be affected differently by them.

Another implication is that buying decision processes and thus buying behavior may differ between groups with different financial strategies. Using the latter as domains for studying buying behavior could thus lead to better understanding of the continuous saving versus consumption decision processes of humans. In this case, however, another type of domain more related also to buying behavior may be of greater value.

The results also enhance the problem of the lack of representative sampling frames and of non-response in surveys. It has been clearly shown that systematic non-response or non-representative samples greatly affect the estimated values of many types of statistics (e.g. means, variances, regression coefficients and R^2:s). This may in turn affect the conclusions drawn. As to means of subjective discount rates, different studies have arrived at different results (cf. Benzion et al., 1989; Thaler, 1981). One important explanation may be the use of different samples, possibly differing as to mental discounting processes and possibly also to saving decision-making styles.

It is interesting to note that mental accounts (time frames) had a large effect on subjective discount rates in all financial strategy groups. For most of the groups, this effect was greater than the influence from time preference as to the household's discretionary income. This indicates that mental accounting is a general and basic human cognitive bias, limiting our ability to be rational in the economic sense but perhaps improving our rationality in a practical sense.

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Appendix: List of Variables Used in the PLS and Regression Models

Subjective discount rates, mental accounts, socioeconomic and demographic variables: these variables have been presented in the text.

Time preference as to the household's discretionary income (scale range):

Some households prefer to spend all the money during the month that is left after food, rent and other necessary expenses have been paid for. Other households prefer to save the money, for example to have a buffer for the future. How would you describe your household compared to these views? (0-100)

Financial interest (scale range):

I'm not interested in financial matters and I don't take an active interest in my private finances. (1-7)

How interested are you in matters pertaining to your own or the household's finances? (1-4)

How interested are you in actively acquiring information about new ways of saving? (1-4)

Financial knowledge (scale range):

I'm knowledgeable about financial matters and economics. (1-7)

A set of five questions measuring knowledge of everyday financial matters. (0-5)

Self-control (scale range):

How often do you have to use your credit card, borrow from friends or get extra income a few days before you receive your paycheck, because your expenses during the month have been too high? (1-5)

How often do you buy something on impulse? (1-5)

I usually buy clothes, shoes and accessories to keep abreast of the trends. (1-7)

I have difficulties establishing regular saving habits. (1-7)

I quickly spend money that I keep in my wallet or have available on my ATM-card. (1-7)

Attitude toward financial risk taking (scale range):

I'm willing to commit a large share of my savings for a longer investment period. (1-7)

Which of the following statements come closest to representing the degree of risk your household is willing to take when saving or investing? (1-4)

How would you describe the risks you have been taking when saving and investing during the past year? (1-7)

How important is it for you to avoid taking risks when you decide how to save or invest your money? (1-7)

Financial control and planning (scale range):

How well does your household keep track of your expenditures? (1-5)

I have good control over my savings and the interest I get from them. (1-7)

Does your household try to keep account of incomes and expenditures, for example in an accounting book? (1-5)

To what extent do you think it is necessary to plan the household's future finances? (1-5)

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