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Household Finance: Portfolio Decision Models and Financing Decisions

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Abstract

This study reviews some household portfolio decision models and borrowing decisions from the extant literature. Household portfolio decisions entail the commitment of financial wealth across a broad range of financial instruments or securities to satisfy intertemporal consumption-investment objectives. Household financing or borrowing decisions, on the other hand, involve the raising of finance to procure specific household needs such as mortgage or a consumer good. Stock market participation (or risky assets participation); portfolio selection, diversification and delegation of portfolio management; portfolio rebalancing in response to market movements; and portfolio rebalancing over the life-cycle underpin household portfolio decisions. Household financing/borrowing decisions are reviewed within the context of credit availability; household mortgage; and mortgage defaults. The main findings are as follows. Fixed transaction costs and non-standard preferences such as ambiguity and loss aversion, are causes of limited stock market participation despite positive risk premium. The observed heterogeneity in household portfolio behaviour is due to disagreement about asset return distribution and need to hedge endowment risk. More sophisticated and more trusting investors are more likely to delegate portfolio management or seek financial advice. Stock market participation and the portfolio share invested in equity show a marked life-cycle pattern. Credit availability, credit market conditions, labour income shocks, relative attractiveness of investment opportunities over cost of borrowing are the primary factors influencing household borrowing decisions.

Keywords: household finance; household portfolio decisions; stock market participation; portfolio rebalancing; household borrowing; mortgage default.

JEL Classification: G50, G51, G52, G53

1.0. Introduction

Household finance is the field of financial economics that considers how households utilize financial instruments, markets, and institutions to achieve their intertemporal consumption-investment objectives. A common result in studies of household finance is that individuals/households respond slowly to changing financial incentives. Inaction and slow actions are prevalent in many spheres of household decision-making. Inaction is visible, even in situations where market conditions are changing continuously, and actions often occur long after the incentives to take them first arose.

On the investment or portfolio decision side, for instance, expected utility theory predicts that, when allocating wealth between a risky and a risk-free asset (two-fund separation theorem), investors allocate a positive amount to the risky asset if its expected return exceeds the risk-free rate of return. However, a large number of households invest none of their wealth in risky assets, leading to the familiar “limited participation puzzle” or “stock market participation puzzle” (Wang, *et al*, 2020). Other well-known household finance puzzling behaviours include savings and allocation decisions in retirement savings plans, and portfolio rebalancing in response to fluctuations in risky asset prices. On the financing or borrowing decision side, well known puzzling behaviours can be seen in the delay or outright failure to refinance a mortgage when market interest rates are falling. Collectively, these behaviours appear puzzling given the standard predictions of expected utility theory.

In this paper, we review household financial decision-making within the broad areas of portfolio decisions and financing/borrowing decisions. Household portfolio decisions entail the commitment of financial wealth across a broad range of financial instruments or securities to satisfy intertemporal consumption-investment objectives. Household financing or borrowing decisions, on the other hand, involve the raising of finance to procure specific household needs such as mortgage or a consumer good. The literature is indeed quite large and thus, difficult to lay claim to completeness. It suffices to note, however, that household portfolio decisions are underpinned in stock market participation (or risky assets participation); portfolio selection, diversification and delegation of portfolio management; portfolio rebalancing in response to market movements; and portfolio rebalancing over the life-cycle (Karpati, 2022). Household financing/borrowing decisions are reviewed within the context of credit availability; household mortgage; and mortgage defaults.

The rest of the paper proceeds as follows. Section two provides the literature review and theoretical framework for household portfolio decisions. Section 3 reviews the literature on household financing/borrowing decisions. Section four summarizes the findings alongside key research questions, while section five concludes.

2.0. Literature Review and Theoretical Framework

2.1. The Merton Model

Risk preferences are integral to models of household portfolio choices that build on the von Neumann-Morgenstern expected utility framework. These models draw a relation between the portfolio risky share and financial wealth. In the classic Merton (1969) model of consumption-portfolio choice, investor h 's optimal risky share, ω_h , is given by:

$$\omega_h = \frac{ERP_h^e}{\gamma_h \sigma_h^2} \quad (1)$$

Where ERP_h^e is the expected risk premium, σ_h is the volatility of risky assets, and γ_h is the Pratt-Arrow degree of risk aversion. A common assumption in asset pricing theory, motivated by the fact that all households (or investors) will have to hold the market portfolio in aggregate is homogeneous belief about the risky assets. In other words, $ERP_h^e = ERP^e$ and $\sigma_h^2 = \sigma^2$. Consequently, the model yields the powerful implication that all heterogeneity in observed portfolio risky shares should be explained by differences in risk attitudes, which are captured in the model by the relative risk aversion parameter γ_h . Portfolio optimization and expected utility theories (e.g., mean-variance model) build on (1) to identify the determinants of the relative risk aversion coefficient γ_h . For example, within the expected utility framework, if individual preferences display constant relative risk aversion (CRRA), wealthy and poor investors should all have the same share of wealth invested in risky assets, ω_h . If investors display decreasing relative risk aversion (DRRA) preferences, instead, wealthier investors should invest a greater fraction of their wealth in risky assets.

Researchers have embraced two common methods to measure risk aversion namely: revealed preference approach and elicitation of risk preferences. Further and from the literature, risk aversion is influenced by many factors such as *wealth*, *consumption commitments* (Grossman and Laroque, 1990; Postlewaite, *et al*, 2008; Aydilek and Aydilek, 2020; Harmenberg and Oberg, 2021), *gender* (Fagereng, Gottlieb and Guiso, 2017; Andreoni, *et al*, 2020; Baeckstrom, *et al*, 2021), *patience* (Brunette and Jacob, 2019), *intellectual ability* (Andreoni, *et al*, 2020; Harrison, *et al*, 2020; Munoz-Murillo, *et al*, 2020), *hereditary factors/background risk* (Cocco, 2005; Heaton and Lucas, 2000; Barth, *et al*, 2020; Fagereng, *et al*, 2020), *past experiences* (Moya, 2018; Kuratko, *et al*, 2020), age (Kesavayuth, Ko and Zikos, 2018), *inter alia*.

2.2. Household Portfolio Decisions

An inference from the Merton model is that all investors, independently of their wealth and of their risk preferences, should participate in all risky assets markets and should invest in the market portfolio. This is a mere simplification of the reality. A substantial fraction of households do not participate in risky assets markets; those who do, do not hold the same securities and do not hold the market portfolio. There is a substantial discrepancy between the predicted homogeneity and the observed heterogeneity of household behaviour. Further, portfolio selection models (diversification, under-diversification, frequency of trading and delegation) are reviewed as well as portfolio rebalancing in response to market movements and over the life-cycle.

2.2.1. Stock Market Participation

Over the past 25 years, a large literature led by Haliassos and Bertaut (1995) has been trying to explain why many households in developed countries do not invest in risky assets despite the equity premium and predictions of expected utility models. Specifically, Haliassos and Bertaut (1995) argue that risk aversion, heterogeneity of beliefs (Fama and French, 2007), habit formation (Constantinides, 1990), time non-separability and borrowing constraints do not

account for the low participation puzzle. Inertia and deviations from utility maximization are proximate causes. In developing countries, the low stock market participation phenomenon may be gloomier given abysmal record of financial inclusion. It is more conventional for many households to access the formal financial system through the banks and insurance companies than the stock market (Carlson, *et al*, 2015).

I. Participation Costs and Stockholding Puzzle

Households might choose not to invest in equity because they face fixed costs of participation. Examples are varied and include monetary expenses (e.g., administrative charges to set up an investment account) and information costs (e.g., learning about financial products). Investors weight the fixed costs of participation against the benefit of investing in risky securities, which, in a rational model, is the risk premium they can earn multiplied by the amount invested. Hence, fixed participation costs imply that more risk tolerant investors are more likely to participate because they are more likely to invest a larger share of their financial wealth in risky assets. The same is true for investors who face less background risk or who are less likely to be liquidity constrained. In general, any factor that increases the optimal portfolio risky share will encourage stock market participation. This can rationalize why stock market participation correlates with characteristics such as investor cognitive skills (e.g. Grinblatt, Keloharju and Linnainmaa, 2011), financial literacy and education (Haliassos, Jansson and Karabulut, 2020; Munoz-Murillo, *et al*, 2020; Fagereng, *et al*, 2020), and risk aversion (Haliassos and Bertaut, 1995; Guiso and Sodini, 2013; Borovicka, 2020). Specifically, fixed participation costs are consistent with the strong positive correlation between participation and wealth.

Since participation costs are not observables, a test of the theory rests partly on its implications and partly on the estimates of the size of these costs. Direct estimates are hard to obtain. One could use information on trading and holding fees, but these are not necessarily fixed and paid upon entry, and in addition they can only provide a lower bound to the estimated costs of participation. Alternatively, one could follow a revealed preference approach and infer participation costs from observed behaviour. The estimates found in the literature with the revealed preference approach are sufficiently small to be reasonable, thus making the participation cost explanation plausible. Additionally, the increase in stock market participation that has taken place over the past two decades is also consistent with a decline in participation costs. The availability of financial information on the Internet, and the expansion of the mutual fund industry have effectively made access to the equity market cheaper.

However, there are features of the data that are hard to reconcile with the fixed participation story. First, it is hard to explain the marked cross-country differences in stockholdings, particularly when one compares countries at similar level of economic and financial development such as Sweden and Germany. Second, it is difficult to rationalize with (small) participation costs the lack of participation at high levels of wealth in many countries. For instance, Guiso and Sodini (2013) report that, even among the top 5% wealthiest investors, 28% have no stocks in the Netherlands, 39% in Germany, and 75% in Spain.

II. Non-Standard Preferences and the Limited Stockholding Puzzle

An alternative approach that has been used to explain the participation puzzle is to consider non-standard preferences. For instance, Barberis, Huang, and Thaler (2006) show that individuals with loss aversion preferences and narrowly framed portfolio decisions choose to avoid the stock market even without direct participation costs. This explanation is consistent

with Dimmock and Kouwenberg (2010), who find that an elicited measure of loss aversion is correlated with the probability of investing directly or indirectly in stocks. Related studies along this line include Easley and Yang (2015), Yang (2019), Rasool and Ullah (2020), Wang, *et al* (2020), and Huang and Chen (2021).

Similarly, if stock returns are ambiguous and investors are averse to ambiguity, it may be optimal not to participate altogether in the stock market, as demonstrated by Dow and Werlang (1992) in the context of a two-asset portfolio model with one ambiguous and one unambiguous asset, and, by Garlappi, Uppal, and Wang (2007) in a model with multiple ambiguous assets (see Epstein and Schneider (2010), Makarov (2021), Ngangoue (2021), Ruan and Zhang (2021) for a review).

While the combination of loss aversion, narrow framing, and ambiguity can potentially rationalize why some households do not participate, it is unlikely to explain the positive correlation between participation and wealth, the lack of participation at high wealth levels, and the persistent cross-country differences in stock market participation. One would have to make assumptions about how loss aversion, narrow framing, and ambiguity affect individuals at different levels of wealth and, if one were to rely on preference-based explanations, why they differ systematically across populations in a way that can explain the observed differences in stock market participation.

III. Beliefs and Stock Market Participation

In portfolio theory with standard expected utility preferences, investors hold risky assets to earn the risk premium. If individuals believe that the stock market does not yield an expected return more than the risk-free rate, they will choose to stay out of the market, even in the absence of participation costs. In other words, investors/households with more optimistic beliefs about stock returns are more likely to participate and vice versa.

In the Merton-type model, the share invested in risky assets depends on their Sharpe ratio, i.e., the equity premium per unit of risk taken $\frac{ERP_h^e}{\sigma_h}$. Coupled with fixed participation costs and investor home bias, variations in Sharpe ratios across countries may also contribute to explain cross countries differences in participation. The perceived Sharpe ratio depends also on the portfolio diversification an investor can achieve. Some studies (e.g., Akintola-Bello, 1985; 1986; Karpati, 2022; Guiso and Zaccaria, 2023) have shown that less sophisticated households tend to hold less diversified portfolios. The typical non-participating household, being poorer and uneducated, would invest in a poorly diversified portfolio if it were to participate, thus earning a lower risk premium. The awareness of this limitation by the said households forces them to stay out of the market.

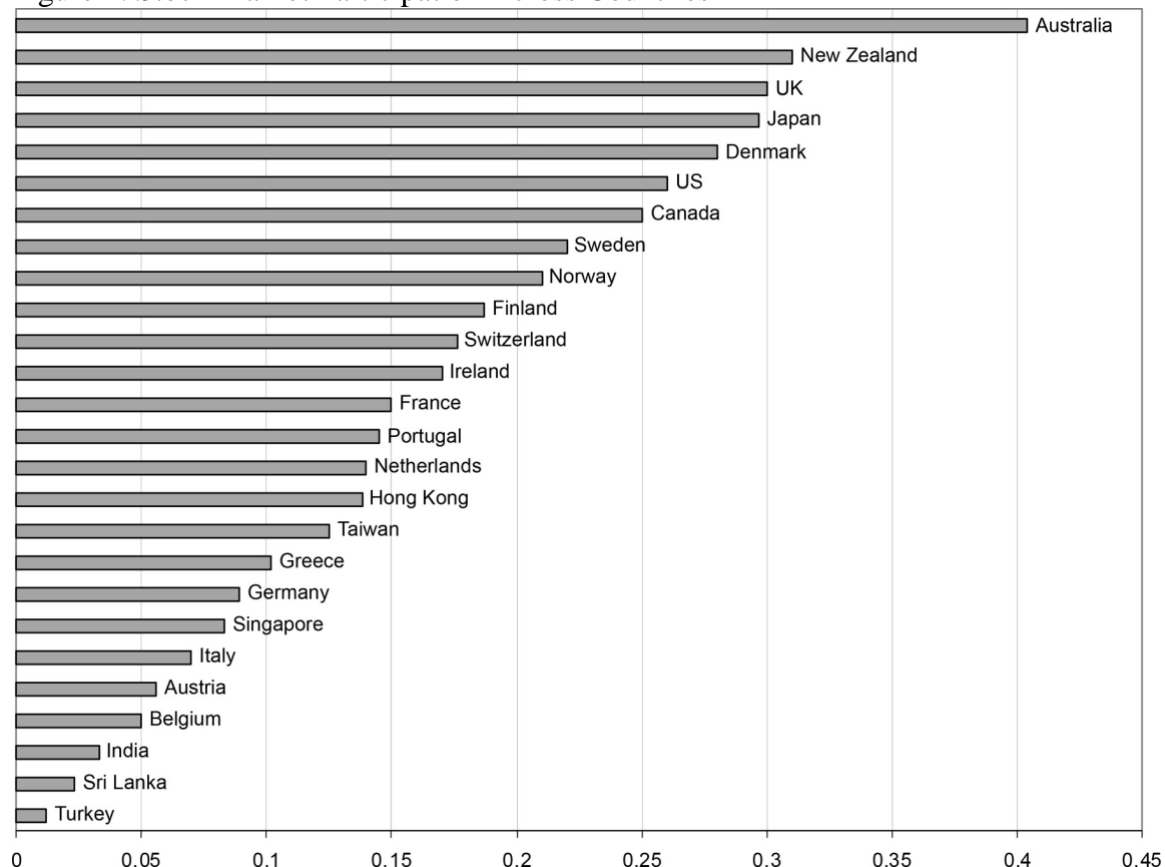
Further, since the decision to participate requires households to form beliefs about the risk-return trade-off achievable by investing in risky assets, it also requires confidence in information sources, financial advisors, portfolio managers, and, more generally, on the overall reliability and integrity of the financial system. High profile market scandals such as the Enron bankruptcy, WorldCom scandal or the Madoff scandal, may not only change subjective probabilities about asset returns, but the fundamental trust in the system that delivers those payoffs. Guiso, Sapienza and Zingales (2008) develop a model showing that wary investors might not participate since their lack of trust dissolves the perceived risk premium. Trust reflects the objective characteristics of the financial system (the quality of investor protection,

its enforcement, etc.) but also investor beliefs and backgrounds. Differences in social norms rooted in history or in religious upbringing (Gur, 2021; Barrios, *et al*, 2021) can create considerable differences in levels of trust across individuals, regions, and countries. To assess the power of a trust-based explanation they rely on a Dutch survey with information on attitudes towards trusting other individuals. They find that trust indeed predicts investor stockholding decisions and that the result is robust to the inclusion of controls for individual risk and ambiguity aversion. They conclude that trust and preferences for risk play different roles in the participation decision. Additionally, the effect of trust cannot be due to unobservable institutional differences since all investors are drawn from the same country.

The trust-based explanation embodies three implications. First, since trust is a (relatively) stable individual attribute, it can explain the persistent reluctance or inclination to invest in risky assets. Second, since trust does not vary much across wealth levels, it can explain limited participation even among the wealthy. Furthermore, even though participation costs are still needed to explain the difference in participation between the wealthy and the poor, lack of trust amplifies the effect of costly participation.

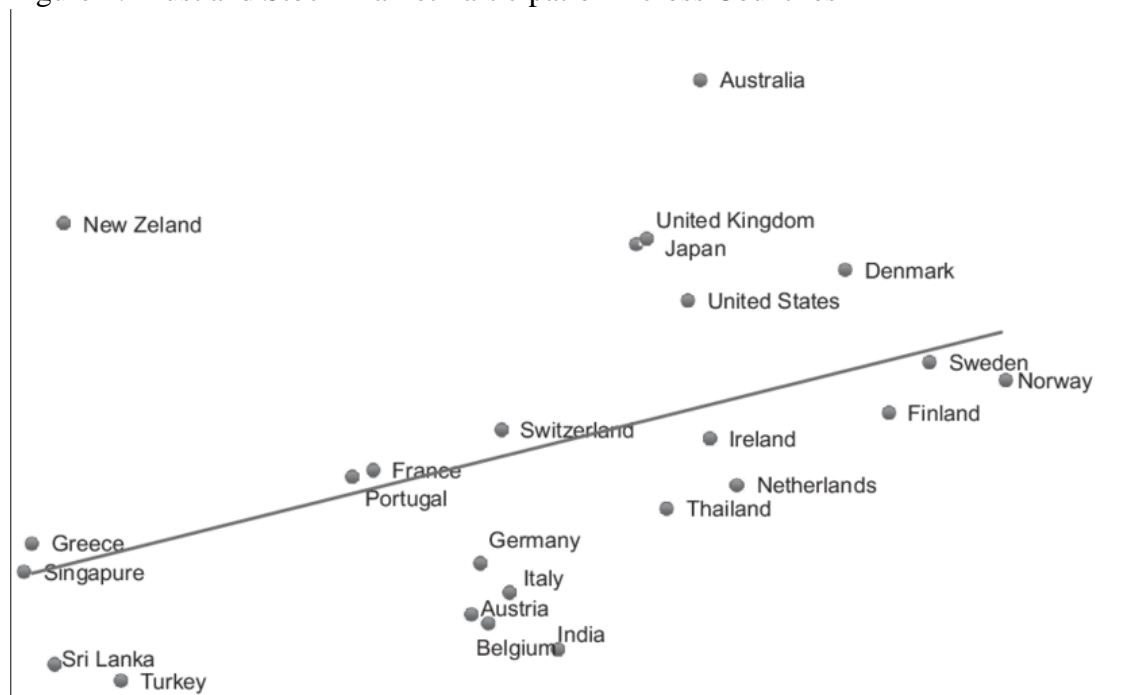
Figures 1 and 2 show how the average level of trust in different countries influences investors' reluctance to invest. To attract investors and households to the stock market therefore, price-earnings (P/E) ratios would fall. The fall in P/E ratios dissuades entrepreneurs from floating their firms or issuing their shares to the public. This is a testable prediction. In figure 1, the fraction of individuals who directly own stocks in Turkey is only 1.2 percent while in Australia, it is slightly above 40 percent (the highest in the sample). In figure 2, stock market participation on the vertical axis is plotted against the average level of trust on the horizontal axis.

Figure 1: Stock Market Participation Across Countries



Source: Guiso, Sapienza and Zingales (2008:2589)

Figure 2: Trust and Stock Market Participation Across Countries



Source: Guiso and Sodini (2013)

IV. Limited Participation in Other Financial Instruments

Limited participation is a broader phenomenon that involves not only risky financial securities. Not all households hold debt and many do not participate in insurance markets. Some of the forces that lead households to stay out of risky securities may be also advocated to explain lack of participation in insurance or in debt market. For instance, bankruptcy costs may discourage borrowing and, with unfair insurance pricing, risk tolerant individuals may decide not to insure leaving the market to the more risk-averse. Oyejide and Soyode (1974, 1976) and Akintola-Bello (1985, 1986) provide important theoretical and extensive developing country perspective of the insurance market. Up until 1980, the insurance industry in Nigeria constituted merely about 4 percent of the financial institutions in terms of assets. As at 1980, its contribution to the Nigerian economy measured by relative assets to the gross domestic product was less than 0.5 percent (Akintola-Bello 1985). Their investment policies are also greatly influenced by regulation in terms of relative composition of assets in corporate securities, government securities and real estate or property business, which also impact on insurers' relative *transactionary*, *precautionary* and *speculative* demand motives for cash (Akintola-Bello 1986). As at 2015, the insurance industry contribution to the economy was 0.7% which is still quite low relative to South African insurance industry penetration at 12%. Lack of awareness, trust, affordability, absence of relevant products and regulatory weaknesses have been cited as some of the key constraints to insurance uptake in Nigeria even as over 60% of the population is considered low-income, leaving room to grow the microinsurance market. The challenges of limited capacity for risk transfer or mitigation may thus necessitate undue accumulation of capital - and in some situations increase the tendency for graft, avarice and/or use of tax havens - amongst the taxpaying public (Paseda, 2020). Trust engenders patronage and so does the endorsement of insurance by a reputable person in a rural or financially excluded setting.

V. Participation Puzzle Bottomline

The literature on the participation puzzle is the oldest in household finance and is large. Compared to other areas, it provides well-established stylized facts that are difficult to reconcile with standard portfolio choice theory. Participation costs, non-standard preferences, and belief heterogeneity, not only in the form of subjective probabilities about future returns but also in terms of trust, capture different features of the data and probably each of them contributes to the explanation of the non-participation phenomenon. The challenge for future research is to identify when and for which investors some of the explanations are more relevant than others. Participation has been studied mostly in a static framework, and the decision to enter and exit risky financial markets has received little attention, probably because many datasets lack the desirable panel structure (Guiso and Sodini, 2013).

2.2.2. Portfolio Selection

Once households decide to participate in risky asset markets, they are faced with a number of decisions: how much to invest in risky assets, which assets to buy, whether to invest through a fund manager, and whether to follow the recommendations of a financial advisor.

The literature on how households decide on the proportion of financial wealth invested in risky assets postulates that some factors determine the portfolio risky share. The portfolio risky share depends on financial wealth, background risk, demographic characteristics, personality traits and intelligence, beliefs, and non-standard preferences. Do households hold diversified portfolios? Which assets do they decide to buy? How do they trade? Do they invest through a fund manager or directly? Do they rely on financial advisors and follow their recommendations?

I. Diversification

One of the basic precepts of financial theory is to hold a diversified portfolio, that is, to avoid concentrating risk in one or few (correlated) assets (Markowitz, 1952; Rubinstein, 2002). Do households follow this simple and basic principle of financial theory? If they do, how do they achieve diversification? If they do not, how heterogeneous are household portfolios? How large and costly is under-diversification? Which households are more diversified?

These basic questions can only be answered by using reliable, highly detailed, and comprehensive information on the portfolio holdings of a representative sample of the population. Unfortunately, datasets that satisfy these requirements are rare. Surveys contain information on a representative sample of the population but cannot be too detailed and are sometimes imprecise since households, especially the wealthy, do not like to share information on their finances. Information on individual accounts held at brokerage houses is very accurate and detailed but it is limited to the clients of the brokerage house, which is a highly selected sample of investors, and to the assets held at the brokerage house, which might not be representative of total financial wealth. Similar issues arise with data based on 401(k) accounts and other tax-favoured retirement accounts. Researchers have used registers of ownerships (Massa and Simonov, 2006) to obtain accurate and detailed data for a representative sample of the population, but the information is limited to directly held stocks and does not consider holdings of mutual funds and other risky assets (Guiso and Sodini, 2013).

A significant advance in characterizing household portfolio diversification has been made by Calvet, Campbell, and Sodini (CCS, 2007). They use a dataset with information on the overall wealth of all Swedish resident households. The data records not only all asset classes (real estate, bonds, stocks, funds, and bank accounts) but also portfolio holdings at individual asset level. Their data can potentially overcome some of the shortcomings listed above. First, a representative sample of the population can be selected. Second, the administrative nature of the data drastically reduces measurement error typically found in surveys. Swedish financial institutions supply information to the tax agency on their clients' worldwide security investments. Taxpayers receive their tax return already filled in, check the figures, and, if necessary, correct errors and add information. Third, since the information is provided for total current financial wealth and at individual asset level, the diversification achieved by households can be estimated precisely.

Consistently with the previous literature, CCS (2007) find that Swedish household hold very few stocks directly but, since they can observe all current financial wealth at individual asset level, they are able to explore the determinants of idiosyncratic risk held in the complete portfolio of risky assets. They consider the following regression of household h 's risky asset excess return, $r_{h,t}^e$, on the excess return, $r_{m,t}^e$, of a fully diversified benchmark portfolio such as market index.

$$r_{h,t}^e = \alpha_h + \beta_h r_{m,t}^e + \varepsilon_{h,t} \quad (2)$$

$\varepsilon_{h,t}$ is an error orthogonal to the benchmark. The variance σ_h^2 of the portfolio risky assets can then be decomposed into a systematic component $\beta_h^2 \sigma_m^2$ and an idiosyncratic component σ_ε^2 .

$$\sigma_h^2 = \beta_h^2 \sigma_m^2 + \sigma_{\varepsilon,h}^2 \quad (3)$$

$$\text{where } \varepsilon_{h,t} \sim N(0, \sigma_{\varepsilon,h}^2); \beta_h = \frac{\text{Cov}(r_h, r_m)}{\sigma^2(r_m)} = \frac{\sigma_{h,m}}{\sigma_m^2} \quad (4)$$

According to the capital asset pricing model (CAPM) of Sharpe (1964), the household expected excess return over the risk-free rate is proportional to the market risk premium:

$$Er_{h,t}^e = \beta_h Er_{m,t}^e \quad (5)$$

That is, households are compensated only for taking systematic or non-diversifiable risk. The CAPM implies that idiosyncratic risk increases the volatility of household portfolios without improving their expected return. To hold only systematic risk and maximize the portfolio Sharpe ratio, $Er_{h,t}^e/\sigma_h$, the necessary condition is that fully diversified households hold the market portfolio. Concentration of financial wealth in individual stocks amplifies idiosyncratic risk.

Losses from under-diversification are potentially severe for households that hold a large fraction of financial wealth in risky assets. When most wealth is held in safe assets, a concentrated portfolio in stocks has very little impact on household welfare. Further, diversification losses and sophistication are closely connected. Studies have also provided evidence that financial literacy is strongly correlated with portfolio diversification, but it is only weakly correlated with self-assessed financial competence.

Diversification is one of the basic principles of optimal portfolio selection. It is cheap to obtain and the lack of it can be extremely costly. It is challenging to measure diversification in

household portfolios since one needs very detailed information on all security holdings. In Sweden, such information is available, and most Swedish households avoid significant losses from under-diversification by holding mutual funds, and by reducing risk exposure when they take idiosyncratic risk. Better educated, richer, and more financially literate households have better diversified portfolios. However, a minority of households suffer large losses from under-diversification.

II. Under-diversification, Information, Hedging and Preferences

The fact that more sophisticated households are better diversified can be interpreted as evidence that under-diversification is the result of mistakes, i.e., households would choose to invest in diversified portfolios if they were told of the negative consequences of being under-diversified. Another possibility is that deviations from diversified portfolios are the result of a rational choice or are induced by systematic behavioural biases. Theories of under-diversification can be divided into three broad categories. First, investors might hold portfolios that differ from the market when they do not have the same information or when some assets are more difficult to evaluate than others. Second, investors might simply have a taste for certain financial asset characteristics, such as proximity, or might display non-standard preferences, such as prospect theory, that induce them to take on idiosyncratic risk. Third, individual portfolio heterogeneity can be motivated by the need to hedge endowment risk such as income risk or risk connected to the investor geographical location.

Information: Like non-participation, under-diversification can simply be the result of households facing fixed learning or transaction costs, that limit awareness of available investment opportunities. Merton (1987) studies an economy where investors have the same information on the securities they jointly know about, but each investor is aware only about a subset of the available securities. He shows that in equilibrium, the market portfolio is not mean-variance efficient and investors' portfolio shares are different from the market portfolio.

Preferences: Theories of under-diversification based on preferences argue that investors prefer certain financial assets regardless of their payoffs. Huberman (2001) argues that investors have a taste for familiar assets whether they represent a profitable investment. Familiarity can take many forms, such as professional or geographical proximity, and it stems from preference inclinations, not from informational advantage. A preference for the familiar can also be the reflection of ambiguity averse preferences an idea made precise in Boyle, Garlappi, Uppal, and Wang (2012).

Fama and French (2007) study the equilibrium of an economy in which some investors value financial assets as consumption goods and choose them simply because they like them. In their model the market portfolio is not mean-variance efficient and investors hold undiversified portfolios in equilibrium. Interestingly, even investors who do not view securities as consumption products, and value them only based on their payoff, are under-diversified in equilibrium, since they must hold the residual supply of assets. Roussanov (2010) adds another channel through which preferences might affect diversification. Investors concerned about social status hold idiosyncratic risk to increase their chances to "get ahead of the Joneses."

Hedging: Investors are endowed with their own individual risk. They hold jobs, own houses, run businesses, live in specific locations, and have different educations. To the extent that their endowment risk is correlated with financial securities, investors should tilt their portfolios away from the market to reduce their exposure to those assets that are correlated with their own

endowment risk. In this way they will reduce their overall, financial, and non-financial, risk exposure compared to the case in which they hold the market portfolio. In partial equilibrium, there is a clear tension between hedging needs and the prediction of models with differential information and familiarity. For example, on the one hand investors should shy away from stocks of sectors close to their professional expertise since they are likely to be correlated with their human capital. On the other, investors might decide to hold professionally close stocks since they are more likely to have superior information about them or feel them as familiar. In general equilibrium, however, limited resources might induce agents to rationally invest in assets positively correlated with their own endowment risk to hedge their relative wealth in the local community. Prices of local goods and services in limited supply have prices that are increasing in aggregate wealth, hence financial assets whose payoffs are correlated with total wealth are highly valuable to local investors.

Empirical Evidence: Theories of under-diversification are difficult to test since they require very detailed and comprehensive data on both household portfolio composition and household characteristics. Most of the empirical literature has focused on individual stockholdings to distinguish among possible causes of under-diversification. A growing, but still thin, literature sheds light on the relation between the level of diversification households achieve in their portfolios and why households choose to hold idiosyncratic risk.

III. Frequency and Profitability of Trading

In the standard Merton (1969) portfolio optimization model, the vector of portfolio shares, invested in risky assets by a household with relative risk aversion is characterized as an increasing function of the risk premium but a declining function of the risk aversion parameter adjusted for the variance-covariance matrix of excess returns.

A common feature of this frictionless, partial equilibrium model, is that any news that results in a change of risk premium, induces household h to immediately reallocate its portfolio. This carries two implications. First, the frequency with which an investor obtains news and the frequency of trading should coincide. Second, events that affect household relative risk aversion γ_h , such as variations in wealth or background risk, should induce households to reduce proportionally the investment in all risky assets. The basic Merton model suggests, then, that households should rebalance and reallocate their portfolio very frequently, if not continuously.

In summary, households trade infrequently on average but a minority of them churn their portfolios. There is large cross-sectional heterogeneity in trading performance with the average investors suffering trading losses even before fees. Investors who trade more suffer larger trading losses net of fees but they seem to learn from past experience and subsequently quit the market. Sophisticated investors earn reliable positive abnormal returns over time and are less prone to behavioural trading patterns, such as the disposition effect.

IV. Delegation of Portfolio Management

Rather than deciding on their finances directly, households may delegate portfolio decisions to professional money market managers and, when deciding on their own, rely on the suggestions of financial advisors. Economies of scale in expertise, information collection and transaction costs make the market for financial expertise suitable to improve household finances and welfare.

Hung *et al.* (2008) document that 73% of US investors rely on professional advice to conduct stock market or mutual fund transactions. However, adverse selection among mutual fund managers (Berk and Green, 2004), conflict of interest with financial advisors (Inderst, 2010; Inderst and Ottaviani, 2012) and lack of financial literacy among households (Lusardi, Michaud, and Mitchell, 2017) might generate suboptimal equilibria that may require regulatory intervention (Campbell, Giglio, and Pathak, 2011).

Portfolio Delegation: A large and long-standing literature studies the determinants of mutual fund performance and net flows. After fees, actively managed mutual funds do not achieve a higher performance than passive indexes on average, and their risk adjusted returns display little persistence over time (Carhart, 1997; Fama and French, 2010; Jensen, 1968; Wermers, 2000; Cline and Gilstrap, 2021; Carneiro, *et al.*, 2021; Cheng, *et al.*, 2021). Net flows seem to correlate with past returns particularly for well-performing funds.

Some studies find that investors with higher IQ seem to minimize fees when choosing across mutual funds. Bailey, Kumar, and Ng (2011) relate the mutual fund choices of the clients of a large US brokerage house to the behavioural biases they display in individual stock trading. They find that less sophisticated and behaviourally biased investors are more likely to choose mutual funds poorly across a number of dimensions such as fees, trading frequency, timing, and performance.

Financial Advice: The early literature on financial advice (Elton, Gruber, and Grossman, 1986; Womack, 1996; Barber *et al.* 2001) has primarily focused on the information content of analyst recommendations, and argued that security analysts seem to be able to predict stock returns, but their recommendations are difficult to be exploited after trading costs. More recently, a number of papers have studied other aspects of the financial advisory activity. In line with the analyst literature, Hackethal, Haliassos, and Jappelli (HHJ, 2011), and Kramer (2012) find that advised accounts do not earn higher raw and abnormal returns than non-advised accounts after fees and after controlling for investor characteristics. Even though advisors do not seem to improve client portfolio performance, they may still help investors to avoid common investment mistakes and mitigate behavioural biases.

Some of the findings reported in the empirical literature of financial advisory impact on portfolio selection are difficult to interpret solely as the outcome of financial advisor skills and incentives. Indeed, the group of individuals that seek and end up using financial recommendations might not be representative of the population and might not be randomly matched to financial advisors. A robust finding is that more sophisticated (wealthier, better educated, more financially literate, less overconfident) and more trusting investors are more likely to delegate portfolio management or seek financial advice.

2.2.3. Portfolio Rebalancing in Response to Market Movements

The popular practitioner recommendation of rebalancing the portfolio so that the share invested in risky assets is stable over time is rooted in the hypothetical predictions of the basic Merton model. Movements in asset prices mechanically induce passive variations of the risky share ω_i that might not coincide with revisions of the target share ω_i^* . The practitioner advice is then based on the assumption that investor beliefs and risk aversion remain unchanged. In this case, the risky share ω_i should be rebalanced back to its original level and should fully offset the variations induced by asset price movements.

Such a conclusion, however, not only assumes that households do not revise their target shares over time, but also does not consider the reaction of asset prices to household rebalancing. In equilibrium, no aggregate rebalancing is possible. The average household must hold the market portfolio and its risky share can only change passively with asset prices. Yet, in a heterogeneous agent economy, the aggregate inertia conceals the trading activity of investors with different information (and beliefs) or different risk aversion. Uninformed investors absorb the trades of the informed, and thus rebalance by engaging in contrarian trading, that is, by buying when prices fall and selling when prices rise (Grossman, 1976; Grossman and Stiglitz, 1976).

Rebalancing individual positions: An aspect of the literature uses data that identify trades on single stocks by individual investors at stock exchanges. High frequency net trades of individual investors are aggregated at stock level and are correlated to the stock past performance. A widespread finding across countries and exchanges is that individual investors as a group tend to be contrarian investors at least over the horizon of up to one year.

Rebalancing the financial portfolio: All these findings pertain to trading in individual stocks. They do not tell us how these trades relate to rebalancing of the overall risky share ω_i and how rebalancing itself correlates with household characteristics. Consistent with markets being in equilibrium, studies find that active variations in the aggregate risky share of households are small but at the same time hide strong rebalancing at individual investor level. Households hold diverse portfolios and therefore experience different passive variations in their risky share. As a result, households have different incentives to rebalance their portfolio and thus trade with each other.

Even though understanding how households react to changes in market conditions is a central issue in financial economics, asset pricing models have so far mostly concentrated on different issues than rebalancing behaviour, and the empirical literature is still identifying the basic stylized facts. An established finding is that households follow contrarian strategies on average both at individual stock level and when they rebalance the share of financial wealth invested in risky assets. The most recent evidence suggests that households offset about 50% of the idiosyncratic passive variations in their risky share, with more sophisticated investors rebalancing faster. Additionally, households rebalance by using a variety of trading strategies that are not symmetric across stocks and funds, and differ depending on past portfolio performance.

2.2.4. Portfolio Rebalancing Over the Life-Cycle

In the past two decades, a number of contributions have re-examined the life-cycle behaviour of investor portfolios. Inspired by empirical findings from novel microeconomic data on household finances, several papers have provided new models of optimal portfolio rebalancing over the life-cycle that go beyond the seminal dynamic framework of Merton (1969, 1971), Mossin (1968) and Samuelson (1969). The Merton-Mossin-Samuelson (MMS) models generate two sharp predictions. First, individuals should participate in risky asset markets at all ages—a proposition that extends to a dynamic context such as the participation principle discussed in Section 2.2.1. Second, the share invested in risky assets should not vary over the life-cycle.

The implications of the MMS model are in contrast both with the limited participation puzzle observed in empirical work and with the widespread advice of the financial industry to invest

substantially in stocks when young and reduce the exposure to the stock market when older—an advice that translates into the popular rule of thumb of investing a share of financial wealth in stocks equal to 100 minus the investor's age (e.g. 75% in stocks when 25 years old and 25% when 75). We are then naturally faced with two questions. First, is it possible to reconcile the recommendations of professional financial planners with the normative predictions of dynamic portfolio choice by relaxing the restrictive assumptions of the early models? Second, how do investors choose their risk exposure over their lifetime?

There are at least three reasons to doubt the empirical findings on participation and risk taking over the life-cycle. First, most of the available evidence is obtained from cross-sectional data. Since in a cross-section one must compare portfolio holdings of individuals of different ages at each point in time, one cannot separate age effects from cohort effects. Any pattern observed in participation or portfolio risky share may not reflect a life-cycle effect but differences across cohorts. Second, most studies ignore the fact that the risky portfolio share is only defined for participants and that participation in assets markets is an endogenous choice. Third, the evidence comes primarily from surveys which are notoriously subject to potentially large measurement errors. Most importantly, measurement errors are likely to be more severe for older individuals since they are known to be correlated with wealth levels.

Fagereng, Gottlieb and Guiso (2017, FGG) have assembled a database based on the Norwegian Tax registry. Since Norwegian households are subject to a wealth tax, they must report to the tax authority all their end-of-the-year assets holdings, both real and financial, item by item, at the level of individual instruments. They have drawn a random sample of 75,000 Norwegian households from the 1995 population and then followed these households for 15 years up to 2009. Information on asset holdings is available at the level of resident individuals—since taxes are filed individually—but can be aggregated at family level since a household code is available. Finally, since the whole population of Norwegian taxpayers has to report to the Registry, there is very little attrition in the panel—exit is possible either by death or emigration.

FGG (2017) control for unrestricted time effects by modelling cohort effects through variables that capture relevant experiences during formative years. They also consider the endogeneity of the participation decision by modelling it explicitly, allowing, again, cohort effects to affect participation in risky assets markets. They find that both participation in the stock market and the portfolio share invested, directly or indirectly, in equity show a marked life-cycle pattern. Participation shows a pronounced hump-shaped profile and is limited at all ages. It rises rapidly for the young, reaching a value of around 71%, and stays constant until retirement. As soon as investors leave the labour market and retire, they start exiting the equity market as well. Interestingly, and in contrast to the previous evidence, the conditional risky share also varies with investor age. The participant share invested in equity (shown on the right-hand scale) is high and perhaps slightly rising at the beginning of the life-cycle. It is flat at almost 50% until investors enter their 50s. At that point, it starts falling regularly by about one percentage point a year until retirement age. During retirement, the portfolio risky share remains fairly constant, or even slightly rising, at about 35%. The pattern of the share invested in equity is remarkably consistent with life-cycle portfolio models.

Nevertheless, there are two significant differences between the model predictions and findings. First, the models typically generate much higher shares in stocks than the ones observed in the data, particularly for the middle aged. Second, they often do not predict limited participation

and exit from the stock market as investors age. The evidence in FGG (2017) suggests two effects. First, as they approach retirement, households rebalance their portfolio away from stocks but continue to stay in the market. Second, after retirement, they start exiting the market. FGG (2017) calibrate a model similar to Cocco, Gomes and Maenhout (2005) but with two additional ingredients, a realistic per period small cost of participation, such as the management fee of a mutual fund, and a limited amount of mistrust, as in Guiso, Sapienza, and Zingales (2008), calibrated on Norwegian trust data. In addition, their model generates exit from the stock market and a decline in the conditional risky share.

3.0. Household Financing Decisions

Since the 1980s, a large literature developed on the determinants and consequences of credit rationing in the household sector. Further, in the last two decades, as industrialized countries witnessed an extraordinary increase in household liabilities, the research focus has shifted. Normative models of optimal debt management have been developed to guide household liability choices, and micro-data on household debt have been used to study the optimality of household borrowing decisions.

3.1. Credit Availability

The spectacular growth in household debt of the last decade is at least partially due to a substantial increase in household access to credit worldwide. Loan to value ratios (particularly in Europe, e.g., Guiso and Sodini, 2013), loan to income ratios (particularly in the US, e.g. Campbell and Cocco, 2015), and conditional acceptance rates of loan applications, all increased during the 1990s. The liberalization of credits and financial markets in many industrialized countries have stimulated unprecedented household debt growth and credit availability in recent decades.

3.2. Optimal Mortgage Choice

3.2.1. Theories of Mortgage Choice

Despite its importance, optimal mortgage decision making has received surprisingly little attention in the academic literature. Only recently, a number of papers have developed realistic models that consider household characteristics that are salient to mortgage type choice. Campbell and Coco (2003) are the first to study under which conditions the purchase of a house of a given size should be financed using a fixed rate (FRM) or an adjustable-rate mortgage (ARM). Even though other forms of mortgages than FRM and ARM are available, and mortgage contracts may differ along several dimensions (e.g. maturity, prepayment options, refinancing opportunities, etc.), most mortgages held by households are either FRM or ARM. For instance, based on the 2007 Survey of Consumer Finances (SCF) in the US, 17.2% of the mortgage holders have an ARM and the vast majority a FRM. Since each type of mortgage offers protection against specific types of risk, the choice between FRM and ARM is a problem of optimal risk management.

In a fixed rate mortgage, the borrower pays a constant nominal amount per period and is thus subject to inflation risk. Additionally, to the extent that the expectation hypothesis does not hold (and there is ample empirical evidence that it does not), fixed rates carry a risk premium. If the mortgage contains a prepayment option, borrowers can reduce their risk exposure by exercising it and switching to the current nominal market rate. The option effectively transfers inflation risk to lenders which, in equilibrium, will charge an additional prepayment premium. In the US, the prepayment premium is about 125 basis points on average and lenders have to offer the prepayment option in FRMs by law. As a result, US households can avoid paying the premium only by choosing an ARM.

ARMs are free from inflation risk, but they are subject to income risk. Since adjust-able rates are indexed to short-term rates that track inflation, the real value of mortgage payments is invariant over time. However, to the extent that nominal income is subject to shocks, and not fully and simultaneously indexed to inflation, variations in nominal rates may force substantial drops in household consumption.

3.2.2. Empirical Evidence on Mortgage Choice

Models of optimal mortgage choice are important for at least two reasons. First, they provide normative recommendations against which it is possible to judge the popular advice that financial advisors and mortgage originators supply to households. Second, they provide a benchmark to evaluate how efficient are households in choosing mortgage types.

Campbell and Coco (2003) discuss the first issue and argue that, at least on some dimensions, practitioners seem to provide advices that are consistent with normative models. For instance, practitioners tend to recommend ARM to households that are likely to move but, at the same time, they do not seem to discern the risks entailed by the two types of mortgages and tend to regard FRMs as unconditionally “safe” and ARMs as “risky”. Furthermore, financial advisors are inclined to recommend FRMs when long-term rates have recently dropped as if long-terms rates were mean-reverting (a conjecture that has weak empirical support—Campbell, 2006).

On the second reason for why normative models are useful, initial evidence on micro-data found that younger households with a higher probability of moving, and with more stable income seem more likely to choose an ARM, consistent with the above normative models. Some of these earlier studies also tended to find that price variables rather than borrower characteristics had more explanatory power on mortgage choice.

More generally, while normative models calibrated with reasonable risk preference parameters seem to suggest that ARMs should be preferred by most households, many choose FRMs instead. Households display a strong preference for the predictability of FRM payments that is hard to explain with the available life-cycle models of mortgage choice.

Though the bulk of mortgages are either FRM or ARM, several alternative types of loans have been introduced in the residential mortgage market over the last decade. The main feature of these “complex” products—such as interest only mortgages, negative amortization mortgages and option ARMs with low initial teaser rates—is to allow debt holders to postpone principal payments. They are desirable for borrowers who face steep income profiles, face high income risk, and can make only small down-payments, but they may have been strategically promoted to obfuscate actual borrowing costs and fool unsophisticated households into inappropriate loans.

3.2.3 Repayment and Refinancing

Households good at choosing the type of mortgage that best suits their characteristics, might not be equally good at managing their loan afterwards. An aspect of the literature has investigated whether households are able to administer their loans efficiently.

One dimension of mortgage management is principal repayment. Since interest rates on mortgages are typically higher than returns on liquid assets, one would expect that positive liquidity shocks, more than consumption and precautionary saving, should be used by households to speed up the repayment of their loans. In the US, the SCF contains information on mortgage and home-equity loan interest rates, and reports how much liquid wealth each household needs for emergencies and other unexpected contingencies.

Refinancing a fixed rate mortgage is another dimension of mortgage management that can be subject to costly mistakes if the opportunity is not properly taken. By exercising the refinancing option when interest rates fall, a household can save on interest payments or maintain the same monthly payments and increase the size of the loan (a practice known as home equity extraction). Because of refinancing fees, households should refinance when market rates fall substantially. Furthermore, since interest rates are volatile, refinancing is optimal only if the drop is sufficiently large to accommodate the option value of postponing the refinancing decision. Campbell (2006) argues that many households fail to take advantage of refinancing opportunities in the face of substantial drops in interest rates. He documents that following the sharp drop in the 30-year mortgage rate in 2003, even though many households did indeed refinance, many others failed to do so. In 1997–2001, prior to the drop in interest rates, the fraction of households paying a mortgage rate in excess of 150 basis points with respect to the market rate—roughly the threshold that should trigger refinancing—was around 15% to 20%. In 2003, after the drop in interest rates, this fraction exceeded 30%, and about 20% of households did not refinance a spread in excess of 200 basis points. Campbell (2006) argues that these households are making a mistake and have a poor understanding of mortgage management. Indeed, he finds that those who did not refinance following the 2001–2002 dip are more likely to be “unsophisticated” borrowers—i.e. borrowers with lower levels of education, wealth, and belonging to racial minorities. Additionally, he also shows that unsophisticated households are more likely to self-report implausibly low mortgage rates. Households might rationally choose not to refinance, even when interest rates drop, if they expect to move. However, Campbell (2006) shows that unsophisticated borrowers are, in fact, less likely to move.

Finally, it is worth noticing that also the opposite mistake may be possible, that is refinancing too quickly by ignoring the possibility that interest rates may continue to fall.

In sum, households seem to make mortgage-related choices that are broadly consistent with the implications of normative models along some dimensions, particularly in choosing mortgage types, but a sizable minority makes mistakes along other dimensions, such as mortgage administration and management. This may not be surprising since optimal mortgage decision making is complex and requires considerable planning and computational capability, as well as a good understanding of the various trades-offs that different alternatives entail. It is conceivable that some households may lack the knowledge and expertise to optimally manage their mortgage when faced with new circumstances.

3.3. Mortgage Defaults

The events of the sub-prime mortgage market during the global financial crises of 2007-2009 wherein many US households - and indeed households in many other developed countries - found the value of their mortgages to be significantly higher than the values of their homes, led to strategic defaults on mortgages. Households with a negative equity position on their home are faced with two alternatives if they do not face a liquidity shortage; First, remain and continue to pay the mortgage, or alternatively, walk away from their homes, default on the loan, and let the bank repossess the collateral. Several papers have recently been looking at the drivers of mortgage strategic default, either theoretically or empirically (Abel and Fuster, 2021; Ratnadiwakara, 2021 and Chen, et al, 2020).

Analytical Framework of Strategic Default

In case of default, borrowers in nation states with non-recourse mortgages are not held personally liable beyond the property value. Upon foreclosure, the lender must accept the loss if the sale does not generate enough money to extinguish the loan. Hence households, even when they can afford the remaining mortgage payments, have an incentive to default whenever the value of the mortgage exceeds that of the property. We now sketch a simple model of strategic default.

Consider first the case of a borrower who owns a house currently worth H_t and still faces one balloon payment equal to D_t on its mortgage. The condition that $H_t < D_t$ is necessary but not sufficient for strategic default. Default entails non-monetary opportunity costs, such as giving up a house adapted to the borrower's needs; direct monetary costs, such as relocation and uncertainty about future interest rates; and non-monetary costs, such as the moral aversion to default, social stigma associated with default, the psychological strain of taking an unethical action (Guiso, Sapienza, and Zingales, 2013; Bursztyn, *et al*, 2019), emotional attachment (Bhutta, *et al*, 2017), people's subjective expectations (Kuhnen and Melzer, 2018), inattention (Andersen, *et al*, 2020; Agrawal, *et al*, 2016) and financial illiteracy (Lusardi, *et al*, 2017). Let K_t denote the net benefit of remaining solvent, a borrower will not default at time t if

$$H_t - D_t + K_t > 0.$$

In other words, many mortgagors with negative equity positions that are not too huge will still pay off their debt in full.

Further, assuming the mortgage expires after several periods and more than one payment is due. Then, the borrower faces the possibility of defaulting at a future date. The postponing

option becomes valuable since house prices might rise in the future, thereby making it worthwhile to continue owing the house and not default today. However, delaying default is less valuable for borrowers that are less likely to be able to serve their mortgage. This may occur, for example, because they might become unemployed, and therefore they might be forced into default before the last mortgage payment is due.

In summary, the mortgage default decision hinges on three factors, the quantum of the shortfall $H-D$, the pecuniary and non-pecuniary benefit of non-defaulting K , and the option value of postponing default. Along these three dimensions, considerable heterogeneity is likely to be displayed by households.

Models of strategic default that take all the relevant household characteristics into account do not yield closed form solutions and have to be investigated using numerical simulations calibrated to realistic parameter values. Campbell and Cocco (2015) explore a life-cycle model of strategic default with borrowing constraints, idiosyncratic labour income risk, interest rate, and inflation risk, as well as time-varying house prices and non-recourse conditions. In their setup, it is possible to study how the type of mortgage (ARM, FRM, or interest only mortgage—IOM) affects optimal default behaviour. They emphasize two mechanisms. First, the loan type directly affects the likelihood that a household ends up with a negative home equity position. For example, in an IOM, the mortgage principal is invariant over time, while it falls continuously with both ARM and FRM. Hence, *ceteris paribus*, negative equity positions are more likely with IOM especially later in the life of the loan. Second, the type of mortgage affects the incentive to default conditional on negative equity. IOMs have lower cash outlays which may relax borrowing constraints and increase the option to delay default. The option is instead less valuable in ARMs and FRMs, which have monthly cash outlays that include an additional principal repayment component, and hence have a higher probability that the borrower will be unable to pay and forced into default in the future. Campbell and Cocco (2015) also emphasize the importance of the loan to income ratio in explaining default frequencies. If loan to value ratios at origination mainly affect the likelihood of negative equity positions (consistently with the previous literature), the loan to income ratio influences the option value of postponing default conditional on home equity. A higher loan to income ratio implies higher interest payments relative to income, and thus more severe liquidity shortages and higher probability of future default.

Campbell and Cocco (2015) highlight that default is more frequent when a combination of shocks occurs: it is more likely in environments with low inflation (because the value of the residual mortgage is large), with low house prices and when there are large mortgage balances outstanding. In these environments it is more likely that a negative shock to house prices results in negative home equity—a precondition for default—and households with negative equity who choose to default have on average lower incomes and larger mortgage payments.

Overall, the theoretical literature emphasizes that negative equity positions do not automatically trigger default. Other monetary and non-monetary costs, such as relocation and social stigma, may play an important role implying that default may not occur unless equity becomes substantially negative. In addition to the option value to delay, default varies in the cross section of households along several dimensions such as mortgage type, leverage ratio, income to loan ratio and income risk.

4.0. Main Findings

Some of the main findings from this review article on household portfolio and borrowing decisions are tabulated hereunder.

Table 1: Main Findings on Household Portfolio and Financing Decisions

Research Questions	Findings	Relevant Studies
What explains the limited risky assets (including stock) market participation puzzle given positive excess risk premium?	Fixed transaction costs of participation, infiltration of non-standard preferences of households (loss aversion, narrow framing, ambiguity aversion), adverse belief and lack of trust in the stock market, and limited participation (as in insurance markets) may be amplified by unfair pricing, “lack of awareness”/ignorance, absence of relevant products, lower life expectancy and regulatory weaknesses are proximate causes of the limited participation puzzle.	Grinblatt, <i>et al</i> (2011), Haliassos, <i>et al</i> (2020), Munoz-Murillo, <i>et al</i> (2020), Haliassos and Bertaut (1995), Barberis, Huang and Thaler (2006), Easley and Yang (2015), Yang (2019), Rasool and Ullah (2020), Wang, <i>et al</i> (2020), Huang and Chen (2021), Karpati (2022) and Luo, <i>et al</i> (2022)
What explains the discrepancy between the predicted homogeneity and the observed heterogeneity of household behaviour?	Disagreement about the distribution of asset returns as a result of differences in information, different tastes or preferences for risky assets, and the need to hedge endowment risk. Some investors value financial assets as consumption goods or as status symbols and choose them simply because they like them. Other investors value them only on the basis of their payoffs.	Fama and French (2007), Roussanov (2010), Andreoni, <i>et al</i> (2020), Aydilek and Aydilek (2020), Borovicka (2020), Fagereng, <i>et al</i> (2020).
Why do households hold undiversified portfolio despite the scope for portfolio optimization?	Mistakes and behavioural biases are causes of under-diversification and inertia. Both factors may be amplified by limited or incorrect information, non-standard preferences and hedging of unique risks.	Calvet, Campbell and Sodini (2007), Bacchetta, <i>et al</i> (2022).

Who delegates portfolio management and who utilizes financial advice?	More sophisticated (wealthy, better educated, more financially literate, less overconfident) and more trusting investors are more likely to delegate portfolio management or seek financial advice. Higher IQ households seem to minimize fees when choosing across mutual funds. For most studies, after deduction of transaction and information acquisition costs, active investing does not earn excess returns relative to passive investing.	Bailey, Kumar, and Ng (2011), Grossman and Stiglitz (1980), Carhart (1997), Fama and French (2010), Jensen (1968), Wermers (2000), Cline and Gilstrap (2021), Carneiro, <i>et al</i> , (2021), and Cheng, <i>et al</i> , (2021)
How do investors choose their risk exposure over their lifetime?	Early models - such as the Merton-Mossin-Samuelson (MMS) models - generate two predictions. First, individuals should participate in risky asset markets at all ages—a proposition that extends to a dynamic context like the participation principle. Second, the share invested in risky assets should not vary over the life-cycle. Later studies find that both participation in the stock market and the portfolio share invested, directly or indirectly, in equity show a marked life-cycle pattern. Participation shows a pronounced hump-shaped profile and is limited at all ages. It rises rapidly for the young, reaching a value of around 71%, and stays roughly constant until retirement. As soon as investors leave the labour market and retire, they start exiting the equity market as well. Interestingly, the conditional risky share also varies with investor age. The participant share invested in equity is high and perhaps slightly rising at the beginning of the life-cycle. It is flat at almost 50% until investors enter their 50s. At that point, it starts falling regularly by about one percentage point a year until retirement age. During retirement, the portfolio risky share remains fairly constant, or even slightly rising, at about 35%. The pattern of the share invested in equity is remarkably consistent with life-cycle portfolio models.	Fagereng, <i>et al</i> (2017)
What factors influence household borrowing decisions?	Credit availability, conditions of the credit market, shocks to labour income, relative attractiveness of investment opportunities over cost of borrowing.	Campbell and Cocco (2003), Agarwal, Rosen and Yao (2016), Badarinsa, Campbell, and Ramadorai (2019)
What factors influence the decision of households to default on mortgage?	The mortgage default decision hinges on three factors, the quantum of the shortfall H–D, the pecuniary and non-pecuniary benefit of non-defaulting K, and the option value of postponing default.	Abel, J. and Fuster, A. (2021), Andersen, <i>et al</i> (2020)

Source: Authors' review of the empirical literature

4.1. Areas for future research

In this study, we have provided a systematic review of the most recent advances in the theory and empirical review of evidence on how household portfolio and borrowing decisions are made. A major theme is the tendency of individuals or households to follow optimal behaviour as predicted by normative models. In some situations, households seem to follow the optimal behaviour predicted by normative models. In other instances, there are significant deviations. The heterogeneity is not only limited to different domains of choice but even in situations when the decision makers are confronted with the same decision problem. Thus, there might be scope for behavioural considerations in household portfolio and borrowing decisions. Behavioural finance offers insights into how emotional biases and cognitive errors may influence households' perception and investment decisions. As a result, knowledge of behavioural finance may help uncover the causes of inconsistencies in portfolio behaviour. In standard finance models, households are characterized as “rational” whereas in behavioural finance, they are modelled as “normal.” It would be interesting to see how robust the qualitative findings of this study are to these behavioural issues and related extensions.

Further, it may be interesting to consider cash management by households. Corporate cash management models are more common and widely researched because of the availability of corporate data on cash balances and related transactions. As micro-data on cash holdings of individuals and households become even more available or accessible, there will be scope for the study of household cash management behaviour, for instance, to ascertain empirical validity of Keynesian motives of transactionary, precautionary and speculative rationales. Consumers' financial decision making may also be transformed through advances in computing such as robo-advising and artificial intelligence (D'Acunto and Rossi, 2022).

Moreover, insurance demand by household would be a fertile area for future studies. Risk management in the context of household is vital to understanding the depth of various aspects of the financial system. As of 2019, the insurance industry contribution to the economy was 0.7% which is still quite low relative to South African insurance industry penetration at 12%. Lack of awareness, trust, affordability, absence of relevant products and regulatory weaknesses are some of the key constraints to insurance uptake in Nigeria even as over 60% of the population is considered low-income, leaving room to grow the microinsurance market (Paseda, 2020).

5.0. Conclusion

In the last two decades, household finance has developed into an interesting sub-field of finance with a unique and distinct research program and style. It shares with assets pricing the importance given to portfolio choice and trading decisions, but differs in its focus on the median, rather than marginal, household, and on the decision process per se, regardless of its implications for financial asset valuation. It shares with corporate finance the emphasis on the design of institutions in tempering agency problems but concentrates on the conflict of interests and adverse selection issues encountered by households when they interface with financial markets.

This review has focused on household portfolio and borrowing decisions. Some areas have been skipped because of space constraints. Insurance demand is a fruitful area for future study of household portfolio decision. Moreover, risk management was only considered within the context of portfolio selection and choice of mortgage type. Nonetheless, insurance coverage against adverse events to household income, wealth and financing needs may be important for household utility maximization. There is also a growing literature with respect to household protection in the context of portfolio delegation and use of financial advisory. Households are being exploited by their own mistakes and behavioural biases. There is need for theoretical framework that can be applied towards taming predatory behaviour in the market for financial advisory and portfolio delegation. The task is as exciting as it is intellectually demanding.

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