Understanding Japanese Household Portfolios*

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February 2025

*We thank the Central Council for Financial Services Information for allowing us to use individual data of the Survey of Household Finance. We thank seminar participants at the Bank of Japan and Pierre-Collin Dufresne, Mark Gertler, Luigi Guiso, Naohisa Hirakata, Urban Jermann, Nobuhiro Kiyotaki, Caterina Mendicino, Arito Ono, Monika Piazzessi, Junnosuke Shino, Yosuke Yasui and Charles Yuji Horioka for helpful discussion and comments, Naohito Abe and Tomoaki Yamada for sharing their data on household income profiles, and Masao Fukui, Miho Kawabe, Kazuhiro Teramoto, and Kentaro Sakata for excellent research assistance. This is a revised draft of an earlier paper entitled "Household Portfolios in a Secular Stagnation World: Evidence from Japan." Aoki thanks financial support from the Center for Advanced Research in Finance (CARF, University of Tokyo) and the JSPS Grant-in-Aid for Scientific Research No. 25380223. We are responsible for any remaining errors.

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Abstract

Why do Japanese households hold so few stocks? We address this question using a quantitative life-cycle portfolio choice model. Before 1990, excessive fees and poor corporate governance generated low expected stock returns and low trust in the stock market. Since the 1990 financial crisis, the Japanese market experienced a large permanent decline followed by low and volatile equity returns, further damaging investors' trust and expected stock returns. Counterfactual analysis suggests that improved trust in the stock market, slightly higher expected stock returns or lower stock market volatility can lead to substantially higher stockholdings.

JEL Classification: G11, G50.

Key Words: Life Cycle Models, Portfolio Choice, Stock Market Participation, Trust, Japanese portfolios.

1 Introduction

Why do Japanese households hold so few stocks? Japanese stockholders hold only around 20% of their financial wealth in the stock market which is far lower than those in the U.S. (52%), France (28%), the Netherlands (35%) or Italy (46%) (Guiso, Haliassos, and Jappelli (2002)). Even within Japanese defined contribution (DC) pension plans, which in the US have been widely credited with raising stock ownership since they were introduced in the late 1970s, stocks accounted for a mere 25% of total assets in 2017. Japan also lags other countries on the extensive margin of stock market participation. Only around 20% of Japanese households held stocks in recent years which is far behind the U.S. at around 50%, Sweden at 68% and Finland at 34% although it is more in line with France is at 23%, the Netherlands is at 19% and Italy at 11.5% (Badarinza, Campbell, and Ramadorai (2016)).

The very low equity share invested by stockholders suggests that Japanese households see the equity market as unattractive rather than merely difficult to access. We follow the idea that personal experiences (Malmendier and Nagel (2011)) and trust in the stock market (Guiso, Sapienza, and Zingales (2008)) are important for household investment decisions. We then use a quantitative life cycle portfolio choice model to show that low expected stock returns, consistent with the Japanese experience, and a lack of trust in the stock market can account for the low stock share, as well as the low participation rate both in recent years and at the height of the 1980s boom.

Stock returns have been low and volatile in the crisis-hit, low-growth decades since 1990 but this was not the case for the high-growth 1970s and 1980s when the Japanese stock market was delivering exceptionally high returns. To motivate a weak demand for stocks during the boom period, we draw on the

evidence in Cai, Chan, and Yamada (1997) that high intermediation costs diminished net returns to ordinary shareholders substantially despite the strong overall market performance. As a result, stock returns experienced by households were low in the 1970s and 1980s due to high commissions and then subsequently due to the weak performance of the Topix.

Our second explanation rests on the idea that poor corporate governance and frequent financial scandals damaged confidence in the stock market and its associated financial institutions. There is direct evidence in Inoguchi (2002) showing that Japanese households trust corporations much less than their European and North American counterparts. The role of financial scandals in shaping these perceptions is emphasized in Franks, Mayer, and Miyajima (2014) and Kinari and Tsutsui (2009). Franks, Mayer, and Miyajima (2014) document how discriminatory policies towards small and minority shareholders led to individual investors being replaced by banks and other corporates as the buyers of new share issues in the 1970s and 1980s. Since the 2000s, corporate governance in Japan has improved significantly but Japan has experienced multiple financial crises and large stock market declines (in 1990, 1997, 2001 and 2009), undermining confidence and trust in the stock market.

We start our analysis by documenting several key household portfolio facts using data from the Japanese Survey of Household Finance (SHF) from 1981 to 2019. We first note that stock market participation is low both on the extensive and intensive margins. Japan is truly exceptional compared to other developed economies in that even stockholders hold a relatively small share of wealth in stocks and a relatively large share in bank deposits.[1]

To better understand Japanese household portfolio choices, we rely on a structural life-cycle portfolio choice model with idiosyncratic uninsurable labor

[1]See, for example, Guiso, Haliassos, and Jappelli (2002) and Badarinza, Campbell, and Ramadorai (2016).

income risk. The key idea is to first estimate the model by matching data from the 2019 survey, and then see the extent to which the model can replicate observed behavior in other time periods such as the height of the boom period in 1990.

The life-cycle model is made up of heterogeneous households choosing how much to consume and how much to save in bonds and stocks. Investors differ ex ante in their time discount factor and in the strength of their bequest motives, and also differ ex post in their realized labor income shocks. Stocks deliver higher expected returns at higher risk, while bonds offer lower and safer expected returns, as well as liquidity benefits. Modelling liquidity benefits is especially relevant in Japan, because time deposits in banks and the Japanese Postal Savings system make up a large part of household bond holdings. We do this using shopping costs - households incur smaller shopping costs when they hold more bonds in relation to their consumption expenditure (Lucas (2000)). Finally, in line with Fagereng, Gottlieb, and Guiso (2017), we model low trust in the stock market by including a risk of a catastrophic 50% loss from holding stocks.

The key structural parameters of the model are estimated using the Method of Simulated Moments (MSM) by matching key data moments from the Japanese Survey of Household Finances in 2019. We target the evolution of the ratio of financial wealth to income over the life cycle, as well as households' portfolio choices in different age groups. This allows us to estimate the discount factors of the two groups, the importance of the liquidity motive to invest in bonds, the fixed cost of entering the stock market for the first time as well as the probability of experiencing a 50 per cent permanent loss in the stock market.

The estimated model matches quantitatively limited stock market participation, and the low share of wealth in stocks. There are two key ingredients

that deliver low demand for stocks. First, as a result of the Japanese Lost Decade(s), we find that, from the vantage point of an investor in 2019, expected Japanese stock returns have been low and volatile. Second, our estimates suggest that stockholders expect a permanent large loss with a probability of 1.2 per cent. This is consistent with recent large stock market falls, the most recent taking place following the collapse of the 1980s bubble, as well as the 2009 financial crisis. With these two key ingredients in the model, it becomes very natural for households not to participate in the stock market and to hold a low share of wealth in stocks once they do participate. These findings are consistent with National Accounts data showing that foreign shareholders in Japanese firms have grown at the expense of domestic ones since the 1990s.

We validate our narrative by using the model to perform a key out-of-sample prediction exercise. We investigate why Japanese households did not participate in the 1980s, when the Japanese stock market index recorded very strong returns. We argue that even though the stock market was growing, individual investors were benefiting to a far lesser extent. Cai, Chan, and Yamada (1997) show that weak investor protection led to Japanese mutual funds persistently under-performing their benchmarks by an average of 6pp per year. Once high intermediation costs are taken into account, the returns received by households decline considerably. In addition, we document a history of frequent Japanese corporate scandals in the 1960s and 1970s which had depleted public trust in Japanese business and hence in the stockmarket. We capture these by also estimating a small probability of large loss for this period. With these two features, the model is capable of rationalizing remarkably well the low participation even at the height of the Japanese bubble.

We end our paper by considering several counterfactuals. In the last decade, there have been a number of corporate governance reforms in Japan. Cross-

shareholdings between firms have mostly disappeared as have cross-holdings between banks and their corporate customers. Protection for minority shareholders has improved. Low cost index funds have removed the need to invest via expensive intermediaries. All these reforms suggest that future stock returns to shareholders should improve relative to the past. We use our estimated model to evaluate how higher expected stock returns, or improved trust in the stock market, would change share ownership in Japan. The model predicts that an increase in the expected equity premium by 50 basis points should increase stock ownership to around 30-35%. A fall in the perceived probability of large losses (in other words, an improvement in Japanese households' trust in the stock market) would lead to similar increases in participation.

Our paper relates to a number of different strands in the literature. Our title echoes a similar question asked for U.S. households in a seminal paper by Haliassos and Bertaut (1995). The subsequent literature has emphasized fixed and/or repeated costs of holding stocks to rationalize limited stock market participation in the U.S.. (Haliassos and Michaelides (2003), Alan (2006), Cocco (2005), Gomes and Michaelides (2005), Bonaparte, Cooper, and Zhu (2012), Favilukis (2013), Fagereng, Gottlieb, and Guiso (2017)). Preference heterogeneity has also been shown to be important in matching household portfolios (for example, Calvet, Campbell, Gomes, and Sodini (2020)).

Housing-related committed expenditures can be another explanation of low stock market participation (Cocco (2005) and Chetty and Szeidl (2007)). While housing expenditures might delay stock ownership, they will not also explain the very low percentage equity share of financial wealth allocated to stocks after participation. Moreover, we subtract housing costs in the model to control for this potential explanation.

Our offered explanations are also consistent with another strand of the

literature that has emphasized experiential learning and how bad experiences with the stock market can affect stock market participation decisions decades later (Malmendier and Nagel (2011)). Finally, low trust in the stock market as an explanation for low participation has been emphasized by Guiso, Sapienza, and Zingales (2008).

2 Financial Markets and Household Portfolios

This section takes a broad overview of the empirical evidence on Japanese household portfolios. We start by reviewing the post-war evidence from the Flow of Funds on the share of stocks for the household sector as a whole. We also review Japanese corporate history and argue that it could affect household expectations about future stock returns and investor trust in the stock market. Then we use the Survey of Household Finances to characterize Japanese household portfolios at the household level.

2.1 Aggregate Japanese household portfolios

We start by reviewing the Flow of Funds evidence on the composition of Japanese household financial asset portfolios since 1949.[2] Figure 1 decomposes asset holdings into several broad categories, revealing two noteworthy features. First, bond-like financial assets overwhelmingly predominate throughout the post-war period. Cash and deposits account for 50-60% of financial wealth. Pension and insurance products account for another 20-30%. This category consists mainly of defined benefit pension schemes and life insurance products invested in fixed income instruments. Second, equities and investment trusts

[2]The official Flow of Funds data started from 1953. Data from 1943 to 1952 are from the estimates by Utsunomiya (2011). There are breaks in data due to changes in statistical standards. Data between 1953 and 1978 are based on 68SNA, 1979-2004 on 93SNA, 2005-2019 on 08SNA.

account for only 10-20% of Japanese household asset holdings. This share has fluctuated over time but has stayed low since 1949. Figure 2.1 zooms in on the evolution of the equity share since 1949. The importance of equities grew significantly (from 10% to close to 25%) in household portfolios during the 1950s and then again during the 1980s. The household sector exposure to the equity market declined during the 1960s and 1970s and then again in the 1990s.

What explanations have been put forward for the evolution of the Japanese stock holdings? Franks, Mayer, and Miyajima (2014) describe how the Japanese post-war financial system was riddled with conflicts of interest and sometimes outright fraud. There was a significant stock market correction in 1964-1965 and, by the late 1960s, the investment trusts that had been marketed to individual investors disappeared almost entirely. As Franks, Mayer, and Miyajima (2014) document, the history of fraud and mistreatment of minority shareholders destroyed trust in Japanese corporations and the stock market. Direct stock-holdings migrated from the household sector into the hands of corporations over the 1970s as Figure 3.1 shows (using Flow of Funds data).

In the late 1980s, Japan experienced a stock market and land price bubble. The bubble collapsed in 1989 and was followed by the long stagnation and the financial crisis of 1997. The stock market declined sharply after the collapse of the bubble and was followed by a number of scandals. The security dealers compensated large corporate customers for their capital loss but not individual clients. Liabilities arising from such compensation was one of the factors that led to the failure of Yamaichi Securities, then the fourth largest security house, triggering the financial panic of 1997.[3]

Figure 3.2 (using Flow of Funds Data) shows that the experiences of the

[3]The compensation of loss was banned by the 1991 Securities and Exchange Act but such historical events can reduce trust in the stock market and trust is important in encouraging stock market participation (Guiso, Sapienza, and Zingales (2008)).

1990s led to a further decline in the share of stocks owned by households, matched by a rise in the share owned by foreigners.[4] After netting off the indirect ownership through corporate and bank shareholdings, we see that households owned most of the stock market at the end of the 1970s but their share fell to less than 50% by the end of our sample in 2019. This is consistent with the view that Japanese households did not find it attractive to invest in Japanese stocks. We will argue that households' experiences of low stock returns and crises have been an important factor in understanding the small equity share in Japanese household portfolios.[5]

2.2 Survey of Household Finances: 1981 - 2019

Our detailed household level data begin in 1981 with the Survey of Household Finance (SHF) - an annual survey of household financial assets by the Central Council for Financial Services Information. Similar to the Survey of Consumer Finances of the United States, the SHF is a series of repeated cross sections.

The SHF asks 8000 households questions about financial assets and liabilities, and about household characteristics such as the age of household head and annual income and households' attitudes about wealth accumulation and risk taking. The survey also asks about households' financial portfolios — the outstanding amounts of currency, current deposits and time deposits, life insurance, non-life insurance, personal annuity insurance, bonds, stocks and investment trusts, workers' asset formation savings, and other financial products. We decompose financial assets into two categories — stocks and bonds. We define bonds as the part of financial assets that is not invested in the

[4]We create different Figures for the data before and after 1978 due to a change in the data definitions that occurred in that year.

[5]Bank of Japan (BoJ) purchases also picked up in the 2000s (Charoenwong, Morck, and Wiwattanakantang, 2021) but its share never exceeds 5% of the market.

stock market (mainly currency and deposits). Households report the amount of stock they own directly. For investment trusts, households report the value of their holdings without specifying whether it is a bond or a stock investment trust. In Appendix A, we describe how we use aggregate data in order to split investment trust holdings into stocks and bonds.

In this section, we discuss the historical evolution of household stock market participation and the conditional stock share during our sample. We start by comparing the aggregate implications of the SHF to those of the Flow of Funds. Figure 4 plots the aggregate share of stocks in household wealth from both data sources. We see that the SHF gives a broadly consistent picture, although there are some differences in the 1980s and since 2008. Overall, they share a similar trend.

Figure 5 shows the time path of the stock market participation rate during our sample. Participation started in the 1980s at a low level of around 13-14%. This is consistent with the collapse in investment trusts in the 1960s due to fraud as reported by Franks, Mayer, and Miyajima (2014). During the 1980s boom, participation increased to almost 20%. Following the collapse of the Japanese "bubble economy" in 1989-1990, participation fell again to 12-14% in the mid-2000s before recovering and increasing to above 22% in the most recent surveys. These findings are consistent with Fujiki, Hirakata, and Shioji (2012) who use the same data set.[6]

Figure 6 shows the conditional stock share for stock-market participants. This measure is computed as the simple average of the share of stocks at the individual stockholder level. It starts in 1981 at around 20%, then during the stock market boom, increases to almost 30% before falling back in the 1990s.

[6]This number counts the percentage of households replying that they own stocks and/or investment trusts. Since 2003, the SHF also asks about 'Individual-type defined contribution pension' for reference purposes only. Households could buy stocks indirectly through the pension plan of this type, but its participation rate is very low (2.35% in 2014).

It has fluctuated around 20% since then.

Figures 6 and 7 show, respectively, the participation rate and equity share of participants by age focusing on the measure that includes investment trusts. Figure 6 shows an age profile of stock market participation which is increasing over the life cycle. In contrast, Figure 7 reveals reveals a rather flat conditional stock share over the life cycle. All age groups exhibit an increase in their exposure to stocks during the 1980s boom followed by a fall in the 1990s. Older age groups (50s and 60s) seem to drive the increase in aggregate participation observed during the 2000s. The stock share of stockholders in their 20s is very volatile reflecting the relatively small number of young individuals who own stocks.

How does Japan compare internationally? Badarinza, Campbell, and Ramadorai (2016) compile stock market participation rates for a number of developed economies for the period 2010-2012. Comparing Japan to those countries, they show that, at 20.5%, Japan is far behind the U.S. (49.8%) but not hugely out of line with other high income European countries. France is at 23%, while the Netherlands is at 19.3% and Italy is at 11.5%.

Where Japan is indeed an outlier is in the conditional stock share. Data from Guiso, Haliassos, and Jappelli (2002) show that U.S. stockholders held on average 52% of their financial wealth in stocks, French ones held 28%, Netherlands stockholders held 35% and Italian ones invested 46% of their financial wealth in the stock market. In contrast, Japanese stockholders only had a 19% stock share conditional on holding stocks. This suggests that Japanese households see stocks as unattractive rather than merely difficult to access.

2.3 Indirect stockholding

The introduction of defined contribution (DC) pension plans has been credited with increased indirect stockholdings in a number of countries (e.g. the US) so it is important to consider how pension policy shapes the incentives for stock market participation in Japan. Unfortunately, the SHF does not have detailed data on personal pensions so we will not be able to tackle this issue directly. In this section we use the limited available public data to argue that indirect stockholding is low and therefore should not significantly affect our quantitative conclusions.

Two types of DC pension plans exist in Japan - corporate DC plans provided through employers and individual DC plans which are organized privately. However, their size is much smaller than those in other countries, both in terms of their share in overall household portfolios and in participation. The size of all DC pensions in Japan in 2016 was around 117 billion US dollars,[7] while the asset size of 401(k) plans in the US, which is a typical defined contribution pension plan, was around 4.5 trillion US dollars in 2014. Moreover, in Japan, the size of monthly contribution is very restricted. As of 2020, the upper limit of monthly contribution to the corporate-type DC plan is 55 thousand JPY (around 550 USD), while that of the individual type is between 12-68 thousand JPY (around 120 and 680 USD, depending on the employers' policy on DC).

The participation rate is also low. In 2020, out of the total Japanese population of 126 million, only about 7.2 million individuals participate in corporate-type DC pension plans, and 1.6 million participate in the individual-

[7]This is the sum of the corporate-type (9.6 trillion JPY) and individual type (2.1 trillion JPY) defined contribution pension plans (we use an exchange rate of 100 JPY to one USD). These numbers and the others in this section are from The Pension Fund Association in Japan. The link (explanations in Japanese) is https://www.pfa.or.jp/activity/tokei/dc_unkan/index.html.

type DC pension plans. In contrast, around 67 million participate in the mandatory "Basic Pension" that is provided by the national government.[8]

These facts indicate that Japanese stockholding through defined contribution pensions is small. Moreover, in these accounts, the share of safe assets (deposit and insurances) is about 75%, while the share of riskier assets (equity investment trusts and balanced trusts) is around 25% (in 2017). This suggests that household demand for stocks is low, and even if participation in DC accounts increases in the future, households will continue to invest mainly in safe assets. These observations motivate our focus on low stock market trust and low expected returns as the major explanations in understanding Japanese household portfolios in our quantitative analysis.

2.4 Summary

In summary, the data show that stock ownership in Japan has been low since the second World War. Over the last four decades, the participation rate has increased only marginally, while the conditional stock share has remained very low despite significant declines in the cost of accessing the equity market.

The stock returns experienced by Japanese households may play a role in household portfolio decisions. Japan has experienced several large declines in stocks and a lot of stock market volatility and corporate fraud. The pension system through DC plans also plays some role in generating low direct participation. Nevertheless, even those households that participate through these plans are very conservative in their asset allocation. This suggests that it is not only regulation which stops participation but a low demand for stocks.

In the rest of the paper we ask whether a standard life cycle portfolio choice model can help us to understand the evolution of Japanese households' stock

[8]Those participants are persons of age 20 to 60 who live in Japan.

ownership since 1981 (covering the period of the household level Survey of Household Finances). We investigate the extent to which low trust, and low and volatile expected stock returns, can provide quantitative explanations for observed choices through a life-cycle model.

3 The Model

We use a version of the life-cycle model extensively used in the household portfolio literature. Agents work when they are young, and receive a pension after retirement. They are subject to uninsurable labor income risk and borrowing constraints. Households hold two assets: bonds and stocks.

3.1 Preferences

Time is discrete and t denotes adult age which, following the typical convention in the literature, corresponds to effective age minus 19. Each period corresponds to one year and agents live for a maximum of 81 (T) periods (age 100). The probability that a consumer/investor is alive at time $t+1$ conditional on being alive at time t is denoted by ξ_t ($\xi_0 = 1$). Finally, the consumer/investor has a bequest motive.

Households have Epstein-Zin-Weil utility functions (Epstein and Zin (1989), Weil (1990)) defined over one single non-durable consumption good. Let C_{it} and X_{it} denote respectively real consumption and wealth (cash on hand) of agent i at time t. There are two household types (denoted by j) to generate more variation in saving outcomes and we use heterogeneity in the discount factor (β^j) and bequest motive (φ^j) to achieve that. The preferences of house-

hold i are defined over real consumption by

$$V_{it}^{j}\left(X_{it}\right)=\left\{(1-\beta)C_{it}^{1-1/\psi}+\beta^{j}\left(E_{t}\left[\begin{array}{l}\xi_{t}V_{it+1}^{j}\left(X_{it+1}\right)^{1-\rho}\\+(1-\xi_{t})\varphi^{j}X_{it+1}^{1-\rho}\end{array}\right]\right)^{\frac{1-1/\psi}{1-\rho}}\right\}^{\frac{1}{1-1/\psi}} \tag{1}$$

where ρ is the coefficient of relative risk aversion. For simplicity, we assume all households have the same inter-temporal elasticity of substitution, ψ. Our economy is populated with two equally-sized groups j, respectively, with high (β_H) and low (β_L) discount factors. Finally, households are heterogeneous in their bequest motive ($\varphi^H > \varphi^L = 0$).

3.2 Financial Assets and Constraints

The agent has options to hold bonds (B_{it}) and stocks (S_{it}). The budget constraint is given by

$$X_{it} = C_{it} + S_{it} + B_{it} + 1_t(.)FY_{it}^{p} \tag{2}$$

where the indicator function $1_t(.)$ becomes one when the fixed cost to participate in the stock market is incurred (equal to FY_{it}^{p}).

Since bonds in our economy include money-like assets such as bank deposits, we follow Aoki, Michaelides, Nikolov, and Zhang (2022) and assume that bonds provide transaction services.[9] Specifically, we include a shopping cost which is increasing in consumption and decreasing in the quantity of bonds

[9] Nagel (2016) uses a money-in-the-utility function approach, and provides evidence that bonds and other near-money assets provide liquidity services and enjoy a liquidity premium. Krishnamurthy and Vissing-Jorgensen (2012) also provide evidence for liquidity and safety premia on government bonds.

(Lucas (2000)). In the benchmark case we assume

$$\Omega_{it} Y_{it}^p = \varepsilon \left(\frac{C_{it}}{B_{it}} \right) Y_{it}^p, \quad \varepsilon \geqslant 0 \tag{3}$$

We assume that the shopping cost related to time t decisions is deducted at the beginning of the next period. This motive provides a natural demand for liquid assets, in this model, these liquid asset are bonds.

The evolution of X_{it} is then given by

$$X_{it+1} = Y_{it+1} + R_{t+1}^s S_{it} + R_{t+1}^b B_{it} - 1_t(S_{it} > 0) f Y_{it}^p - \Omega_{it} Y_{it}^p \tag{4}$$

where R_{t+1}^s and R_{t+1}^b respectively denote the real returns of stocks and bonds. Y_{it+1} is real income at time $t+1$. Finally, f is a repeated fixed cost which is paid whenever the household holds a positive amount of stocks.

Following the portfolio choice literature, we prevent households from borrowing against their future labor income (this prevents households from counterfactually leveraging up to invest in the stock market to take advantage of the equity premium). More specifically we impose the following restrictions:

$$B_{it} \geq 0$$

$$S_{it} \geq 0$$

We have one continuous state variable: X_{it} and the control variables are C_{it}, S_{it} and B_{it}.

3.3 Labor Income Process

Following the standard specification in the literature, the labor income process before retirement is given by

$$Y_{it} = Y_{it}^{p} U_{it} \tag{5}$$

$$Y_{it}^{p} = \exp(f(t, Z_{it})) Y_{it-1}^{p} N_{it} \tag{6}$$

where $f(t, Z_{it})$ is a deterministic function of age and household characteristics Z_{it}, Y_{it}^{p} is a permanent component with innovation N_{it}, and U_{it} a transitory component. We assume that $\ln U_{it}$ and $\ln N_{it}$ are independent and identically distributed with mean $\{-.5 * \sigma_u^2, -.5 * \sigma_n^2\}$, and variances σ_u^2 and σ_n^2, respectively. The log of Y_{it}^{p} evolves as a random walk with a deterministic drift, $f(t, Z_{it})$. For simplicity, retirement is assumed to be exogenous and deterministic, with all households retiring in time period K, corresponding to age 65 ($K = 46$). Earnings in retirement ($t > K$) are given by $Y_{it} = \lambda Y_{iK}^{p}$, where λ is the replacement ratio.

Durable goods, and in particular housing, can generate higher spending early in life.[10] We exogenously subtract a fraction of labor income every year allocated to durables (housing). This empirical process is estimated from the National Survey of Family Income and Expenditure.

3.4 Normalizing by Growth

Let lower case letters denote real variables normalized by the permanent component of labor income (Y_{it}^{p}). For example the normalized real cash on hand is defined as $x_{it} = X_{it}/Y_{it}^{p}$. The evolution of the state variable is then given by

[10] Iwaisako (2009) and Iwaisako, Ono, Shu, and Tokuda (2015) emphasises the role of owner-occupied housing on Japanese household financial portfolio.

$$x_{it+1} = \frac{R^s_{t+1}}{g_{it+1}} s_{it} + \frac{R^b_{t+1}}{g_{it+1}} b_{it} + U_{it+1} - \frac{1_t(S_{it} > 0) f + \Omega_{it}}{g_{it+1}} \tag{7}$$

and $g_{it+1} \equiv Y^p_{it+1}/Y^p_{it}$ is the gross growth rate of the permanent component of labor income. The representation of consumer preferences in terms of stationary (normalized) units is given in the Online Appendix.

4 Parameter Calibration and Estimation

We aim to match the life cycle profiles for Japanese households in 2019. To do so, some parameters will be based on previous studies, and others will be estimated.

4.1 Calibrated parameters

4.1.1 Life cycle income profiles

The life cycle income profile and labor income risks are in line with Abe and Inakura (2007), Abe, Inakura, and Yamada (2007) and Abe and Yamada (2009): $\sigma_u = 0.1$, $\sigma_n = 0.1$.[11] The replacement ratio is set to $\lambda = 0.6$.[12] The correlation between permanent idiosyncratic labor income shocks and the stock return (ρ_{sn}) is set to 0.15 based on the relatively scant evidence that exists with regards to this choice in Japan, and consistent with the literature for the U.S. data.

As explained in Section 3.3, we exogenously subtract a fraction of income every year allocated to housing. The empirical process is estimated from the

[11] Abe and Inakura (2007) use micro data from the Japanese Panel Surveys of Consumers (JPSC) and estimated permanent and transitory income risks from balanced and unbalanced panels. They report that the standard deviations of transitory and permanent income shocks are, respectively, in the range of 0.099-0.135 and 0.091-0.156.

[12] See, Ministry of Health, Labour and Welfare (2014) http://www.mhlw.go.jp/english/org/policy/dl/p36-37_1.pdf.

Means and Standard Deviations		
	1960-2019	
Variable	Mean	S. D.
Real Bond Returns	1.70	-
Real Stock Returns	7.30	24.0

Table 1: Means and standard deviations of annual real stock and bond returns.

National Survey of Family Income and Expenditure. For each age group, we compute the fraction of housing-related expenditure (mortgage payments and rents) as a fraction of income, and take a polynomial interpolation with respect to age.

4.1.2 Asset returns

To solve for household portfolios, we need to make some assumptions about the exogenous expected real returns on stocks and bonds. We do this on the basis of historical data. Figure 8 shows the real level of the Topix index (including dividends) starting from 1960. Returns were high until the end of the 1980s before falling sharply in the 1990s as Japan's "Lost Decade" began. In 1991 alone, the Topix fell by over 41%. The next such large annual decline occurred in 2009 when the stock market fell by 40%. The rest of the period was also characterized by extreme volatility with stock returns registering annual gains of 61% in 2000, and 44% in 2006, alongside other periods of significant losses.

In order to explain Japanese household decisions in the 2019 survey, we focus on the asset returns in the post-war period: the 1960 - 2019 period. Table 1 reports the first two moments that describe the distributions for real bond and stock returns.

Table 1 shows that the equity premium for the 1960-2019 period is around 5.6% per annum. We subtract 2% for fees and taxes, leaving a 3.6% excess

return of stocks over bonds.[13] In addition, the volatility of Japanese equity returns has been very high at 24.0%, much higher than the 18% assumed for US stocks. Together the low and volatile returns will be important in explaining why so few Japanese households have found it attractive to invest in stocks despite the very low real returns available from safer alternatives. Another key factor will be the lack of trust in the stock market which we will capture by assuming that investors believe that with a small probability they face a permanent 50% to their stockmarket wealth. This probability will be estimated to match Japanese households' portfolio choices. We will discuss this in the next subsection. The bond return process has a mean real return equal to 1.70% for the 1960-2019 period. In line with the literature, we assume that the bond return is risk free.

4.1.3 Other calibrated parameters

Given the large number of preference parameters, we set a number of them to standard values in the literature. Preference parameters are $\psi = 0.5$ and $\rho = 10.0$. The coefficient of relative risk aversion is set at the lower end of the range in Fagereng, Gottlieb, and Guiso (2017) who estimate coefficients between 10 and 15. We set the bequest motive of patient households to $\varphi^H = 2.5$. For impatient households that do not accumulate substantial financial wealth, the bequest motive is set to zero consistent with De Nardi, French, and Jones (2010) and De Nardi (2004) that find evidence for bequest motives in the richer part of the population but not for poorer households. The Preference Parameters Study of Osaka University also found that wealthier Japanese households

[13] It is relatively standard in the household finance literature to assume that due to annual management fees investors earn a lower equity premium than the historically observed equity returns.

Calibrated Structural Parameters

Parameter	Value	Description
ψ	0.5	Intertemporal Elasticity of Substitution
ρ	10.0	Relative Risk Aversion
L_D	0.5	Loss in stock market disaster
φ^H	2.5	Bequest motive patient agents
φ^L	0.0	Bequest motive impatient agents
λ	0.6	Pension replacement rate
σ_U	0.1	SD transitory income shocks
σ_N	0.1	SD permanent income shocks

Table 2: Calibrated structural parameters. ψ is the elasticity of intertemporal substitution, ρ is the relative risk aversion coefficient, σ_U is the standard deviation of the transitory labor income shocks and σ_N is the standard deviation of the permanent labor income shocks.

tend to have a stronger bequest motive than poorer households.[14]

4.2 MSM Estimation

For the remaining structural parameters there is much less guidance from the empirical literature. We estimate the shopping cost ε, the fixed cost of entering the stock market F, the discount factors of the two groups (β_H and β_L) and the probability of a rare disaster in the stock market p_D in order to match the evolution of wealth to income over the life cycle as well as household portfolios over the life cycle. We also target the fraction of all households who hold stock.

We use the Method of Simulated Moments Estimator of Duffie and Singleton (1993). The structural parameters collected in a vector $\hat{\theta}$ are determined as:

$$\hat{\theta} = Argmin_{\theta} D' S^{-1} D.$$

Let Y_t and $\tilde{Y}_t$ denote the observations at time t of the actual and simulated endogenous variables, respectively. Let T be the sample size of the observed

[14]For the Preference Parameters Study, see http://www.iser.osaka-u.ac.jp/survey_data/top_eng.html.

series whereas $T \cdot H$ data points are simulated to compute moments from the structural model. For the latter, let $Y_{[T]}$ and $\tilde{Y}_{[TH]}$ denote the vectors of actual and simulated endogenous variables of length T and TH, respectively. We have:

$$D = \left(\frac{1}{T} \sum_{t=1}^{T} moments(Y_t) - \frac{1}{TH} \sum_{t=1}^{TH} moments(\tilde{Y}_t) \right).$$

where $moments(\cdot)$ denotes a particular moment. The asymptotically efficient optimal weighting matrix S^{-1} equals the inverse of the variance-covariance matrix of the data. Following Appendix B in De Nardi, French, and Jones (2010), we use a diagonal weighting matrix for S^{-1} with the elements along the diagonals being the variance of each moment from the data. This is also the approach that works well in the Monte Carlo experiments in Michaelides and Ng (2000) who also recommend simulating around ten times the number of observations in the data and incorporating that additional uncertainty when computing the final standard errors. We follow these recommendations in our approach.

4.2.1 The 2019 SHF cross-section

We will match the evolution of the ratio of wealth to income over the life cycle for households who own stocks (stockholders) and who do not (non-stockholders). Table 3 reports this data moments for 5 age groups. In the table, mean financial wealth is reported for each age group and it is normalised by labor income.[15] There are two facts worth stressing about the table. First, households that hold stocks are considerably wealthier than households that do not participate in the stock market. Japan is therefore no exception to the

[15]We do not include home equity in our measures of household financial wealth: we want to think of the available financial assets and how they are allocated across money, stocks and bonds. In the structural model we will use a data-driven housing expenditures life-cycle function to exogenously subtract the expenditures that go in housing from labour income, as is done in Gomes and Michaelides (2005) and Love (2010).

Life Cycle Financial Wealth Relative to Labor Income in Japan 2019

Age Group	Mean (Wealth/Income) Non-Stockholders	Mean (Wealth/Income) Stockholders
20-29	0.49	1.05
30-39	1.02	1.96
40-49	1.16	2.44
50-59	1.52	3.63
60+	3.24	8.58

Table 3: Mean financial wealth relative to labor income for the non-stockholders/stockholders in the 2019 SHF data.

well-known stylized fact in the life cycle portfolio choice literature that financial wealth is correlated with stock market participation. Second, reflecting less widespread stockownership, Japanese non-stockholders are considerably wealthier than their US counterparts.

We next examine the way household portfolios evolve over the life cycle. We compute the mean asset allocations across bonds and stocks for the households that hold both assets (who we define as stockholders). Table 4 reports the mean portfolio shares for bonds (α_b) and stocks (α_s) for the five age groups in the stockholder group. We also compute the stock market participation rate in each age group. It is immediately clear that the share of wealth in stocks for stockholders is very low and Japanese household portfolios are dominated by bonds and bank deposits throughout the life cycle. The share of wealth in stocks increases slightly over the life cycle both on the extensive (participation) and intensive margin (conditional stock share).

To estimate the model using the Method of Simulated Moments (MSM) we target the mean holdings of financial wealth over the life cycle for stockholders and non-stockholders, the share of stocks in stockholders' portfolios and the mean participation rate. This gives a total of sixteen moment conditions.

The two discount factors are identified by the wealth-to-income ratios of stockholders (more patient households) and non-stockholders (less patient

Life Cycle Portfolio Choice in Japan

Stockholders 2019			
Age Group	α_b	α_s	Participation
20-29	89.2	10.1	12.5
30-39	80.4	19.5	20.8
40-49	81.9	18.1	17.1
50-59	80.4	19.6	24.7
60-79	76.3	23.7	25.3

Table 4: Mean financial portfolios for the non-stockholders/stockholders in the 2019 SHF data.

households), respectively. The fixed cost for stock market participation matches the overall rate of stock market participation, while the probability of stock market disaster helps to match the average portfolio share in stocks. The value of the shopping cost reflects a liquidity preference that can improve matching stock market participation further; in a more complex model it can help determine the share of low/zero yielding liquid balances in the portfolio.

4.2.2 Baseline estimated parameters

The estimated parameters for our model are given in Table 5. The parameter values are consistent with previous estimates in the literature. We estimate a probability of large loss in the stock market p_D equal to 1.21% which is similar to the estimates in Fagereng, Gottlieb, and Guiso (2017) . A lack of trust in Japanese financial institutions should not be surprising given Japan's recent history. Following the collapse of the Japanese bubble economy of the 1980s, a number of well known corporations have been implicated in accounting or corruption scandals.[16] Little direct evidence exists on how such scandals affected Japanese households' attitudes to the stock market[17] but there is evidence that their trust in business more generally is very low in international perspective.

[16]Examples include Nomura Securities, Yamaichi Securities and Sumitomo Corporation.

[17]From a historical perspective, Aoki (1987) documents that the stock market scandal in the 1960s lowered significantly households' stock market participation in Japan.

Estimated Structural Parameters

Parameter	Point estimate	St. Err.	Parameter Description
β^H	0.912	0.0008	Discount factor (patient)
β^L	0.886	0.0007	Discount factor (impatient)
p_D	0.0121	0.0008	Probability of stock market disaster
ε	0.008	0.0011	Shopping cost parameter
F	0.0396	0.0010	Fixed cost of stock market entry

Table 5: β^H (β^L) is the annual discount factor of the more (less) wealthy households, p_D is the probability of disaster in the stock market, ε is the shopping cost parameter, and F is the fixed cost incurred to participate in the stock market. The standard errors (S.E.) are computed using numerical derivatives of the moment conditions weighted by the inverse of the standard deviation of each moment.

Inoguchi (2002) reports comparative survey evidence on how much people in different countries trust various institutions (including 'Business Firms'). Interestingly, it turns out that the Japanese are one of the most mistrustful nations in the survey with only 20-30% of respondents saying they trust business firms. Only South Korean respondents trust business less (10-20%). In contrast, nations with a higher stock participation ratio (the US, the UK and Sweden for example) have 40-50% of people saying they trust corporations. Kinari and Tsutsui (2009) also argue that a lack of trust in security companies is an important factor behind low holdings of risky assets.

There are no estimates for the equivalents of the shopping cost parameters (from microeconomic data) against which we can compare our results. The implied shopping cost is equal to 1% of mean annual labor income that we view as a reasonable transaction cost and is consistent with Lucas (2000).

The fixed stock market entry cost F is similar to that calibrated (Gomes and Michaelides (2005)) or estimated (Alan (2006), Bonaparte, Cooper, and Zhu (2012)) to generate stock market non-participation for poorer households in the US. Even though we are trying to match a much lower 22.9% participation rate, the low fixed cost is sufficient due to the low returns and high risks

from investing in Japanese stocks. This cost should be interpreted as a short cut for anything ranging from inertia, behavioral biases, low trust in the stock market (Guiso, Sapienza, and Zingales (2008)), observation and transaction costs stemming from rational inattention (Alvarez, Guiso, and Lippi (2012)).

In addition, we assume the existence of repeated costs from having a stock trading account (small annual trading and brokerage costs as in Bonaparte, Cooper, and Zhu (2012) and Fagereng, Gottlieb, and Guiso (2017)). To keep the number of estimated parameters down, we assume that this repeated cost (f) is equal to one tenth of the fixed cost. Given our estimate of F, this implies an annual repeated cost of 0.4% of annual labor income.

The estimated discount factors are within the range of recent estimates (Attanasio, Banks, Meghir, and Weber (1999), Gourinchas and Parker (2002)) from structural estimation of life cycle consumption models. They are also in the range of recent estimates from Swedish data with the same preference specification (Calvet, Campbell, Gomes, and Sodini (2020)).

4.2.3 Model versus Data

How do predicted moments compare with the actual ones? We first go through the mean wealth to mean labor income ratios which are given in Table 6. The model matches the life cycle profile of the ratio of household wealth to income extremely well. In particular, it captures the fact that wealth grows over the life cycle for both stockholders and non-stockholders. The model also captures the fact that stockholders are considerably richer than non-stockholders.

Next, we present the moments for stockholders' portfolio shares (Table 7). Here, once again, the model performs remarkably well in capturing the low stock share of Japanese households. The main failure of the model is in overpredicting the stock share early in the life cycle and underpredicting it

Mean Financial Wealth/Income: Data versus Model

Age Group	Non-Stockholders		Stockholders	
	Data	Model	Data	Model
20-29	0.49	0.41	1.05	3.17
30-39	1.02	0.63	1.96	1.73
40-49	1.16	1.16	2.44	2.18
50-59	1.52	2.42	3.63	4.15
60+	3.24	2.67	8.58	6.49

Table 6: Actual versus predicted moments for mean financial wealth relative to mean labor income for the non-stockholders/stockholders. The model is compared to the 2019 SHF data.

Life Cycle Portfolio Choice by Age

	Stockholders 2019			
Age	Data	Model	Data	Model
Group	α_b	α_b	α_s	α_s
20-29	89.2	76.9	10.1	23.1
30-39	80.4	73.1	19.5	26.9
40-49	81.9	76.7	18.1	23.3
50-59	80.4	85.3	19.6	14.7
60+	76.3	87.4	23.7	12.6

Table 7: Actual versus predicted moments for mean financial portfolios for the stockholders. The model is compared to the 2019 SHF data.

from age 55 onwards. The model delivers an 23.1% participation rate which is very close to the 22.9% participation share in the 2019 survey. Overall, the ability of the estimated model to account for Japanese household finance facts is extremely good.

4.2.4 Untargeted moments

We also compare the model's predictions for untargeted moments. Table 8 compares the participation rates over the life cycle between the model and the data. The model replicates the rising participation over the life cycle but it underpredicts participation until age 45 and overpredicts it for households over 55 years of age. Given that these moments were not targeted in estimation,

Life Cycle Participation Rates by Age		
Age Group	Data	Model
20-29	12.5	3.8
30-39	20.8	2.3
40-49	17.1	12.1
50-59	24.7	33.8
60+	25.3	47.8

Table 8: Actual versus predicted moments for mean financial portfolios for the stockholders. The model is compared to the 2019 SHF data.

the model delivers reasonable predictions.

5 Can the model account for Japanese household portfolios in 1990?

We saw that the model was able to fit the life cycle wealth-to-income and portfolio profiles in the 2019 survey. The low and volatile returns on Japanese stocks and the probability of a big permanent fall in stocks were crucial in matching the data. However, Japan did not always have poor investment returns. In the boom in the 1980s, Japanese stocks grew rapidly. In this section, we test the ability of our estimated model to fit the data in the 1990 survey, at the height of the 'boom' period. In 1960-1990, stock returns in Japan were much higher compared to the baseline sample. The Topix total real return was 12.4% which, if we ignore fees, gives an enormous 10.25% equity risk premium over the 2.15% average real return on bonds in the 1960-1990 period. Such a high premium would ensure that most households with reasonable risk aversion would participate in the stock market.

However, Cai, Chan, and Yamada (1997) show that Japanese intermediaries charged enormous commissions, thus reducing very significantly the returns available to ordinary savers. Japanese mutual funds missed their bench-

Means and Standard Deviations

	1960-1990		1960-2019	
Variable	Mean	S. D.	Mean	S. D.
Real Bond Returns	2.15	-	1.70	-
Real Stock Returns	12.4	24.0	7.30	24.0

Table 9: We report the means and standard deviations (S.D.) of key inputs in the annual frequency decision model.

marks by an average of 6 percentage points (pp) during the 1980s due to very high entry and exit charges and excessive trading coupled with very high trading commissions. Cai, Chan, and Yamada (1997) also explain that most investment trusts and mutual funds were owned by security dealers and there was a very high incentive to generate profits for the parent company at the expense of individual clients. Thus, even though the Topix was delivering very high returns during the 1980s boom, these returns were mostly benefiting financial intermediaries with only a limited impact on ordinary shareholders.

In line with this evidence, we assume a 4.25% annual premium of stocks over bonds. This is 6.0 pp lower than actually excess stock returns of 10.25%. The annual volatility of stock returns is set to 24%.

One additional challenge in evaluating our model's ability to account for the 1990 survey is the fact that trust in the financial system as well as the level of financial literacy are likely to have changed considerably between 1990 and 2019 (our baseline estimated model). We therefore re-estimate the probability of disaster in the stock market and the fixed cost of stock market entry (reflecting different levels of financial literacy). The fixed cost helps to match the overall rate of stock market participation while the disaster probability helps to match the share in stocks. We keep the discount factors, the shopping cost and the bequest motive of patient households the same as the ones estimated in matching the 2019 survey.

Estimated Structural Parameters (1990)

Parameter	Estimate (1990)	S.E. (1990)	Baseline (2019)
β^H	0.912	0.0011	0.912
β^L	0.886	0.0012	0.886
p_D	0.007	0.0012	0.0121
ε	0.008	0.0014	0.008
F	0.0766	0.0031	0.0396

Table 10: β^H (β^L) is the annual discount factor of the more (less) wealthy households, φ^H is the bequest parameter for the wealthier households, ε is the shopping cost parameter, and F is the fixed cost incurred to participate in the stock market. The standard errors (S.E.) are computed using numerical derivatives of the moment conditions weighted by the inverse of the standard deviation of each moment.

Table 10 shows the estimated parameters for the 1990 survey together with the baseline estimates for the 2019 survey. We estimate a much lower probability of disaster in the stockmarket (p_D) which is 0.71% pa instead of 1.21% in the baseline. This is intuitive. Despite the corporate governance problems in Japan in the post war period, investors' experience in the 1980s was much better than in the 1990s and 2000s at least in terms of the frequency of large stock market declines and corporate scandals. This is reflected in a lower estimated disaster probability. We also estimate a somewhat higher fixed cost of entering the stock market (F) which is yet again intuitive given the less developed state of the financial system in 1990 compared to 2019. A higher fixed cost of participation in the 1990s is also consistent with evidence from the U.S. experience (for example, Bogan (2008) and Favilukis (2013)).

Table 11 shows the life cycle profile implied by the model and the values for the 1990 survey. The partially re-estimated model does a good job at matching the wealth profiles in the 1990 survey. Given that we do not attempt to match the 1990 wealth profile using discount rates, we consider the model's performance as very satisfactory.

The fixed cost helps to match the overall rate of stock market participation:

Mean Financial Wealth/Income: Data versus Model 1990

Age Group	Non-Stockholders		Stockholders	
	Data	Model	Data	Model
20-29	0.67	0.43	1.09	3.25
30-39	0.94	0.60	1.89	1.39
40-49	1.11	1.15	2.43	1.89
50-59	1.37	2.49	3.47	4.04
60+	2.51	3.31	6.98	7.65

Table 11: Actual versus predicted moments for mean financial wealth relative to mean labor income for the non-stockholders/stockholders. The model is compared to the 1990 SHF data.

Life Cycle Portfolio Choice by Age

	Stockholders 1990					
Age Group	Data α_b	Model α_b	Data α_s	Model α_s	Data Part	Model Part
20-29	70.8	70.6	29.1	29.4	7.9	4.0
30-39	71.7	70.8	28.2	29.2	17.6	4.0
40-49	72.5	73.7	27.4	26.3	19.6	6.3
50-59	70.6	82.2	29.4	17.8	18.4	17.6
60+	75.3	82.3	24.7	17.6	20.2	38.6

Table 12: Actual versus predicted moments for mean financial portfolios for the stockholders. The model is compared to the 1990 SHF data.

the model replicates the 18.7% in the 1990 survey.

Table 12 shows the conditional stock share as well as the participation rate over the life cycle for our 1990 model version. The model does a remarkably good job at replicating the conditional stock share. Yet again, due to the stock market entry cost, the model predicts that stock market entry does not happen in significant numbers until age 50 - i.e. when households have accumulated significant amounts of wealth.

6 Counterfactual analysis

We saw that the model can account for the low stockholdings of Japanese households both in 2019 and at the height of the boom in 1990. Through the

Counterfactual Scenarios

Scenario	Counterfactual participation
Higher trust in the stock market	36.3%
Higher expected stock excess returns	47.3%
Lower stock return volatility	47.2%

Table 13: Stock market participation under three different counterfactual scenarios. Higher trust is captured through a lower probability of a disaster in the stock market (from 1.21% to 0.75%). Higher expected stock returns are captured by a 0.5% higher equity risk premium. Lower stock return volatility is captured by a reduction from 24% to 20% standard deviation in annual stock returns.

lens of the model, low and volatile stock returns are the key factor behind low participation and a low conditional stock share. For the post-crisis period (the 2019 baseline), we also estimated a relatively high probability of large loss reflecting numerous recent crises in Japan. These explanations motivate several counterfactual experiments with the model. We consider the possibility that expected stock returns in Japan increase, their volatility decreases and that households reduce their subjective probability of a large loss. The results of the three counterfactual experiments for the stock market participation rate are summarized in Table 13.

In the first exercise (first row in Table 13), trust in the stock market improves and households attribute a 0.75% probability to a 50% permanent stock market loss as opposed to 1.21% in the baseline 2019 calibration. This effectively unwinds half of the increase in this estimated probability between the 1990 and the 2019 surveys. This counterfactual generates a big increase in stock market participation which rises to over 36.3% compared to 22.9% in the baseline model. Stockholdings increase also on the intensive margin with the conditional stock share rising modestly by 1-2 pp across different age groups.

The second counterfactual implements a 0.5% higher equity risk premium (ERP) which is 4.1% instead of 3.6% in the baseline (second row of the table).

Such an increase in the ERP could occur for two reasons. Real stock returns could increase by 0.5% per year with real bond returns unchanged. But importantly, real bond returns may decline with real stock returns unchanged. This could happen if, for instance, nominal interest rates remain at or close to zero while inflation increased by 0.5% thus erroding real bond returns. The model's implications for these two scenarios are very similar so the table presents the results of an implementation relying on higher expected real stock returns. As a result of the increase in the ERP, stock market participation rises to 47.3%, while the conditional stock share also rises with under-50s holding 26-30% of their portfolios in shocks as opposed to 23-27% in the estimated baseline model.

The final counterfactual we consider is lower stock return volatility (third row in Table 13). We consider the implications of 20% annual stock return standard deviation instead of 24% in the baseline. This sets the volatility of Japanese stock returns closer to US numbers. The lower volatility improves the Sharpe ratio of Japanese stocks and participation rises to 47.2%. The conditional stock share increases strongly as risk declines. Under 50s now devote 30-38% of their portfolios to stocks.

Overall, our counterfactual simulations suggest that what is preventing Japanese households from holding stocks is the low expected stock return and high perceived risk of holding equities. Higher expected stock returns or a reduction in Japanese stock market volatility is likely to draw a large number of new participants, even though they are unlikely to hold a very large fraction of their wealth in stocks. Our model implies that a reduction in stock return volatility is the one single factor that may lead to a big increase in the conditional stock share.

7 Conclusion

We build a life-cycle portfolio choice model of the Japanese economy and use it to explain low Japanese stock market participation. Our explanation centres on two main factors: low expected returns by households contemplating to participate in the stock market and low trust in the stock market. These expectations are well grounded in historical experience. Stock returns were low in the 1980s due to high intermediation costs. Later on (in the 1990s and 2000s), the Japanese stock market performed very poorly during the Lost Decade and its aftermath.

Trust in the stock market has been low in the post war period due to poor corporate governance which led to scandals even during the economic and stock market boom of the 1980s. Later on, Japanese stock markets experienced losses of around 40% in 1991 and then later on in 2009. In addition, stock market return volatility was elevated compared to the US. Such a history of investor-unfriendly policies, corporate scandals and financial crises would have weighed on the minds of potential investors for most of the post-war period. When we include these two factors in a lifecycle model, we show that it fits the Japanese data well and replicates closely Japanese households' reluctance to invest in the stock market.

We end the paper with three counterfactuals motivated by recent policy attempts to improve economic performance. In line with recent advances in Japanese corporate governance we consider an improvement in savers' trust in the stock market. There have also been significant attempts to boost Japanese economic growth and to return inflation to the 2% target using monetary and fiscal policy. Motivated by this so-called Abenomics, we consider the impact of higher equity risk premium and a reduction in stock return volatility. All

three counterfactuals suggest that successful reform should lead to substantial gains in stockownership in Japan.

Appendix A Data

The household data are taken from the Survey of Household Finance (SHF). The participation rate is computed as the ratio of households who report positive amounts of stockholdings and/or investment trusts out of the total number of respondents. The survey asks about households' financial portfolios — the outstanding amounts of currency, current deposits and time deposits, life insurance, non-life insurance, personal annuity insurance, bonds, stocks and investment trusts, workers' asset formation savings, and other financial products. Stocks in our model is the amount of direct stock holdings and indirect holdings through investment trusts. We define all the other assets as 'bonds.' Investment trusts include bond trusts, equity trusts and REITs, but the Survey does not decompose those three.

In the 2019 SHF data, the participation rate in investment trusts is 12.0%, and their average share in the household portfolio is 2.8%. The average share of investment trusts conditional on owning investment trusts is 15.9%. We need to take a stance on how much stock is included in investment trusts. Since micro data is not available, we used aggregate data compiled by the Investment Trust Association of Japan. According to this data in 2019, 92% of investment trusts are classified as equity investment trusts, and 8% as bond investment trusts. Moreover, in the equity trusts, the average portfolio shares of stock, bond, investment securities, and benefiting certificate (other investment trusts) are, respectively, 57%, 12%, 12%, and 16%, respectively. Based on these numbers, we make the following assumptions: (1) All the households who replied

that they own investment trusts have both equity trusts and bond trusts; (2) all the households who have investment trusts have the average portfolios, i.e., 92% equity investment trusts and 8% bond investment trusts; (3) investment securities are risky assets (i.e., we regard them as equity). Then, we define the share of stocks in a representative investment trust, α_f, as follows:

$$\alpha_f = 0.92 * (0.57 + 0.12 + 0.12 * \alpha_f),$$

where 0.92 represents the share of equity investment trusts out of total trusts; 0.57 is the direct share of equity in investment trusts, 0.12 is the share of investment securities, and 0.12 is the share of benefiting certificates. Based on these assumptions we obtain $\alpha_f = 0.72$. Therefore, our measure of the amount of stock holding (financial wealth in equities) of a household is

$$\text{stock holding} = \text{direct stock holding } + 0.72 * (\text{investment trust}).$$

Note that, since the participation rate of investment trusts is low and the portfolio share of investment trusts out of total financial wealth is small, our measures of household asset portfolios are not sensitive to our assumptions on the treatment of investment trusts.

Inflation is the year-on-year change in the Consumer Price Index. The stock returns are annual returns of the TOPIX including dividends (Total Return Index). Bond returns are the average of time deposit interest rates of maturity 1-2 years (from the BoJ). Real wage growth is computed from the wage index reported in the Monthly Labour Survey produced by the Ministry of Health, Labour and Welfare.

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Figure 1: Japanese household wealth composition: 1949 - 2019
(Source: Flow of Funds (Bank of Japan))

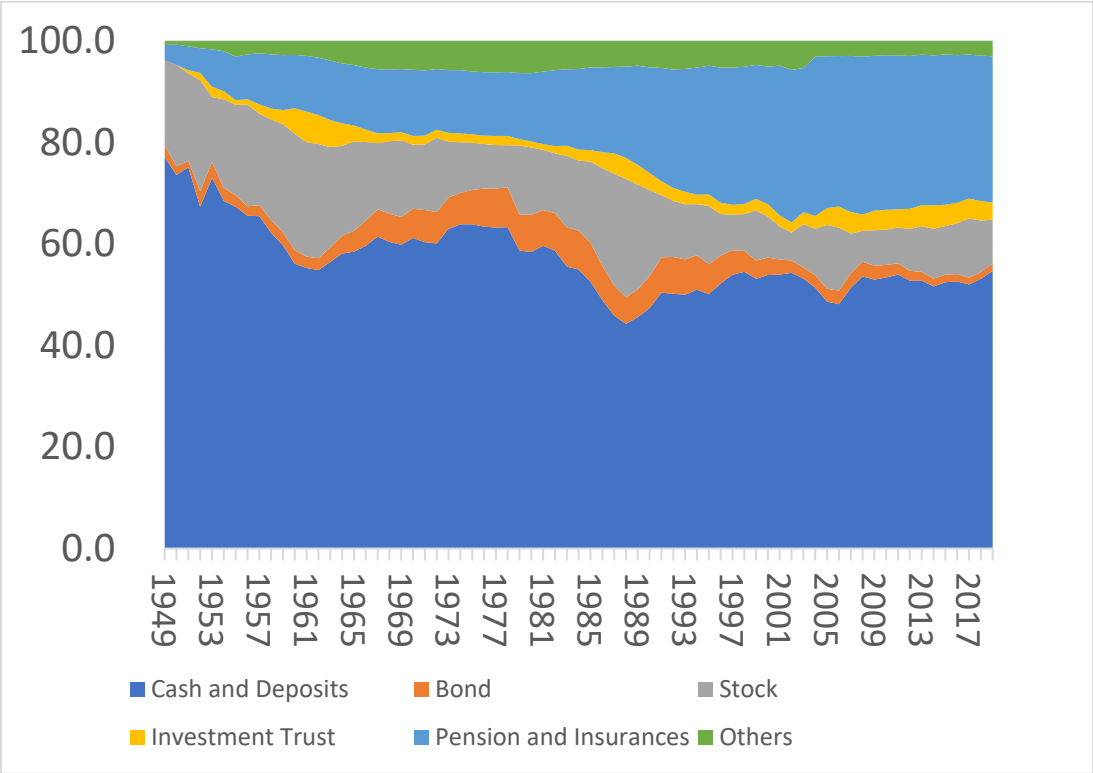

Figure 2: Percent share of financial wealth in stocks in Japanese household portfolios: 1949 – 2019
(Source: Flow of Funds (Bank of Japan))

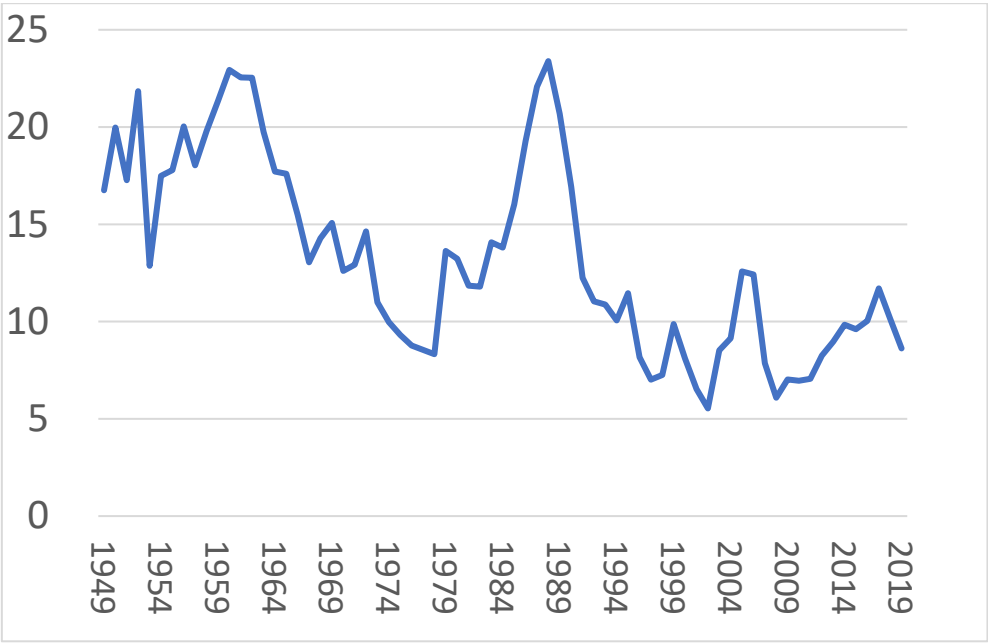

Figure 3.1: Holders of Japanese stocks: 1964-1978 (Source: Flow of Funds (Bank of Japan))

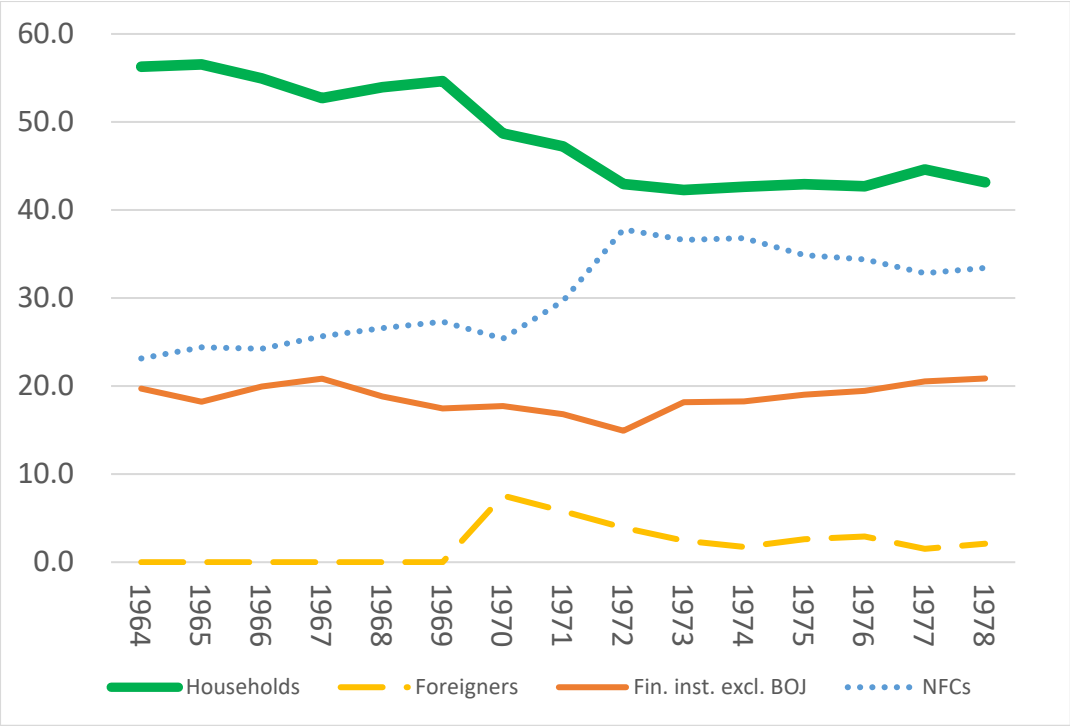

Figure 3.2: Holders of Japanese stocks: 1978-2019 (Source: Flow of Funds (Bank of Japan))

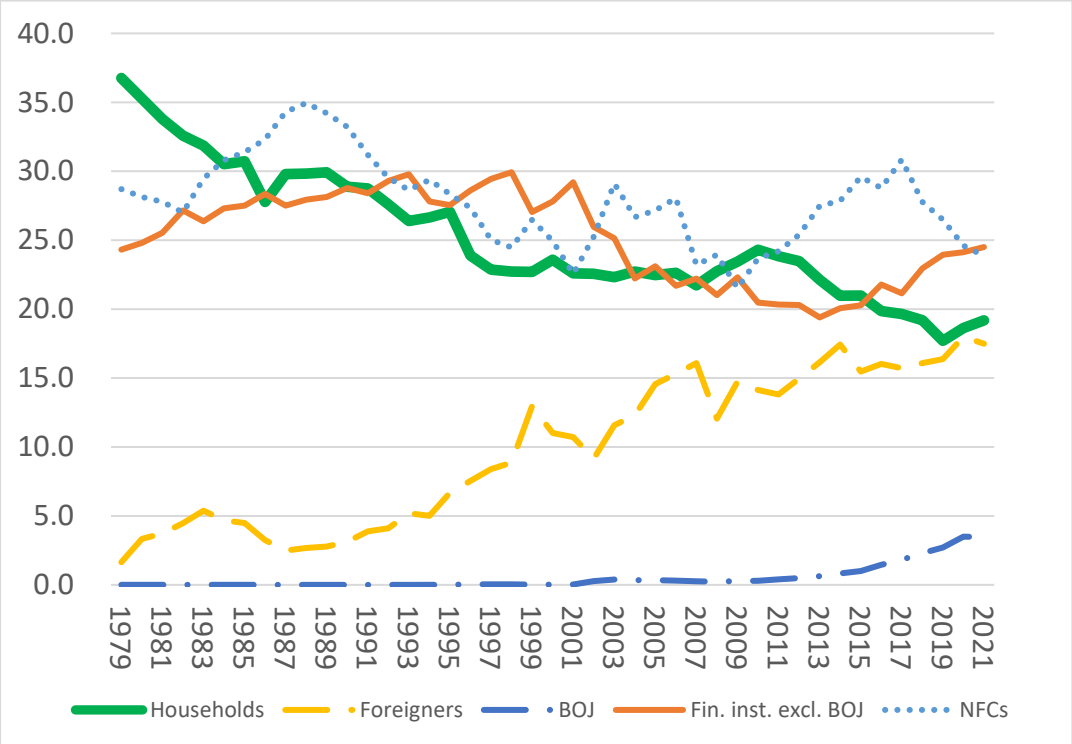

Figure 4: Percent share of financial wealth in stocks in Japanese household portfolios: 1981 – 2019 (Sources: Flow of Funds (Bank of Japan) and the Survey of Household Finances (Central Council for Financial Services Information (CCFSI)).

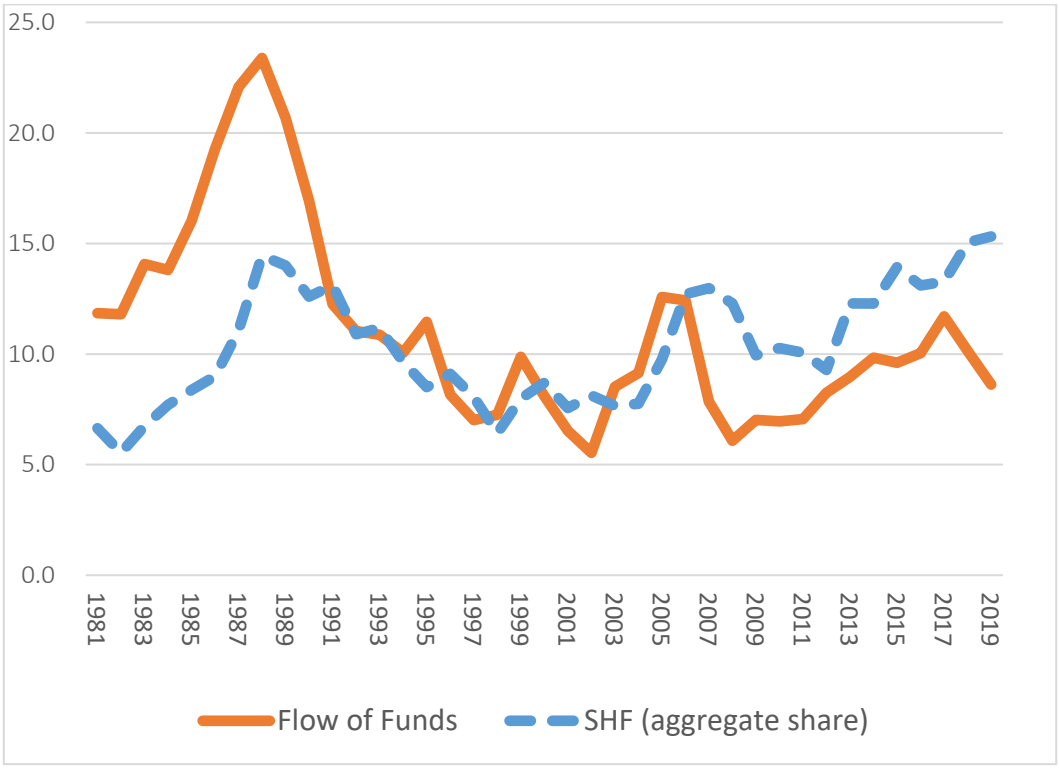

Figure 5: Stock market participation rate: 1981 – 2019
(Source: Survey of Household Finances (CCFSI))

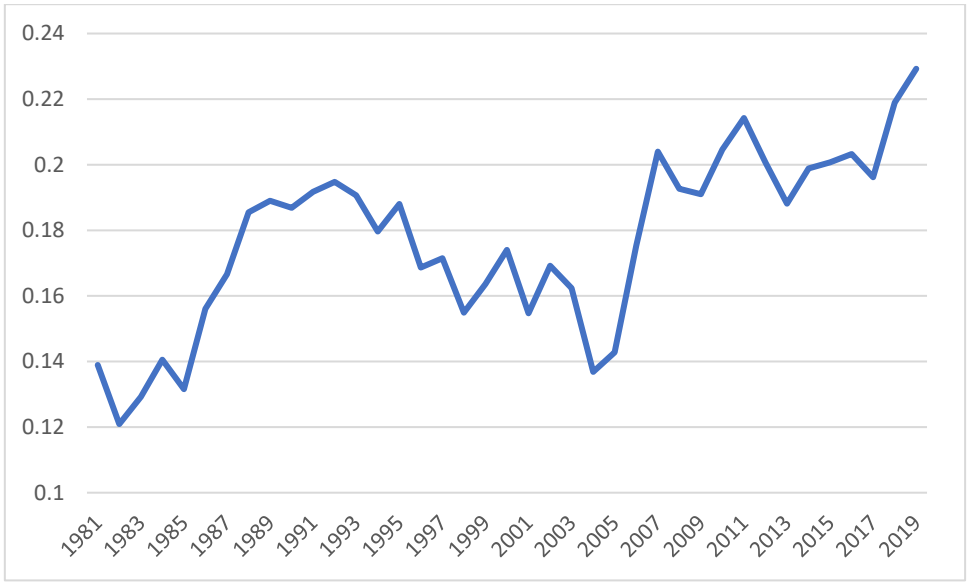

Figure 6: Equity share in stockholders' portfolios: 1981 – 2019
(Source: Survey of Household Finances (CCFSI))

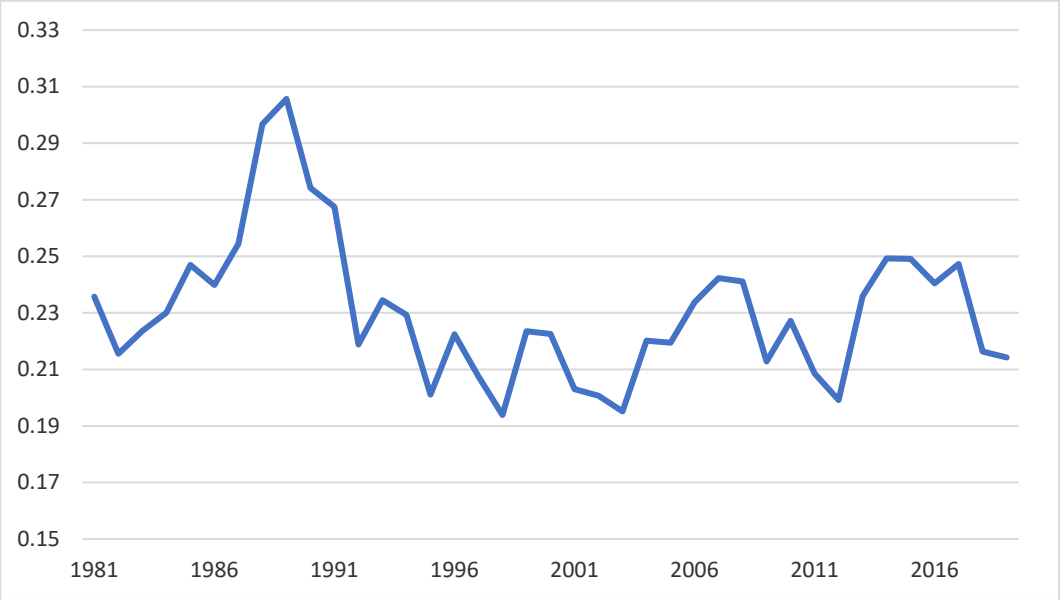

Figure 7: Stock market participation by age: 1981 – 2019
(Source: Survey of Household Finances (CCFSI))

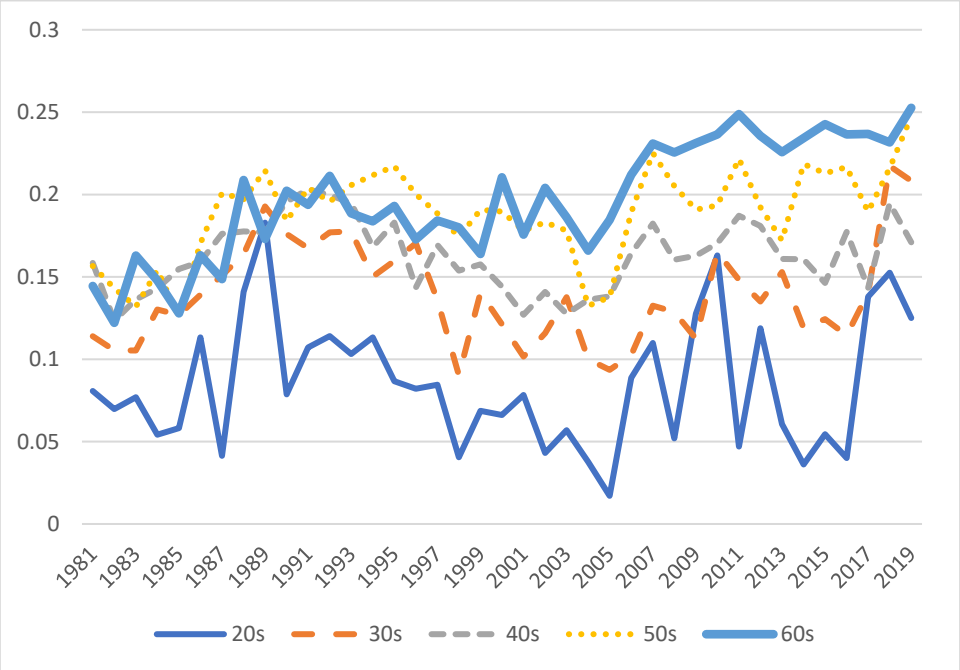

Figure 8: Equity share in stockholders' portfolios by age group: 1981 – 2019
(Source: Survey of Household Finances (CCFSI))

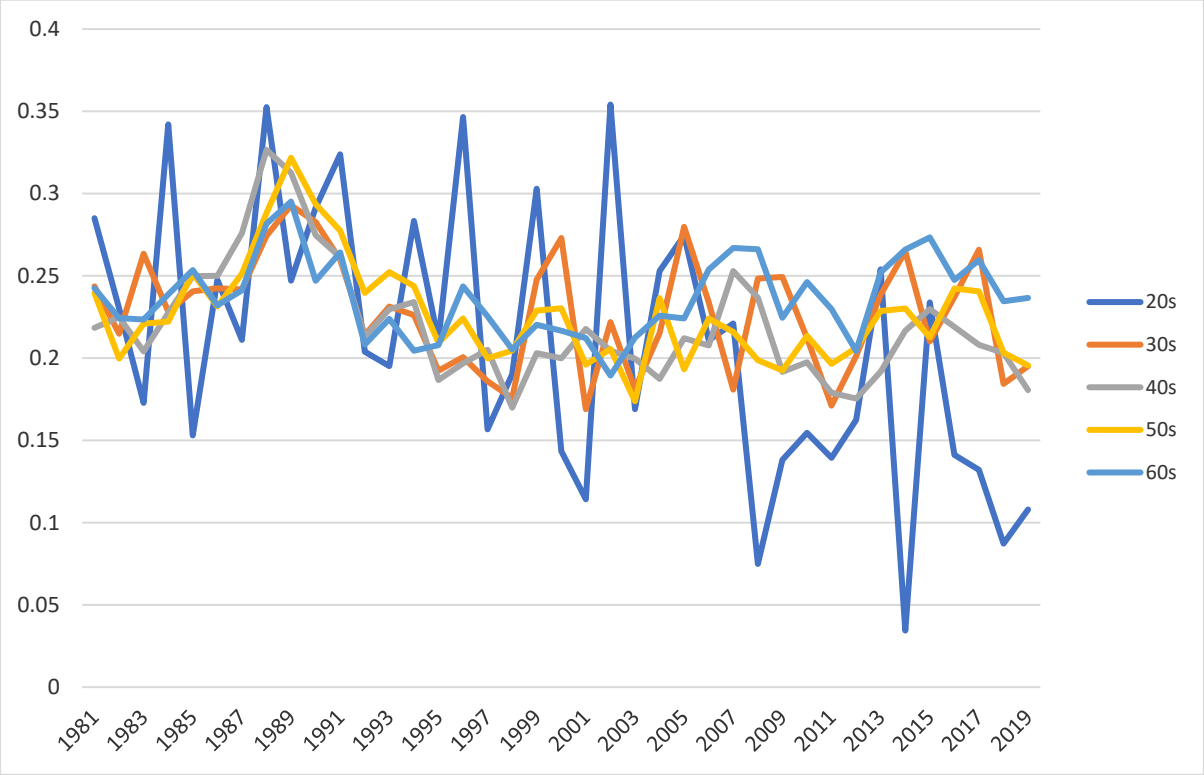

Figure 9: Real Topix level including dividends: 1960 – 2019
(Source: GFD)