Household Financial Decision Making

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Abstract

We survey the literature studying household financial decision making. Our chapter would focus on how households make decisions regarding their consumption, savings, investment and borrowing. We explore the basic theoretical foundations underpinning each household decision followed by a summary of important empirical results in the literature. We discuss studies that fall within following four themes - 1) how households deviate from the utility maximizing rational behaviour while making financial decisions; 2) role of government, central banks, regulators, financial institutions and external factors in influencing household decisions; 3) household heterogeneity in financial decision making; and 4) similarities and differences in household behavior across countries and between developed and developing countries. We also look at how recent development in fintech has revolutionized the way households interact with fintech platforms in lending, payments, investments and trading

1 Introduction

Households play an important role in the economy. Households are the most important decision-making agents that drive consumption and savings in the economy. The savings generated by households is directed towards investment in various asset classes and the asset allocation of households affects the structure of the economy and financial system, thereby making it an important player in the economy and financial system. Households also make borrowing decisions and household debt has became an important component of overall debt in the economy with the growth of mortgages, credit cards, and securitized products. The rapid rise in household debt was cited as one of the causes for the global financial crisis. Despite the importance of households to the economy, the academic field of finance was focused on corporate finance and asset pricing. Household decisions were often explained through a simplistic representative agent model with little focus on empirical evidence. These explanations failed to capture the dynamic aspects of a richer and more complex reality.

In recent decades, household finance has emerged as a field in itself with significant contributions in theoretical and empirical studies in recent years. These studies help us in understanding the causes and effects of various household decisions, impact of policies and regulations affecting households, thereby producing vast amount of knowledge for researchers, policymakers, investors, managers, and regulators. The rapid growth in the filed of household finance was enabled by the widespread participation of households in financial markets, the important role played by household in the global financial crisis, the availability of more detailed high-quality granular data, and the growth in technology innovation and fintech sector (Gomes et al., 2021). The recent growth in behavior finance also sparked interest in more carefully explaining household preferences, beliefs, and constraints.

The chapter covers important topics in the household finance and has section each on consumption, savings, borrowing, investment and fintech.

2 Consumption

An understanding of basic theories of consumption is essential to recognize the decision-making choices of households. Early economists like Say argued that the production of goods and services will determine demand and free markets without government intervention would result in economic growth and prosperity. Keynes challenged this view when households experienced massive decline in consumption during Great Depression. Keynes proposed the absolute income hypothesis, where consumption is a function of disposable income (Keynes, 1946). He argued that lower income households will spend higher share of their income than higher income households, which means that average propensity to

consume (APC) will decrease as income rises. However, empirical findings of Kuznets showed that APC remained constant in the long run despite change in income, while it decreased with rise in income in the short run (Kuznets, 1946).

This led Friedman to propose the permanent income hypothesis (PIH), where he argued that individuals would spend money at a constant level as share of their expected permanent income (Friedman, 1957). According to Friedman, short-term changes in income would not affect the level of consumption and that households prefer to smoothen their consumption. Thus, PIH argues that changes in consumption would result due to change in expectations of long-term income and not short-term fluctuations in income. Later, Modigliani and Brumberg proposed the life-cycle hypothesis, where they observed that households would maintain the same level of consumption throughout their life and that consumption would be based on resource available to them over their lifetime and their current life stage (Modigliani and Brumberg, 1954). The amount available would be sum of current wealth and present value of future income, and consumption would be equally spread across all years. In the short-run, wealth would not change proportionately with income and thus consumption would remain constant even with increasing income, which would result in decreasing average propensity to consume (APC) with rising income. In the long-run, both wealth and income would move simultaneously and APC would remain constant.

These economic theories assume that households are rational and homogeneous, but households are often irrational, heterogeneous, inconsistent and biased. Later models and empirical studies add significant features of consumer biases, behavioral factors, liquidity constraints, income uncertainty, market imperfections, demographics, peer influence to build alternate hypothesis to existing theories.

2.1 Liquidity Constraints

Liquidity constraints is useful in explaining the unusual consumption response of households to temporary increase in income. Permanent income hypothesis and life cycle hypothesis assume that household consumption will be unaffected unless there is change in expectations of permanent income, while empirical studies show that there is significant consumption response to increase in temporary income. Households with liquidity constraints cannot smooth their consumption as they cannot borrow. Hence, there is an excessive consumption response to income increase (Jappelli and Pagano, 1989; Zeldes, 1989). (Jappelli and Pistaferri, 2010) developed a theoretical model that predicts that consumption should not respond to anticipated income changes, whereas it should respond to unanticipated income change.

US households significantly increase spending in response to anticipated temporary income increase such as US tax rebates in 2001 (Johnson et al., 2006; Agarwal et al.,

2007; Shapiro and Slemrod, 2003) and US Economic Stimulus in 2008 (Parker et al., 2013; Parker, 2017; Shapiro and Slemrod, 2009). Other forms of anticipated income increases such as as shopping coupons, sales tax holidays, annual sale event also generate consumption response (Agarwal et al., 2022; Woo et al., 2021; Agarwal et al., 2017d). However, the economic stimulus to the pandemic reported a smaller consumption response compared to the previous tax rebates of 2001 and stimulus of 2008 (Baker et al., 2020b; Parker et al., 2022; Karger and Rajan, 2020). Households increased their spending by less than 40 percent of their stimulus payments during pandemic. Households with lower incomes and lower levels of liquidity display stronger responses while households with large checking account balances have negligible response (Baker et al., 2020b).

In the presence of illiquid savings, many households consume hand-to-mouth as they hold very little or no liquid savings including wealthy people (Kaplan and Violante, 2014; Kaplan et al., 2014). Non-liquidity-constrained households also exhibit hand-to-mouth behavior, as households actually feel liquidity constrained when they hold cash balances or liquidity cushions to meet unforeseen expenses (Olafsson and Pagel, 2018). Households increase consumption in response to tax refunds, while these same households smoothen consumption when there is transfer of funds from the account for one-time payments. This asymmetric behavior is inconsistent with pure liquidity constraints and can be explained by mental accounting behavior (Baugh et al., 2021).

Unanticipated income shocks can be either temporary or transitory. Many theoretical models predict a significant consumption reaction to the announcement of an unanticipated income increase unlike anticipated income increase which induces negligible consumption response. However, PIH predicts that the MPC out of temporary income shock should be small. Most studies report very high MPC out of unanticipated income (Browning and Crossley, 2001; Agarwal and Qian, 2014; Di Maggio et al., 2017a).

India has many large-scale income transfer programs, which provides relief to low-income households. NREGA is a rural workfare program that provides 100 days of employment for anyone who demands work. When NREGA was introduced in India, it boosted the consumption expenditure of participant households and changed their consumption in favour of nutrient rich and high value food. As the program achieved a level of permanence, households smoothen consumption by investing in durable goods (Klonner and Oldiges, 2022; Bose, 2017).

Many studies report significant reduction in consumption after retirement, which is not consistent with pure liquidity constraint (Banks et al., 1998; Bernheim et al., 2001). This behavior is often explain by retirement being not anticipated (Haider and Stephens, 2007) or households having more time for searching or buying inexpensive and high quality goods (Aguiar and Hurst, 2005, 2007; Li et al., 2015).

2.2 Income Uncertainties

Various theoretical models demonstrate that income uncertainties encourage individuals to delay consumption and increase precautionary savings (Carroll et al., 1992; Carroll and Kimball, 1996; Carroll, 1997). (Baker and Yannelis, 2017) show that 2013 episode of government shutdown represented a significant and unanticipated income shock for federal government workers, with no direct effect on permanent income. They find significant difference in the consumption patterns between affected and unaffected government workers, which violates the permanent income hypothesis. Studies also find that the consumption responses to unanticipated losses are larger than unanticipated gains (Fuster et al., 2020; Christelis et al., 2019). However, some empirical results suggest that household spending reduction following increases in uncertainty are limited and may only appear after considerable passage of time (Khan and Knotek, 2011). (Ben-David et al., 2018)suggests that household expectations of uncertainty predict their consumption decisions. Households that are more uncertain in their economic expectations after accounting for socio-economic characteristics, are more likely to engage in precautionary behaviors.

Global Pandemic due to Covid in 2020 represented a scenario of anticipated income shocks along with significant uncertainty. Many empirical studies on the consumption pattern in the aftermath of Covid pandemic threw interesting findings. Household beliefs and expectations played an important role in the consumption decisions. There is significant stockpiling and spending increase in the during the early phase of Covid, which suggest that expectations played an important role (Baker et al., 2020a). There is evidence of excess sensitivity of household consumption due to a purely temporary income shock as a result of pandemic. There is substantial spending reduction during the second half of March, when Covid cases rise and there is uncertainty regarding the future course of pandemic (Baker et al., 2020a; Chen et al., 2021). A study in France during Covid estimated that households in the bottom income decile experienced a severe decrease in consumption and their marginal propensity to consume was the largest in magnitude (Bounie et al., 2020). Another multi-country survey in Europe suggested that household consumption is correlated with severity of the Covid crisis in their respective location and personal experience of Covid. As expected, infection risk was the main reason cited for the reduction in consumption, while precautionary savings was the second biggest reason for the consumption reduction in countries like Italy and Spain (Christelis et al., 2020).

Demographics and political affiliation played a role in determining consumption patterns during the pandemic. Hispanic, Asian Americans and college-educated individuals showed particularly large and persistent declines in relative spending. Consumption heterogeneity were particularly influenced by individual political beliefs, as Republicans were less likely to take the pandemic and its restrictions seriously compared to Democrats,

which reflected in lower spending reduction for Republicans compared to Democrats (Cotton et al., 2021; Barrios and Hochberg, 2021). Households with children tend to have the largest decline in consumption, with overall spending reduction twice as that of households without children. (Baker et al., 2020a).

As we shift our focus to emerging economies, India's policy of demonetization in 2016 created an economic shock and uncertainty, when 86% of cash in circulation stopped being legal tender. Households affected more severely by cash crunch saw higher reduction in consumption expenditure, which disappeared after few months. Once personal finances recovered, households were able to smooth out the consumption in post-demonetization period (Chodorow-Reich et al., 2019; Karmakar and Narayanan, 2020). Decline in consumption was higher for richer households, suggesting that MPC increases with income, which is different from the results observed in US and Europe (Wadhwa, 2019).

India's pandemic experience was very similar to Western countries, while the economic stimulus was modest compared to that of Western countries. This resulted in very high fall in income, with incomes of salaried workers dropping by 35% and daily laborers by 75% (Gupta et al., 2021; Bartik et al., 2020). Consumption fell less than income, suggesting households were able to smooth consumption. Food and fuel consumption fell less than consumption of durable such as clothing and appliances. Some of the reductions in consumption was also due to price shock (Gupta et al., 2021).

2.3 Wealth Effects

Life-cycle hypothesis predicts that short-term changes in wealth would have no impact on consumption, while empirical evidence show that there is strong consumption response. Consumption response due to housing collapse during the Great Recession is very significant. Most studies estimate an MPC of 4 to 8 cents for every dollar change in home value (Mian et al., 2013). MPC also varies by consumption category, with MPC highest for durable goods and smallest for staple food. Changes in house prices explains half of the changes in non-durable expenditures (Kaplan et al., 2020). However, (Zhou, 2022) shows that residential investment is more responsive than consumption to wealth effects.

There is heterogeneity in consumption response to wealth. Many economists have proposed that borrowers have higher MPC out of wealth than savers, which explains why high levels of household debt are associated with economic slowdown (King, 1994; Tobin, 1957). (Aladangady, 2017) shows that largest consumption response is from credit constrained households. Households in low-income zip codes increase spending substantially when house prices rise, while households in high income zip codes are not responsive (Mian and Sufi, 2014). Effect of house price on consumption is larger for older homeowners than younger homeowners. Young households plan to increase house size later in

life, while many old households plan to move to a smaller house for retirement. Thus, younger homeowners will engage in lower consumption reduction, as they will incur lower housing expenditure for larger sized house (Campbell and Cocco, 2007).

2.4 Inflation Expectations

Basic economic prediction on inflation expectations derives from the Fisher equation, which relates the real rate of interest as difference between nominal interest rate and expected inflation rate. Thus, a decrease in real interest rate leads to lower returns on savings and thereby boosting current consumption over future consumption (Coibion et al., 2019). However, higher inflation creates uncertainties about the future which can also cause downward revision in real income expectations leading to lower current consumer spending (Juster and Wachtel, 1972). Empirical studies suggest a limited impact of inflation expectations on consumption response and even negative effect inside zero lower bound (Bachmann et al., 2015; Duca-Radu et al., 2021). Another study shows how durable spending increases to expected inflation, while non-durable spending does not respond (Burke and Ozdagli, 2021). Moderating effect of inflation expectations can also be explained by financial investments, as households with higher net worth will generate lower real returns in future (Lieb and Schuffels, 2022).

In Japan, there is a positive effects of inflation expectations on consumption expenditure. The reason for a different behaviour than US is that after a long period of zero nominal interest rates, Japanese consumers have understood how inflation affects the real interest rate and therefore react with higher spending to inflation expectations (Ichiue and Nishiguchi, 2015). In India also, a study found a positive relationship between inflation expectations and current household spending, which can be attributed to the fact very few households own financial assets (Yadav and Shankar, 2015).

2.5 Monetary Policy

Monetary policy affects household consumption through multiple channels. Monetary policy shocks generate balance sheet revaluation, and MPC out of windfall gains from asset price increases are significant (Auclert, 2019; Sterk and Tenreyro, 2018). Monetary policy affects through deposit channel, where rate sensitive customers reduce consumption to hold money in deposit accounts in order to earn higher returns (Agarwal et al., 2021a). Monetary policy also affects through the income effect, when unanticipated drop in the mortgage interest rate leads to a reduction in mortgage payments for households with adjustable-rate mortgages (ARM) (Jappelli and Scognamiglio, 2018; Wong et al., 2019; Cloyne et al., 2020). Mortgagors respond more towards monetary policy than homeowner without mortgagors and renters (Cloyne et al., 2020). Consumption response is stronger among homeowners who entered new mortgages, especially younger homeowners (Wong

et al., 2019). In developing countries like India, monetary policy influences consumption through food price channel. Monetary expansion leads to relative rise in food prices and thereby reducing the consumption of poorer households (De and Kakar, 2021).

2.6 Behavioral Factors

Many behavioral factors affect the consumption related decision choices of households. Households deviate from rational decisions due to behavioural factors such as as bounded rationality, mental accounting, hyperbolic preferences, present bias, and peer influence.

Mental accounting is phenomenon, where people classify assets and income in different mental accounts. It may explain how consumption choices are influenced by temporary income changes (Shefrin and Thaler, 1988) . (O'curry and Strahilevitz, 2001) found that windfall gains are more likely to be spent on hedonic as opposed to utilitarian goods in comparison to ordinary income and MPC for windfall gains is higher than regular income (Kahneman and Tversky, 1981; Thaler, 1990). MPC out of dividend income is higher than capital gains (Baker et al., 2006; Di Maggio et al., 2020). Dividend incomes are anticipated in regular frequencies with predictable estimates, thereby allowing individual to make planned consumption, which is consistent with rational behaviour (Bräuer et al., 2022). Money that is designated as being earmarked for a specific category of consumption is spent on that category, which violates fungibility. Studies have found that child benefits are used for consuming child clothing (Kooreman, 2000), UK winter fuel payment being spent primarily on heating (Beatty et al., 2014) and Supplemental Nutrition Assistance Program payments are disproportionately spent on food (Hastings and Shapiro, 2018).

Another behavioural factor is hyperbolic preferences, where individuals show preference for rewards that arrive sooner than later and future rewards are discounted by a factor more than length of the delay. It is different from time consistent model of discounting called exponential discounting. Hyperbolic discounting can explain phenomenon such as saving and a sharp consumption decline at retirement (Laibson et al., 1998). Individuals are generally impatient in the short run relative to their long-run preferences and desire instant gratification, which leads them to borrow excessively from costly sources of debt such as credit cards, payday loans and often fail to repay later despite the intention (Meier and Sprenger, 2010; Ben-David and Bos, 2021) . Many consumers also fail to abide by their own debt paydown plans. This behavior is best explained by present bias, where naive consumers value spending more on current cycle more than consuming in future cycle, which makes delaying debt paydown attractive (Kuchler and Pagel, 2021).

Various studies find evidence suggestive of a strong peer influence on consumption patterns. (Charles et al., 2009) demonstrate that status concerns in Black and Latino community drive conspicuous consumption. (Bertrand and Morse, 2015) find that middle-income households' consumption trace the trajectory of consumption of top-income house-

holds. Peer effects are reported for consumption of various goods and services such as automobile, food, movie tickets, mobile phones, books and home ownership (Grinblatt et al., 2008; Moretti, 2011; Kuhn et al., 2011; Bailey et al., 2018, 2019; Gilchrist and Sands, 2016; Chevalier and Mayzlin, 2006).

3 Savings

Early thinkers like J.S Mill, Adam Smith considered savings as being instrumental for investment (Smith, 1776). According to Mill, when savers restrict their consumption, the saved part of the income would be used for buying productive services of labour and capital goods (Mill, 1859). Mill assumed that savings involved buying capital goods instead of consumption goods. Thus, there is an assumption that decision to not spend on consumption goods is immediately followed by investment. Walrus proposed that any decrease in expenditure on consumer goods is met by an equivalent increased in new capital goods and equilibrium rate of interest is the outcome. These explanations failed in the Great Depression of 1930s, as investment fell despite very high savings rate. It is in the context of the failures of early models during Great Depression that Keynes proposed his theory (Keynes, 1946). Keynes believed that saving and consumption are based on changes in disposable income instead of interest rates. So, if the investment is greater than saving, it will lead to higher income and will raise both consumption and saving; but at low levels of disposable income, savings rate would be very low and can be negative. Thus Keynesian model suggests that APS increases with disposable income and the marginal propensity to save should always be higher than the APS. However, empirical evidence suggest that APS does not increase along with income in the long run (Clark, 1945).

Alternative theories were proposed by (Friedman, 1957) and (Modigliani and Brumberg, 1954) that extend household saving decisions in the long run. Friedman's PIH suggest that saving is determined by the long-term expected income in the future and that APS will remain constant. Life cycle hypothesis similarly assumes the consumers will plan consumption and saving over their own life-cycle. There are motives for savings other than life-cycle motive such as inter-temporal substitution, precautionary motive (Hubbard et al., 1995), bequest motive (Kotlikoff, 1988; Browning and Lusardi, 1996), improvement motive and enterprise motive (Browning and Lusardi, 1996; Canova et al., 2005; Fisher and Montalto, 2010). Empirical studies have shown that many factors affect household saving decisions such as interest rate, inflation expectations, demographic, and social-economic characteristics, institutional features and government interventions.

3.1 Interest Rate

Interest rate affects household saving in multiple ways. When interest rate rises, it increases the cost of current consumption compared to future consumption, which leads to substitution of consumption by savings. This is called substitution effect. Similarly, the present value of future income from stocks, bonds decrease due to increase in discount rates, which encourages savings as net wealth decreases. This is called wealth effect. An increase in interest rate leads to increase in income for depositors and pensioners, which reduces the need to save and this phenomenon is called income effect. The sign of the relationship between real interest rate and savings is how substitution and wealth effects balances with the income effect.

(Weber, 1975; Friend and Hasbrouck, 1983; Loayza et al., 2000) find that an increase in the real interest rate reduces saving and increase consumption, suggesting that the income effect is stronger than substitution and wealth effect. However, studies also document that saving increases with real interest rate, which suggests that substitution effect dominates (Wright, 1969; Boskin, 1978; Gylfason, 1981; Tullio and Contesso, 1986; Edwards, 1996; Bailliu and Reisen, 1998; Agarwal et al., 2021a). Other studies document no significant relationship between interest rate and saving (Howrey and Hymans, 1978; Hendershott and Peek, 1985).

China and India exhibit different behavior despite being developing countries of similar income. China exhibited high savings rate despite low real interest rate, which is explained by the target saving hypothesis. The basic idea is that households have a target level of savings that they want to achieve by the end of their working life (Chamon and Prasad, 2010). India exhibits a different pattern that supports substitution effect, where an increase in 50 bps of interest rate leads to reduction in consumption expenditure by 12% (Kapoor and Ravi, 2009; Loayza and Shankar, 2000).

3.2 Demographic and Socio-Economic Factors

Many demographic and socio-economic characteristics influence household decisions on saving such as income, age, family size, marital status ethnicity, nationalities, financial literacy.

(Browning and Lusardi, 1996) proposed the certainty equivalence model, in which marginal utility of expenditure falls over time, as consumption grows. Hence, saving rates increase until the period around retirement and then decreases gradually. The prediction was backed by evidence which suggested a hump shaped age profile for savings rate, which peaks at age of 57 for US households (Attanasio, 1993). Results by (Carroll et al., 1994) suggest that the precautionary motive is strong for younger households who are not wealthy. Savings rate also varies across birth cohorts and (Attanasio, 1993) observed that generation before baby boomer (birth between 1925 to 1939) had the lowest saving rate

compared to earlier cohorts, while a more recent study by (Dynan et al., 2009) found that later cohorts had higher saving rate. Distribution of savings across income deciles show a very strong relationship between income and savings rate. (Avery and Kennickell, 1991; Bosworth et al., 1991). Family composition also impacts saving decisions. Studies show that married couples without children have the highest saving rate and single parents with children have the lowest savings rate (Browning and Lusardi, 1996; Yuh and Hanna, 2010; Attanasio, 1993).

Race and ethnicity also influence savings decision, as Hispanic and black Americans are less likely to save than White Americans, after accounting for other economic factors (Dal Borgo, 2019; Kuan et al., 2015). Both permanent and temporary migrants are more likely to save than natives. Temporary migrants save for sending remittances and for their future plans in country of origin, while permanent migrants have the precautionary motive (De Arcangelis and Joxhe, 2015; Djajic and Michael, 2009). (Carroll et al., 1994) find that the saving patterns of immigrants are significantly different across countries of origin. The effect of health on saving is also significant. Poor-health households save less, as rising healthcare expenditure in US left households with very little to save (Fisher and Montalto, 2010; Chen et al., 2019; Canilang et al., 2020). Financial literacy can explain some of the differences in saving rate across demographics (Bosworth and Bell, 2005; Hung et al., 2009; Lusardi and Mitchell, 2011). Financially literate individuals keep enough liquid savings to meet unforeseen expenses, while even wealthy individuals with low level of financial literacy have lower liquid savings, thereby explaining the phenomenon of wealthy hand-to-mouth (Bhutta et al., 2021). Studies document that higher financial literacy among households leads to a higher likelihood to engage in financial planning, which in turn leads to higher wealth accumulation (Lusardi and Mitchell, 2007, 2014; Agarwal et al., 2009a).

Many countries in the Asia such as India and China had rising working-age population, which resulted in higher savings rate (Curtis et al., 2017; Park and Shin, 2009; Ladusingh and Narayana, 2012). Households with fewer children have higher saving rate, as they incur lesser expenditure on childcare and would invest in future education (Jain and Goli, 2022). Family composition affects the saving through gender differentiation. Households with female children in India are more likely to save in order meet the financial burden associated with dowry (Deolalikar and Rose, 1998). Extended households in India save more than nuclear households, as per capita adult consumption is lower for extended households (Bairoliya and Chanda, 2021). This contradicts the results in China and Japan, where smaller households have higher saving rate. College educated individuals have higher saving after accounting for income, which can be explained by financial literacy and access to banking facilities (Agarwal et al., 2015a).

3.3 Pension

The extended life cycle model proposed by (Feldstein, 1974, 1977) suggests introduction of social security would not alter consumption in absence of budget constraint. Thus, payments towards social security tax would reduce the overall saving. This is called wealth replacement effect. Also, protection from Medicare and social security reduces the precautionary motive to save (Hubbard et al., 1995; Chou et al., 2003). Many studies report that public pension schemes, social insurance, and social security reduce personal saving (Summers et al., 1987; Kotlikoff, 1979; Feldstein and Pellechio, 1980; Diamond and Hausman, 1984). However, social security is likely to induce earlier retirement, which would increase retirement period, thereby increase total saving during working age (Barros, 1979; Feldstein, 1974). Therefore, net effect of social security on saving is mixed. Another study shows that there is differential saving response to Medicaid eligibility (Gallagher et al., 2020). Disincentive effect of Medicaid on household savings is heavily concentrated in the middle net-worth household (Maynard and Qiu, 2009). Many developing countries like China do not have public pension or social security schemes, which could explain the high saving rate consistent with precautionary model (Chamon and Prasad, 2010; Curtis et al., 2017). An increase in expected pension benefits tends to discourage household saving in China in the long run, but the reverse is found in India (Ang, 2009).

3.4 Government Intervention

Governments have an incentive to encourage household saving in order to reduce its future pension burden and fund its current borrowing. Tax exemption on retirement, education, saving plans, and investment plans are strategies usually used by governments. Empirical studies show tax deferred savings plan, 401(k) and tax subsidies boost household savings without crowding out other savings (Venti and Wise, 1986, 1990; Poterba et al., 1995; Benjamin, 2003; Gelber, 2011) , while many other studies document no net effect of tax exemption plan on household savings (Gale and Scholz, 1994; Engen et al., 1996; Chetty et al., 2014). Indian policy of increasing tax exemption eligibility leads to increase in net private savings (Agarwal et al., 2017c). In a developing country like India, the access of households to banking increases saving rate. India's universal banking program PMJDY provides bank accounts to all unbanked households, which increased the savings among the new account holders (Agarwal et al., 2017a; Chopra et al., 2017). Similarly, Self-help groups (SHGs) promoted by government in India encouraged a culture of savings among women in poorer households (Deininger and Liu, 2013; Datta, 2015).

4 Borrowing

4.1 Motive for Household borrowing

The permanent income hypothesis and life-cycle hypothesis suggests that households consume according to expected future income and households anticipating future increase in income will borrow in order to smoothen consumption (Brady, 2008; Hall, 1978; Ludvigson, 1999). (Bacchetta and Gerlach, 1997) observed that growth in consumer credit are positively correlated with the growth in non-durable goods and services expenditures. (McCarthy, 1997) found only a negligible link between household credit and non-durable goods and service expenditures, but a more significant link between credit and durable goods expenditures. Despite stagnant wages, the poorest and most vulnerable households experienced very high growth in consumption due to consumer credit (Costantini and Seccareccia, 2020). Younger households that anticipate growth in future income to grow are likely to borrow more (Kumhof et al., 2015; Blundell et al., 1994). The second motive for household borrowing is deal with temporary fluctuations in income (Guerrieri and Lorenzoni, 2017). High-risk borrowers increase their credit-card balances and use of mortgage credit in response to increased localized uncertainty (Di Maggio et al., 2017b). However, uncertainty in household income would lead to higher precautionary saving, according to PIH/LCH theories (Bertola et al., 2005; Gourinchas and Parker, 2002). This precautionary motive can explain the increases in personal saving rates in 2008 and 2009, which leads to lower credit utilization. In developing countries like India and Korea high levels of income volatility push households to reduce their household debt (Jung and Kim, 2020; Gupta, 2022). Third motive is to meet funding needs in the event of sudden personal emergencies such as illness or unemployment. Liquidity constraints may force households to resort to risky short-term unsecured loans such as payday loans (Morse, 2011; Melzer, 2011; Fitzpatrick and Coleman-Jensen, 2014), pawnshop loans (Bhutta et al., 2016) or credit cards (Baugh et al., 2018; Agarwal et al., 2021b). Fourth motive for household credit is behavioral biases such as present bias, optimism, and hyperbolic preferences which may also lead to higher present consumption and over-borrowing (Laibson et al., 1998; Fuster et al., 2010; Meier and Sprenger, 2010; Agarwal et al., 2020; Eggertsson and Krugman, 2012).

4.2 Reason for growth in Household borrowing

Household borrowing has increased remarkably in first two decades of 21st century, with household debt doubling from $8 trillion in 2004 to $16 trillion in 2022. There are many factors responsible for the growth in household debt. One of the key factor is changes in loan production such as securitization, information sharing, risk-based pricing. Securitization influence supply of debt by reducing lenders incentives to carefully screen

borrowers (Keys et al., 2009, 2010, 2012; Rajan et al., 2010, 2015; Purnanandam, 2011). Securitization led to the expansion of subprime credit during period prior to the global financial crisis (Nadauld and Sherlund, 2013). Theory predicts that information sharing among lenders moderates adverse selection and moral hazard, thereby increasing the probability of loan getting approved ((Jappelli and Pagano, 2006; Kallberg and Udell, 2003). Bank lending is higher and credit risk is lower in countries where lenders share information (Padilla and Pagano, 2000).

Banking deregulation played an important role in increasing credit market competition, thereby increasing the supply of credit. It led to expansion of credit card availability and higher utilization of credit cards among households (Ellis, 1998; Sullivan and Worden, 1989; Gerardi et al., 2010; Dick and Lehnert, 2010). Deregulation of predatory lending laws resulted in significant uptick in lending (Di Maggio et al., 2017b; Mian and Sufi, 2018).

Another possible factor is the improvement technology of persuasion, which suggests that advertising, uninformative sales tactics, marketing brochures, monthly payments marketing and non-linear contracts increases the quantity of household borrowing (Gabaix and Laibson, 2006; Agarwal and Evanoff, 2013; Bertrand et al., 2010; Gine et al., 2014; Gurun et al., 2016). Innovations in pricing and product formats is a different mode of persuasion that attracts new customer (Stango and Zinman, 2011). Some of the example are teaser pricing, bank checking account overdrafts (Stango and Zinman, 2014), credit card introductory rates and penalty fees (Agarwal et al., 2014; DellaVigna and Malmendier, 2004; Heidhues and Kőszegi, 2010), and adjustable rate mortgages (Gurun et al., 2016).

(Banerjee and Duflo, 2010) cited several factors that were responsible for low penetration of bank loans in developing countries like India. These include high rates of interest, high fixed and monitoring costs, adverse selection and moral hazard, and higher probability of default, which discourage both lenders and borrowers from engaging in an efficient credit market (Bottomley, 1975; Karlan and Zinman, 2009). Another reason is the high level of controls and restrictions maintained on banking activity by the central bank in India, which contributed negatively to financial deepening (Demetriades and Luintel, 1996).

The financial innovation of microcredit addressed the problems in the traditional credit markets by lowering the fixed costs and costs of monitoring. Microcredit reduces administrative costs and screening costs through dynamic incentives, group liability (Ghatak, 1999; Stiglitz, 1990; Giné and Karlan, 2009), repayment frequency and social capital (Field and Pande, 2008; Field et al., 2013; Feigenberg et al., 2009). The growth of microcredit and self-help group lending programs in India has resulted in sharp rise in formal credit in recent year with significant welfare benefits (Banerjee et al., 2015; Hoffmann et al., 2021). The share of rural informal credit in total debt outstanding has

significantly reduced with efforts of central bank's financial inclusion plan and regulation of moneylender (Pradhan, 2013), while (Kochar, 1997) suggests that there is limited rationing in rural formal credit markets in India.

4.3 Effects of household debt

The rapid growth in household debt had several consequences. First, lowering borrowing standards and growth in consumer credit led to higher household indebtedness (Dynan, 2009; Mayer et al., 2009; Dick and Lehnert, 2010), which is largely believed to be the reason behind the 2008 financial crisis (Mian and Sufi, 2011). High levels of household debt makes country;s financial system vulnerable to future stresses and instability (Drehmann and Juselius, 2014).

Second, the high debt exposure of the US households depressed the consumption of households, which played an important role in amplifying the global financial crisis. (Mian and Sufi, 2010; Dynan et al., 2012; Mian et al., 2013)have argued that the recession was amplified by the high marginal propensity to consume of heavily indebted US households who reduced expenditure rapidly following the negative house price shock. (Mian and Sufi, 2018) suggests that an increase in the household debt-to-GDP ratio reduces consumption across countries with a lag of three years. Households with easier access to credit has smaller impact on consumption, while constrained households are more sensitive to consumption when faced with income shocks (Baker and Yannelis, 2017). (Bishop and Park, 2004) show that consumption response to income shocks become weaker following a relaxation in borrowing constraints. (Zeldes, 1989; Johnson et al., 2006; Blundell et al., 2008). Third, credit booms associated with high household debt leads to misallocation of resources and affects long-term productivity growth, with adverse consequences on investment and employment (Cecchetti and Kharroubi, 2015; Borio et al., 2016).

Borrowers, especially those in poorer or developing economies, can engage in widespread default if they are unable to serve high-interest loans (Karlan et al., 2019). Therefore, microfinance lenders in developing countries such as India have adopted coercive recovery practices (Shylendra, 2006; Kar, 2013). Political intervention in credit markets with eye on borrowers' votes leads to distortionary behaviour among borrowers, including destroying credit culture (Mukherjee et al., 2018; Tantri, 2018). (Kanz, 2016) and (Giné and Kanz, 2018) study the Indian debt waiver program of 2008 and find that there are significant costs associated with the debt waiver program, including reduction of investment and agricultural productivity of the benefiting households.(Cole, 2009) finds that lending by government owned banks track electoral cycle with large increases in districts have close electoral contests, while (Alok et al., 2022) show that discretionary regulations encourage even private banks to engage in politically motivated lending.

4.4 Behavioral Factors affecting borrower decision

Borrowers often do not choose financial products that minimize their costs (Agarwal et al., 2011). One reason for the inability is the searching costs to understand the terms and conditions of the financial products (Hortaçsu and Syverson, 2004). Financial literacy and searching effort would help households make better decisions (Bertrand and Morse, 2011; Campbell et al., 2011b). Borrowers also suffer from present bias, where they borrow high-interest loans and fail to repay later incurring unnecessary overdue costs and penalty fees (Agarwal et al., 2009b; Stango and Zinman, 2009; Kuchler and Pagel, 2021).

There are many paradoxical behaviours observed among credit card users. Co-holding puzzle is a suboptimal behavior observed among credit card users is that household hold both credit card debt and liquid assets simultaneously (Gross and Souleles, 2002a). One potential explanation is that mortgage and rent payments cannot be processed through credit card payments (Telyukova, 2013). Similarly, debt puzzle is another phenomenon where there are households with frequent card borrowing and voluntary retirement saving, which can be consistent with the hyperbolic preference interpretation if the savings are in the form of an illiquid asset (Laibson et al., 2003). Trade-off in credit card contracts provides borrowers the opportunity to make optimal decisions. (Agarwal et al., 2015b) study an experiment involving the choice between two credit card contracts, one with an annual fee but a lower interest rate, while the second has no annual fee, but charges a higher interest rate on revolving debt. The optimal decision for convenience users would be to opt for the contract with no annual fee, and for revolvers to opt for the contract with the lower interest rate. The authors find consumers on average choose the contract that minimizes their net costs, but about 40% percent choose the suboptimal contract. Individuals similarly make credit card payment around the minimum payment level due to an anchoring effect (Tversky and Kahneman, 1974; Keys and Wang, 2019). They also prefer to choose the default payment method, which is often suboptimal (Marx and Turner, 2018; Cox et al., 2020). It therefore suggests that welfare can be improved by simply changing the default choice. The optimal behaviour for borrowers with multiple credit card debts is to repay the card debt with a higher interest rate. High income and educated households can efficiently allocate their debt repayment (Becker and Shabani, 2010; Stango and Zinman, 2016). However, other studies report that most households do not follow the optimal repayment sequence, leading to higher financial costs (Ponce et al., 2017; Stango and Zinman, 2014; Gathergood et al., 2019). A major regulatory reform, Credit CARD Act limited the ability of providers to adjust interest rates or substitute other fees in response to dynamic information about customers following origination. (Agarwal et al., 2015c) show that the act reduced the average fee-inclusive cost of credit card borrowing, even though it raised the cost for customers with higher credit scores.The complexity of financial products also makes some individuals make suboptimal choices.

The refinancing of the fixed-rate mortgage, which allows the borrower to get extra liquidity by replacing the older mortgage with a newer mortgage when the interest rate falls. The refinancing decisions require the customer to pick interest rate and timing of refinancing, thereby leading to a suboptimal choice for some households (Campbell et al., 2011a; Agarwal and Mazumder, 2013; Agarwal et al., 2016). It also appears that many borrowers leave money on the table in comparison to an optimal refinancing benchmark (Agarwal et al., 2013), with some evidence that errors of commission are somewhat common, and that errors of omission are particularly large (Agarwal et al., 2016; Keys et al., 2016).

4.5 Borrower Default

Borrowers may default if they are unable to repay interest. Unemployment and illness often lead to credit card default (Deng et al., 2000; Gross and Souleles, 2002b; Agarwal and Liu, 2003). Individuals may choose to strategically default, if there are sufficient benefits associated with it (Fay et al., 2002). Strategic defaults have spillover effects, bringing negative externality to peers (Campbell et al., 2011a) and reduction in credit supply in local neighbourhood (Gupta, 2019). This led to many believing that renegotiation is more welfare enhancing than foreclosures. However,(Agarwal et al., 2017b) find that the policy incentivizing renegotiation of mortgages has limited effect. Some researchers propose that the monitoring problem in the securitized mortgage, frictions in renegotiation contract, and information asymmetry between lenders and borrowers lead to insufficient renegotiation (Piskorski et al., 2010; Adelino et al., 2013; Maturana, 2017). Lack of capabilities of financial intermediaries also partly responsible for higher foreclosures (Agarwal et al., 2017b).

5 Investments

Investments in stocks generate positive and higher returns than deposits in bank. The rational economic models therefore imply that all households should participate in risky asset market. However, there is a substantial share of household who hold very little or no risky assets. This discrepancy between theory and what is observed in reality is called stock-holding puzzle or non-participation puzzle.

5.1 Equity Market Participation

Low participation of equity market has been documented in various studies, with (Mankiw and Zeldes, 1991) and (Haliassos and Bertaut, 1995) for the United States, and (Guiso et al., 2002) for Europe. These studies show that equity market participation rates

below 50% for all countries (Christelis et al., 2013; Guiso et al., 2008). The United States has participation rate just below 50%, while it is lower for other countries in Europe. If we exclude the retirement or pension accounts, household participation in stocks come down to 20% in 2010 in United States (Badarinza et al., 2016). A prominent paper by (Haliassos and Bertaut, 1995) attributed various factors for the low participation of households in stock market, which can broadly be classified into household preferences, fixed costs of participation, lack of trust and influence of peers.

5.1.1 Household preferences

If household preferences exhibit risk aversion, it leads to non-participation in stock market. Risk aversion that prevents participation can take different forms such as disappointment aversion (Ang et al., 2005), narrow framing (Barberis et al., 2006), loss aversion (Gomes, 2005), rank-dependent utility (Chapman and Polkovnichenko, 2009), and ambiguity aversion (Cao et al., 2005; Campanale, 2011; Peijnenburg, 2018). (Dimmock et al., 2016) finds that ambiguity aversion is negatively co-related to stock market participation. Ambiguity aversion is the tendency to favour the known over the unknown. The introduction of capital guarantee products in Sweden resulted in its broad adoption across households, especially among those with low risk tolerance or pessimistic beliefs (Calvet et al., 2020) . Participation is positively correlated with investor's risk preference as risk tolerant individuals allocate a substantial share of their wealth in risky assets such as equities (Haliassos and Bertaut, 1995).

5.1.2 Fixed Costs

Non-participation could arise due to fixed costs, which rational investors would incur and offset the potential benefits earned by investing in the equity market (Vissing-Jørgensen, 2002; Haliassos and Michaelides, 2003; Gomes and Michaelides, 2005). These costs could be direct costs such as the expenses incurred for account opening, brokerage fees, costs paid to trade, fees paid to financial advisors (Vissing-Jørgensen and Attanasio, 2003). Indirect costs are in the form of time and efforts in learning by investing and research required to pick and choose stocks. These indirect costs can be especially high for individuals with low financial literacy. There is evidence to show that individuals participate in stock market if they incur very low indirect costs. Participation is higher among individuals who have high financial literacy (Calvet et al., 2007; Van Rooij et al., 2011; Lusardi and Mitchell, 2007) , higher education (Black et al., 2018), or high cognitive skills (Grinblatt et al., 2011; Benjamin et al., 2013). Households are also more likely to invest in stocks when they are better informed about financial markets (Guiso et al., 2002). (Calvet et al., 2007) also show that non-participants are likely be inefficient investors, and small losses participation would be enough to deter them future investments.

Fixed cost explanations receive strong evidence from the very high correlation between participation rates and wealth (Guiso et al., 2002, 2008). (Andersen and Nielsen, 2011) and (Briggs et al., 2021) find that half of the households that previously held no stocks, when experienced with random increases in wealth due to inheritance or lottery, decided to invest in stocks Poor households would find fixed costs as a share of their accumulated capital to be very high to be able to invest in stocks. A small fraction of wealthy households also does not invest in stocks, which can be attributed to factors such as trust, preferences, or peer effects.

5.1.3 Trust

(Guiso et al., 2008) explains the role of trust in influencing individual's motivation to participate in stock market. Trust could affect participation in two different ways. First, the decision to invest involves trusting the essential features of the financial system, its institutions, regulators, quality of data and enforcement of investor protection. Second, trust also reflects the investor's belief about the subjective features such as the fairness of the system or the probability of being cheated. (Guiso et al., 2008) show that trust predicts investor stockholding participation even after accounting for risk and ambiguity aversion.

5.1.4 Peer Effects

Peer effects play an important role in stock market participation. Households start investing in stocks when their neighbours have experienced good stock returns (Kaustia and Knüpfer, 2012). (Hong et al., 2004) consider the role of social interaction and find that households that report interacting with their neighbors and attending church are more likely to be stockholders. (Brown et al., 2008) reports a positive relationship between an individual's decision to own stocks and average stock market participation in that individual's community. In a rational model, peer effect works in stock market participation through stockholding both observational learning and social utility, where one's utility is dependent on possession of assets by others. Household learn from their past trading and often experience losses, which can explain the limited stock market participation (Linnainmaa, 2011; Malmendier and Nagel, 2011).

5.1.5 Other factors

There are other factors such as market sentiments, income uncertainty and debt level which affect stock market participation. Lower expected equity premium would make stock participation less attractive, as net benefits for households are limited. (Malmendier and Nagel, 2011) and (Hurd et al., 2011) find that stock market participation declines with decreasing expected stock returns. (Bonaparte et al., 2014) show that individuals

are less likely to participate in the stock market when they face income or labour market uncertainty. Households find it difficult to invest in stocks if they have large amounts of debt, as they have very little wealth available for investing (Cocco, 2005; Yao and Zhang, 2005; Davis et al., 2006).

5.2 Portfolio Choice

Early rational models suggest that all households would participate in the risky asset market. (Merton, 1969) model of consumption portfolio choice implies that all rational individuals would hold the market portfolio. Mean-variance analysis of (Markowitz, 1952) assumes that investors only care about the mean and variance of returns during a particular period. It implies that all investors should hold risky assets in the same proportion and difference would only in the scale and not composition of the portfolio (Tobin, 1957).

The basic theory of investment is to hold a diversified portfolio since it reduces investor's risk and protect the portfolio from high volatility. Various studies in literature on household portfolio diversification attempts to explain why households have under-diversified portfolio and the costs associated with it. (Campbell and Cocco, 2007) use the administrative data of all Swedish resident households and find that they hold undiversified portfolio of very few stocks. The lack of diversification can be extremely costly and median losses are 0.3% of financial wealth relative to the market performance. (Blume and Friend, 1975) find that households hold highly undiversified portfolios in United States. Younger, low income and less educated individuals hold under-diversified portfolios (Goetzmann and Kumar, 2008; Polkovnichenko, 2005). (Campbell et al., 2019) find in India that returns on directly held stocks generate slower growth of for small investors than for larger investors, because small investors are poorly diversified.

The under-diversifcaion of households can be attributed to the familiarity of investor to certain stocks. A rational investor would utilize the information advantage of a familiar stock to outperform the market (Korniotis and Kumar, 2013; Van Nieuwerburgh and Veldkamp, 2010). (French and Poterba, 1991) and (Grinblatt and Keloharju, 2001) predict that investors are more likely to hold stocks of companies of their own countries or stocks of local companies (Huberman, 2001; Feng and Seasholes, 2004; Ivković and Weisbenner, 2005; Graham et al., 2009). Investors tend to allocate a significant share of their portfolio in own employer's stocks (Benartzi, 2001; Poterba, 2003). (Knüpfer et al., 2017) find that stockholders have the same stocks as their parents. Professional and local familiarity is consistent with preference-based explanation. (Van Nieuwerburgh and Veldkamp, 2010) argue that investors have preference towards stocks where they have an informational advantage. Investors are also likely to buy stock of companies whose goods and services they consume. (Bekaert et al., 2017) show that education, financial liter-

acy, and exposure to foreign-born individuals are associated with greater international diversification.

5.3 Trading

Expected utility framework states that rational individuals would choose an option in a complex situation based on their risk and preferences. However, investors form and update individual beliefs in Bayesian manner. (Odean, 1999) and (Barber and Odean, 2000) find that US retail investors' portfolios have high trading volume.

5.3.1 Overconfidence

The high turnover in trading is inconsistent with standard models of portfolio choice, where households invest passively. The leading explanation for high volume is overconfidence, which can overconfident can cause investors to underestimate the precision of others' signals to one's own (Banerjee et al., 2009). This leads to substantial divergence in opinions about trades, thereby generating high trading volume. Men are considered to be overconfident than women and studies find men trade aggressively and in higher volumes while earning lower returns due to higher transaction costs (Lundeberg et al., 1994; Barber and Odean, 2000).

5.3.2 Learning and experience

Learning from past trading has immense influence on future trading. Investors learn differently from the standard Bayesian model, as they are influenced by both the signal and noise components of their past experiences (Kuchler and Zafar, 2019; Fuster et al., 2010). (Gervais and Odean, 2001) document that traders extract biased signals from their past performance, and weight very highly their past successes when learning about their own trading, which results in overtrading. It often leads to reinforcement learning, where investors pursue actions that have been rewarding in the past without recognizing whether those experiences reflect signal or noise (Roth and Erev, 1995; Camerer and Hua Ho, 1999). Similarly, a unique Indian phenomenon of random allocation of IPO stock showed that investors substantially increase their subsequent trading volume in the remainder of their portfolio if the IPO they are randomly allotted experiences gains, and they symmetrically reduce their subsequent trading volume in the face of losses on the IPO stock (Anagol et al., 2021). There are some households that learn more than Bayesian models would predict, as households simply extrapolate from recent data and put higher weightage on important or painful personal experiences (Greenwood and Shleifer, 2014; Barberis et al., 2018).

5.3.3 Inattention and Inertia

Many empirical studies suggests that households are less active while re-balancing their risky asset portfolios. Household behavior in 401(k) retirement accounts is passive and slow (Agnew et al., 2003; Ameriks and Zeldes, 2004; Madrian and Shea, 2001). Many reasons have been cited for this inactive behavior such as lack of capacity to process large volume of information (Sims, 2003), observational costs of evaluating the portfolios. Portfolio inertia is also cited as a reason for the inactivity, as it relates to the endowment effect (Kahneman et al., 1991), in which random allocation of an object leads to a reluctance to trade it in exchange for another. Evidence of endowment effect is seen in India, where IPOs are randomly allocated to investors who applied. Those who were allocated IPOs continue to hold these stocks, while those who missed on the allocation rarely purchase the same stock in future (Anagol et al., 2018).

5.3.4 Disposition Effect

Investors exhibit disposition effect where investors tend to sell stocks that have increased in value, while holding those that have decreased in value. This could result in losses in markets with positive momentum. This phenomenon is partly explained by the prospect theory. (Tversky and Kahneman, 1985) performed an experiment in which subjects demonstrate significant loss aversion with respect to an initial reference point, implying evaluating utility in terms of gains and losses rather than in terms of final wealth levels. This formed the basis of the prospect theory Some studies attribute disposition effect to realized gains and losses (Barberis and Xiong, 2012; Shefrin and Statman, 1985; Ivković and Weisbenner, 2009; Kaustia, 2010; Ben-David and Hirshleifer, 2012). The tendency to exhibit disposition effect is correlated with cognitive skills, wealth and financial literacy (Dhar and Zhu, 2006). Recent trends show that disposition effect works in a limited manner at the security level and investors may compare within portfolio (Hartzmark, 2015; An et al., 2019; Ghosh et al., 2021).

6 Fintech

Fintech has revolutionized the way consumers access financial products and services. According to the definition decided by regulators and central banks, Fintech is technologically enabled financial innovation that could result in new business models, applications, processes, products, or services with an associated material effect on financial markets and institutions and the provision of financial services. The scope of activity in fintech ranges from mobile payments, money transfers, peer-to-peer loans, online lending, robo-advisory, blockchain and cryptocurrencies. The growth of fintech is linked with the dynamics outside the financial sector, as start-ups and technology firms are creat-

ing innovative products and services to challenge the traditional players in the financial system.Even before the rise of Fintech, banks have adopted new technologies to improve efficiency and manage risks. Credit scoring technology's role in lending process (Mishra et al., 2022) and introduction of MERS, which led to an expansion in mortgage credit supply encouraging lenders to originate mortgages to low-income borrowers (Lewellen and Williams, 2021).

6.1 Fintech Lending

The regulatory environment in the aftermath of the global financial crisis created immense opportunities for the growth of shadow banks and fintech non-banks played an important role in transforming the sector. Shadow banks are not subject to the strict regulatory requirement of capital and liquidity like traditional banks that accept deposits. (Buchak et al., 2018)examine the rise of online fintech in the U.S. residential mortgage market and find that the market share of origination activity among shadow banks including fintech lenders almost doubled between 2007 and 2015. Similar evidence is found in UK where regulatory differences created an opportunity for small banks and fintech lenders to exploit regulation disproportionately affecting the big banks (Begley and Srinivasan, 2022) . Fintech companies gained competitive edge over banks, as fintech payment providers can use payment data to assess the credit score of customers. It ensures that banks are not the only custodians of payment data and fintech can disrupt the loan market by increasing access to marginal borrowers (Parlour et al., 2022). Fintech firms can also use The information content of a digital footprint variables such as device type, operating system and email provider for predicting consumer default (Berg et al., 2020).

(Fuster et al., 2019) document that finTech lenders increased their market share of U.S. mortgage lending from 2% to 8% from 2010 to 2016. fintech lenders process applications faster and have lower documentation requirements. Another finding within the same paper is that finTech lenders do not target borrowers with low access to traditional finance, suggesting that they are mostly competing with the traditional mortgage lenders rather than broadening access. However, (Jagtiani et al., 2021) claim that finTech lenders are expanding credit availability for consumers, as their market share is higher in areas with higher mortgage denial rates and lower credit scores. Similarly, the introduction of the Paycheck Protection Program during the Covid pandemic created opportunities for Fintech to expand access and FinTech was disproportionately used in ZIP codes with fewer bank branches, lower incomes and minority households (Erel and Liebersohn, 2022). (Bao and Huang, 2021) also find that Fintech companies are more likely to expand credit access to new and financially constrained borrowers, resulting in higher delinquency rate than traditional banks. (Di Maggio and Yao, 2021) attributes this to the strategy of Fintech lenders to gain market share by lending first to high-risk borrowers and relying

only on hard information. Fintech borrowers are significantly more likely to default than individuals with the same characteristics borrowing from traditional financial institutions (Di Maggio and Yao, 2021).

There is evidence of ethnic/racial discrimination observed in services provided by traditional players such as mortgage brokers (Ambrose et al., 2021) and retail auto loan providers (Butler et al., 2022). (Bartlett et al., 2022) find that lenders charge ethnic minority borrowers higher interest rates for purchase and refinance mortgages in United States. (Bartlett et al., 2022) finds that FinTech algorithms also discriminate, but 40% less than face-to-face lenders. The lower levels of price discrimination by algorithms suggests that removing face-to-face interactions can reduce discrimination. There are also gaps in interest rate by race and ethnicity in interest rates (Bhutta and Hizmo, 2021). (Fuster et al., 2022) predict delinquencies using traditional and machine learning models and find that Black and Hispanic borrowers are disproportionately less likely to gain from the introduction of machine learning, while (Tantri, 2021) argues that machine learning algorithms improve the efficiency in lending without discriminating against disadvantaged households in India where soft information traditionally played an important role.

6.2 Peer-to-peer Lending

The P2P lending is marketplace lending where both lenders and borrowers are matched through a web aggregator or a digital platform. Lending is heavily relied on screening and information production by investors. (Vallee and Zeng, 2019) find that there is trade-off between better screening by sophisticated investors and adverse selection among investors. It challenges the traditional role of banks as being the exclusive information producer on behalf of investors. As bank lending came under higher regulatory burden, (Tang, 2019) finds that P2P lending becomes an option for marginal and lesser creditworthy borrowers who do not have access to bank lending. Lenders in the platform also receive much lesser information about borrowers than traditional banks, thereby attracting borrowers with lower credit scores (Chava et al., 2021). (De Roure et al., 2022) also show how stricter capital requirements led to a credit reallocation from banks to peer-to-peer (P2P) lending in the German consumer credit market.

6.3 Payment Technology

New payment technologies are more convenient, quicker, smarter and cheaper for consumers (Bachas et al., 2018), but the adoption can be slow and heterogeneous. Older individuals are less likely to adopt new technology due to a lower perceived benefits and less technological sophistication. (Agarwal et al., 2019) show that the introduction of a new QR code payment technology increases sales for small and entrepreneurial merchants. Another study in France shows that contactless card payments using NFCs affects card

sales. Contactless payments increase the card-sales on average compared to merchants who do not accept contactless payments (Bounie and Camara, 2020). US government introduced an innovative payment platform called Quickpay to accelerate payments to small business contractors. (Barrot and Nanda, 2020) found that it had a strong direct effect on employment growth at the firm level

6.4 Fintech and Trading

FinTech has automated investment advice by providing AI based financial advice to consumers, which are often called robo-advisors. Robo-advisory has shown to address and manage behavioral biases such as the disposition effect and momentum chasing. (D'Acunto et al., 2019) find that robo-advisors improve investor performance in case of ex-ante non-diversified investors while showing no improvement for already diversified investors. Robo-advising helps investors to become better diversified with reduced portfolio volatility. Retail investor participation in stock market skyrocketed during Covid pandemic. Fintech innovations in trading platforms were significant determinants of retail-investor stock market participation (Ozik et al., 2021). There has been a remarkable increase in cryptocurrency investors as well in recent years. (Hackethal et al., 2022) find that their characteristics are similar to active traders who are prone to investment biases and hold risky portfolios. They are more likely to invest in stocks with high media sentiment and more likely to employ heuristics from technical analysis.

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