Individual Investors' Housing Income and Interest Rates Fluctuations*

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Abstract

We study the effects of interest rates on the decision to invest in rental properties. Using unique tax filing data from Australia, we show that declines in interest rates between 2006 and 2019 coincide with a substantial increase in the share of landlords, driven by middle-income retirement-age individuals. Empirical tests, field surveys, and results from a quantitative portfolio model point to *reaching-for-income* as the mechanism. Retirees prefer consuming from income payments, rather than liquidating wealth. As rates decline, they substitute interest income with rental income. This behavior impacts homeownership rates and retirees' exposure to local shocks.

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1 Introduction

A growing literature explores the role of institutional and professional investors in housing markets. Nonetheless, relatively little is known about individual (non-institutional) investors in rental properties, even though rentals are a popular form of investment for households in many countries.[1] An interesting aspect that sets rental properties apart from other investments is that they pay a substantial fraction of their returns through recurring income, in the form of rent payments (Demers and Eisfeldt, 2021). Money is fungible, and investors should be indifferent between being compensated with investment income or capital gains. However, previous research has shown that certain investor groups may prefer income payments (see, e.g. Graham and Kumar, 2006 and Di Maggio, Kermani, and Majlesi, 2020), because of frictions and costs that limit their ability to consume capital gains, or because of behavioral biases.

In this paper, we provide novel evidence on the role of rental properties as an investment asset for retirees, and on how this is influenced by the level of interest rates. Using tax filings data, we show that the fraction of middle-income retirement-age individuals who are landlords increases drastically as rates fall. We find that this pattern is determined by retirees' preference for assets that provide compensation through periodic income payments. When money market rates and bond yields decline, retirement-age individuals shift their portfolios toward rental properties to *reach for income* (Daniel, Garlappi, and Xiao, 2021).

Traditionally, financial economics would not predict an effect of the level of interest rates on the preference for risky assets. However, a growing number of studies documents such effects across different classes of investors, and attributes them to various competing mechanisms.[2] Our results cast new light on residential real estate and on the importance of the reaching for

[1] Total households' wealth invested in non-owner-occupied properties is larger than investments in financial assets outside of retirement plans, and is approximately equal to one quarter of the wealth held in retirement and insurance plans (Badarinza, Campbell, and Ramadorai, 2016).

[2] Becker and Ivashina (2015), Di Maggio and Kacperczyk (2017), Andonov, J., and Cremers (2017), and Campbell and Sigalov (2022) focus on frictions faced by institutional investors; Hau and Lai (2016), Lian, Ma, and Wang (2019), Jiang and Sun (2019), and Korevaar (2023) focus on reaching for yield; Daniel, Garlappi, and Xiao (2021) provide evidence of reaching for income in financial markets; Whited, Wu, and Xiao (2021) study the effects of banks market power.

income channel, which we empirically disentangle from other alternative explanations using tests based on administrative data and field surveys. We then formally study the mechanism in a simple quantitative portfolio model, and show that the preference for consuming income significantly impacts the trade-offs involved in the decision to become a landlord, making this option attractive for middle-income retirees when interest rates are low. Finally, we explore the broader effects of reaching for rental income on homeownership rates and on retirees' exposure to local economic shocks.

The context of our study is Australia, which is in many respects a more suitable setting than the United States. Like the United States and other major industrial and developed countries, Australia has experienced a substantial decline in interest rates between 2006 and 2019. However, unlike the United States,[3] Australia has not experienced at the same time a housing bust. House price growth in the country has been largely unaffected by the Great Recession (see Figure 1), and thus interest rates drops (and investment opportunities in the housing market) have not been influenced by a local housing crisis.

Another advantage of Australia is that individual tax filings offer detailed information on rental income. Income losses from directly owned real estate properties can be subtracted from taxable income. Thus, most individual investors directly own rental properties and report both their rental income and expenses. In the United States, even small investors frequently own their real estate investments through a legal entity, which makes the measurement of rental income challenging.[4] In addition, there is no joint tax filing in Australia, and our data contain detailed information on individuals' demographics, which we use to study the share of landlords across different segments of the population.

As a first step, we establish some key empirical facts. From 2017 to 2019—the last three years of our sample— the fraction of landlords is highest for middle-age (40 to 59) and retirement-age

[3]But like other major countries, such as Canada, Germany, and Chile.

[4]While also in the United States it is possible to deduct rental losses from ordinary income, there are substantial restrictions, which exclude the more affluent landlords, or those with multiple properties. The deduction can be taken only if taxable income is below $100,000, and cannot exceed $25,000.

(60 and older) individuals in the top quintile of income within each age group. However, even among retirement-age individuals with median income, investment in rental properties is quite common: 20% own rental properties, with average annual gross rental income of AUD 18,000.

Most importantly, we find that the share of landlords has increased substantially over time. From 2002, the first year in our sample, to 2019, the fraction of individuals who are landlords has increased, in relative terms, by 30% (from 13% to 17%). Retirement-age individuals with median income within their age group have the largest increase in the share of landlords, equal to 80% in relative terms (9% in absolute terms). Most of this increase has taken place between 2009 and 2014, with a pattern that is negatively correlated with the evolution of money market rates and bond yields (see Figure 1).

We then turn to disentangling the competing economic mechanisms that could explain these time-series patterns. Retirement-age individuals are the most reliant on investment income, since they typically have higher wealth, but lower earnings than the younger groups. This is particularly the case for middle-income retirees, since high-income retirees in the data have substantial earnings from private businesses and trusts. The fact that middle-income retirees have the strongest response to interest rates drops is then consistent with *reaching for income*. Low interest rates reduce investment income from money market accounts, and from roll-overs of bonds. Retirees who use investment income for consumption respond by seeking other assets that offer high yields in the new low-rates environment. Rental properties are a potential candidate, offering high yields in the form of frequent (monthly) recurring payments. Thus, a drop in interest rates may lead to an increase in the share of landlords among retirees through reaching for income. Interestingly, this may be in spite of the lumpiness and illiquidity of individual rental properties.

However, the co-movement between interest rates and the share of landlords may also be driven by other channels. We use a battery of empirical tests, as well as field surveys to address this concern. We consider three main sets of alternative mechanisms. First, the period of interest rate cuts is also a period of sustained growth in house prices. Our results could be

explained by investors responding to price growth. Increases in house prices may change views on long-term house price growth (Agarwal, Hu, and Huang, 2016, Armona, Fuster, and Zafar, 2019, and Kuchler and Zafar, 2019).[5] Even in the absence of effects on beliefs, price appreciation relaxes collateral constraints and increases individual wealth for homeowners. This increases the ability to borrow for new investments, and may increases the willingness to invest in risky assets through wealth effects (see for example Chetty, Sandor, and Szeidl, 2017).

Second, cuts in interest rates reduce mortgage rates, and may also coincide with declines in credit spreads, and laxer underwriting standards. Lower cost of debt and easier credit access may then stimulate investors' activity in the housing market (Haughwout et al., 2011).

Finally, investors might be *reaching for yield*. This mechanism consists of increasing allocations to risky assets when the risk-free rate declines, to maintain the expected rate of return earned by an investor's portfolio unchanged.[6]

Note that none of the alternative mechanisms described above predict that the largest increase in the share of landlords should take place among retirees. If the effects were driven by beliefs of future price growth, the patterns in the data could be matched only if retirement-age individuals were the most prone to over-extrapolation. This is not consistent with the results in Armona, Fuster, and Zafar (2019), who show that young individuals extrapolate the most. If the effects were instead driven by the relaxation of credit constraints, we would expect the largest increase in the share of landlords among young or middle-age individuals, who have on average lower wealth and are more likely to be constrained. Finally, while reaching for yield can explain an increase in real estate investments (Korevaar, 2023), it does not have specific predictions for middle-income retirees. This, combined with the additional evidence from observational data and surveys that we discuss below, points to the fact that individual investors in our data are specifically seeking real estate income, rather than just higher returns.

[5] Over-extrapolation from recent price trends has been a driver of speculative investments in the United States before the Great Recession (Chinco and Mayer, 2016, and Bayer et al., 2020).

[6] Hau and Lai (2016) and Lian, Ma, and Wang (2019) document that retail investors shift asset allocations from bonds to stocks when interest rates decline. Korevaar (2023) shows reaching for yield effects in real estate, using historical evidence from the 18th century.

In the data, we first estimate at the postcode level the association between the evolution of the share of local residents who are landlords and the level of interest rates, which we measure either using the rate on 6-month Australian certificates of deposit, or the 2-year and 10-year government bond yields. We include postcode fixed effects, and control for concurring fluctuations in stock market returns, mortgage spreads, and local house price growth. We find that a 1% lower level of rates is associated with an increase in the fraction of landlords of 0.6-0.9%. Interestingly, the fraction of landlords is negatively related to house price growth in the postcode of residence. This is at odds with the predictions of the house price growth channel discussed above, which would instead predict a positive relation. Moreover, the coefficient for the relation between the share of landlords and the mortgage rate spread over the 10-year government bond yield is not statistically significant.

We then use sales and listings data from Corelogic to construct a measure of local housing investments by small landlords, based on "buy-to-let" purchases. We define "buy-to-let" transactions as house purchases for which the property is re-listed as a rental within 9 months.[7] The volume of buy-to-let activity is strongly negatively associated with the level of interest rates. However, this association could just be explained by the fact that lower rates stimulate investment activity in general. To dispel this concern, we construct a placebo test. We use the listings data to identify buy-to-resell transactions (house flips), defined as properties re-listed for sale within 9 months of purchase.[8] If the association between buy-to-let volume and rates is just part of an investment boom in residential housing, we should also observe a corresponding pattern in speculative trading. Instead, speculative trading activity is only weakly (and *positively*) related to interest rates.

Fluctuations in buy-to-let volume also appear to be tied to changes in interest rates around

[7]These transactions are carried out by small landlords and small investors. Institutional investors focus on the development and acquisitions of large multifamily buildings, and sophisticated landlords likely acquire even individual small properties with the help of specialized agents.

[8]While houses might be resold quickly also because of unforeseen circumstances or life-changing events, previous research has shown that the volume of resales with holding period up to 9 months is a good proxy for speculative investment volume (Bayer et al., 2020).

monetary policy announcement dates, consistent with an effect of rates on the decision to buy rentals. Using the local projections method (Jorda, 2005), we find that negative bond yields surprises around announcement dates are associated with a higher volume of buy-to-let transactions in the following six months. Moreover, across postcodes, the increase in the volume of buy-to-let investments in response to lower rates is larger in areas that have historically offered higher rental yields, measured as average yields between 2000 and 2005. The fact that rental investors are more likely to purchase in areas that offer high income payments is consistent with reaching for income.

The last batch of tests based on observational data uses information from individual tax records. We show that retirement-age landlords are the group most likely to extract positive net income (rent net of interest, capital expenses, and other expenses) from rental properties. Moreover, retirement-age landlords have little leverage (the majority of these landlords have no mortgage interest expenses), and thus are not taking advantage of lower cost of debt or laxer underwriting standards. Finally, we show that, as rates decline, retirement-age individuals substitute income from interest rates payments with real estate income. All these results are consistent with elderly investors reaching for income using rental properties.

Having extensively explored evidence from listings and tax filing data, we turn to survey methods to obtain direct insights on the mechanisms motivating retirees' behavior. We develop and deploy two surveys targeting Australian individual small landlords who purchased their rental properties during the period of declining interest rates (between 2006 and 2019).[9]

The first survey targets members of the Australian Landlords Association, an organization of small individual landlords. We ask in an open-ended question about the reason (or reasons) driving the respondents' decision to invest in rental properties. We also ask close-ended questions in which respondents can assign scores to different motives. We use this second format to directly run a horse race among the different channels discussed above: the desire to earn in-

[9]Surveys are increasingly common in the finance literature, in particular when in studies of investors' motives and behavior (see, e.g. Giglio et al., 2021), or of subjective beliefs (see, e.g., Kuchler, Piazzesi, and Stroebel, 2022 and Adelino, Schoar, and Severino, 2018).

vestment income, the desire to realize capital gains, access to larger home equity in the primary residence due to higher prices, low mortgage rates, and so on.

Landlords who are retirees rank the desire to earn income higher than any other motive, including the desire to realize capital gains. This result is present both in the close-ended scoring questions, and in the answers to the open question, in which we quantify the importance of different motives using text analysis. Crucially, retiree landlords assign higher scores to rental income than non-retirees, who instead favor capital gains. Landlords who are not retirees also assign higher scores to low mortgage rates, and to the desire to take advantage of rental income losses as tax shields (negative gearing). Finally, both retirees and non-retirees agree that rental real estate is a safe asset. Thus, the decision to invest in rentals is unlikely to be driven by risk-taking due to wealth effects.

The second survey is deployed through Qualtrics to a proprietary panel of Australian landlords and, in the light of the results discussed above, focuses on retirees and tests two key predictions of the reaching for income channel: 1) whether retirees use rental income for consumption, and 2) whether, when becoming landlords, retirees make their down payment using wealth from cash savings, whose yields are directly impacted by the drop in interest rates. We find that 63% of respondents rank rental income as an important or very important source of cash for paying for consumption in retirement. Moreover, we find that saving accounts are the most important source of funds for down payments, and that before purchasing a rental property, saving accounts were the main source of investment income for the respondents.

Given the evidence from observational data and the surveys, we develop a simple quantitative portfolio model, which extends the standard framework (see Gomes, 2020) by including the preference for consuming income, rather than liquidating wealth. In the model, individuals may invest their wealth in liquid assets only (the stock market and a risk-free account) or become landlords, and hold part of their wealth in a rental property. The rental property offers diversification benefits with respect to the stock market, but is lumpy and its purchase entails transaction costs. We show that the preference for consuming income substantially increases

the attractiveness of rental housing, since landlords earn higher investment income for the same wealth level. When the model is calibrated to the low-interest rates environment of 2017-2019, middle-income retirees with low or intermediate levels of wealth (below the 75th percentile) optimally choose to invest in liquid assets only (to not be landlords) if there is no preference for consuming income. However, if the preference for consuming income is sizable, the same individuals instead optimally choose to become landlords.

The last part of the paper studies the aggregate implications of the increase in the share of landlords among retirees. First, we explore the effects on the homeownership rate. If new landlords are mainly purchasing their properties from other landlords, from institutions owning multiple properties, or from developers, the increase in the share of landlords may have limited effects on the fraction of owner-occupied homes. However, evidence from the data and the surveys shows that retiree landlords are most likely to purchase their rental properties from owner-occupiers. Thus, our findings suggest that reaching for income behavior has a negative impact on the homeownership rate.

Second, we study the implications for retirees' income risk. Since retiree landlords are reaching for income, they tend to be highly exposed to fluctuations in the rental income of their rental properties. This in turn makes their income highly sensitive to local economic shocks. We quantify this effect using shocks to iron ore prices, which impact the local economy of Western Australia. We find that the exposure of retiree landlords to local shocks is twice as large as the exposure of middle-age individuals who are not landlords.

We contribute to the literature on reaching for yield and reaching for income (Hau and Lai, 2016, Lian, Ma, and Wang, 2019, Jiang and Sun, 2019, Daniel, Garlappi, and Xiao, 2021, and Korevaar, 2023). Daniel, Garlappi, and Xiao (2021) provide evidence of reaching for income in financial markets, showing that retirement-age individuals respond to rate declines by increasing investments in high-dividend yield stocks. We provide novel evidence for real estate. Housing produces, in general, higher income yields than most segments of the stock market. However, real estate properties are lumpy and illiquid. Thus, it is not clear *ex-ante* whether retirees

would engage in reaching for income using rentals. Moreover, the implications of a higher share of small landlords for the housing market and for income risk are potentially far-fledged, and interesting in their own regard. Korevaar (2023) uses data from the Netherlands in the 18th century to present evidence of capital flows away from (into) government bonds and into (away from) real estate in response to rate declines (increases). We provide a complementary contribution, showing that fluctuations in interest rates, even today, with developed financial markets, impact direct real estate investments. Moreover, thanks to the granularity of our data, we disentangle the reaching for income channel and the role of retirees.

Our study also contributes to the literature on investors in housing markets. Most of these papers focus on house flipping (see Chinco and Mayer, 2016, Badarinza and Ramadorai, 2018, Bayer et al., 2020, Favilukis and Van Nieuwerburgh, 2021, and Deng et al., 2021). Our work is more closely related to recent studies of long-term housing investors (Garriga, Gete, and Tsouderou, 2021, Gurun et al., 2022, and te Kaat, Ma, and Rebucci, 2021). The findings are novel, since we focus specifically on individual investors, and on the reaching for income channel. Finally, we contribute to a growing literature on differences in income composition across households, and on how this is affected by interest rates changes and monetary policy.[10]

The rest of the paper proceeds as follows. Section 2 presents the data. Section 3 discusses the key stylized facts at the center of our analysis, and competing mechanisms and interpretations. Section 4 contains tests that use observational data to disentangle competing mechanisms. Section 5 presents the evidence from the field surveys. Section 6 provides the results from the quantitative portfolio model. The effects on the homeownership rate and on income risk are in Section 7. Finally, Section 8 contains our concluding remarks.

[10] Kuhn, Schularick, and Steins (2020) and Smith, Zidar, and Zwick (2020) study business income, while Fagereng et al. (2021) focus on heterogeneity in financial income. Coibion et al. (2017) show that expansionary monetary policy decreases income inequality, while Peydro et al. (2021) show that the gains from a lower monetary policy rate are increasing over the income distribution.

2 Data and Summary Statistics

To study the share of landlords, landlord characteristics, and rental income we use information from tax filings made available by the Australian Taxation Office (ATO). First, we use postcode-level data tracking taxable income and its components over the fiscal years ending from June 2002 to June 2019 (the Australian fiscal year starts on July 1st and ends on June 30th). The data cover the entire population in each postcode and contain information on aggregate postcode totals for each income component, and on the number of individuals declaring income (or losses) for each component. This can be used to track net rental income, and the share of individuals with rental income (or losses) in each postcode over time.

The second dataset is an anonymized representative sample of individual tax returns. The sample is a repeated cross-section for the fiscal years ending from June 2003 to June 2019, and covers approximately 2% of Australian taxpayers.[11] There is no joint filing in Australia, so all tax returns are for distinct individuals. The data contain the single line items in each return, pertaining to both non-investment income (salary and wages, pensions, business income), investment income (interest income, dividend income, Australian real estate rental income, foreign investment income, and other sources), and capital gains. Table 1 displays summary statistics, in terms of 2019 Australian Dollars.[12]

The individual tax filings provide highly detailed information on real estate rental income, which is the focus of our study. Only net real estate income is taxed, and negative rental income is considered a loss, and deducted from other income sources for tax purposes. Landlords report the gross rental income collected over the year, along with all deductible expenses. These are interest expenses, capital investments, and other expenses. Other expenses also include non-cash expenses, such as depreciation, while interest expenses are a good proxy for debt services, since most loans issued to real estate investors by Australian banks are interest-only (with

[11] The total number of taxpayers per year over our sample period ranges between 10 and 14.7 million.

[12] Inflation adjustments are based on the Consumer Price Inflation index published by the Royal Bank of Australia, available at https://www.rba.gov.au/inflation/measures-cpi.html

adjustable interest rates).[13] Crucially for our study, the data contain information on tax filers' demographics: age, gender, partner status, location of residence,[14] and occupation. Figures A.1 and A.2 display the distribution of these characteristics in our sample. We exclude from the data individuals below age 20.

Tax filings might be plagued by misreporting issues, such as understatement of income and overstatement of deductions. However, we believe this is not a major concern in Australia. Tax fraud is punished harshly, with administrative fees and penalties for serious offenses equal to 75% of the payment shortfall or evasion. Tax evasion can also be punished with jail sentences, with a maximum of 10 years. For each fiscal year, the ATO reports statistics on the tax gap,[15] which is the difference between the amount collected, and an estimate of what should have been collected if taxpayers were fully compliant with the law (this inference is based on misreporting detections and other ATO estimates). For salary income, dividends, interest payments, and rents the gap is on average only 5.6%.

For our analysis of rental investments, we also obtain micro-data on sales and rental listings from Corelogic. The data cover the states of Victoria, New South Wales, and Western Australia, which is the largest state on the West Coast. These markets account for the majority of sales and rental listings in Australia. The data span the period from January 2005 to December 2019, and include unique property identifiers, the postcode in which each property is located, property size, number of bedrooms, bathrooms, and car spaces. For both sales and rental listings, we observe initial listing dates, original listing prices, and changes to listing prices. For sales, we observe the sales dates and prices. Table A.1 displays summary statistics.

[13] In the case of co-ownership, gross rents and expenses are split across co-owners, and each co-owner reports on her return only the fraction of income and expenses that are of her competence.

[14] The location of residence is reported at the level of 33 macro-areas. For the most populated states (New South Wales, Victoria, Queensland, South Australia, Western Australia, and Tasmania), we can observe if the individual lives in the capital city, in a high urbanization area, in a low urbanization area, in other urban areas, or in a rural area.

[15] The data are available at this link: https://www.ato.gov.au/About-ATO/Research-and-statistics/In-detail/Tax-gap/Inividuals-not-in-business-income-tax-gap/

3 Stylized Facts and Competing Mechanisms

3.1 Housing Income and Landlord Demographics

We begin by studying the share of landlords in the latest years of our sample, and across different groups of individuals. We split individuals into age groups (25 to 39, young, 40 to 59, middle-age, and 60 and older, retirement-age), and into income quintiles *within* age groups.

Panel (a) of Figure 2 shows the share of landlords in each group in 2017-2019. We identify as landlords all individuals who report gross income, or expenses from rental properties in their tax returns. Unsurprisingly, the share of landlords increases with income and age. The fraction of landlords is lowest (below 5%) for young individuals with income below the median, and highest (above 35%) for middle and retirement-age individuals with income in the top quintile of their age group. However, when considering middle-age and retirement-age individuals in the 50th and 60th income percentile of their age group, we find that the share of landlords is still relatively high, and equal to 17.5% and 20%, respectively.

Panel (b) displays the average rental income of landlords. Middle-income landlords of middle and retirement-age earn annual gross rental income of 15,000 and 18,000, respectively. Individuals in the same age groups, but in the top income quintile, earn 27,000 and 31,000.

Panels (c) and (d) display the composition of total income, across income quintiles, for middle-age and retirement-age landlords. We focus on these age groups since they have the larger shares of landlords. Rental income is not the main source of income for most middle-age landlords, who mainly rely on wages and salaries (with the exclusion of landlords in the lowest income quintile). Rental income also accounts only for 20% of total income for retirees in the top income quintile. However, most significant for our analysis, rental income represents 50% of total income for retirement-age landlords with median income. This implies that landlords in this specific age and income group are highly reliant on their rental properties.

3.2 The Economic Environment

In the United States, the Great Recession and the following slow recovery coincided both with a sharp decline in interest rates and with large fluctuations in real estate prices, which experienced a large boom-bust cycle.[16] It is challenging to specifically link the behavior of real estate investors, either institutions or individuals, specifically to fluctuations in interest rates.

Australia did not experience similar swings in house prices. Nonetheless, largely in response to the situation in international markets, and to other long-term trends common across developed economies, interest rates steadily declined over the period between 2006 to 2019. Panel (a) of Figure 1 shows the evolution of the rate on 6-month certificates of deposit (CDs) issued by Australian banks, and of yields on 10-year Australian government bonds, over the years from 2002 to 2019. The figure also shows the average residential rental yield across Australian postcodes.[17] The 6-month CDs rate declines from 7% in 2008 to 2% in 2019, and government bond yields follow a similar pattern. On the other hand, rental yields remain rather stable. This is in sharp contrast with what happened in the United States, in which rental yields experienced large fluctuations over the same time period (Piazzesi and Schneider, 2016).

Panel (b) shows the evolution of house prices in Australia, both based on a country-level index, and on indices for the two most populous states (New South Wales and Victoria). All indices are normalized to be equal to 100 in 2002. As mentioned above, we do not observe a large price drop in the period of the Great Recession. The country index is 15% up in 2009 compared to 2006 (the Victoria index is 35% up), and more than 25% up in 2012 (the Victoria index is 58% up). This steady trend in price growth is similar to what observed in other major economies, such as Canada in North America, Germany in Europe, and Chile in South America.

[16] Previous work has shown that this cycle was amplified by changes in lending standards (see Mian and Sufi, 2011, Keys, Seru, and Vig, 2012, and Keys et al., 2013), and by extrapolative beliefs on the future evolution of house prices (see Case, Shiller, and Thomson, 2015 and Kaplan, Mitman, and Violante, 2020), and that it was followed by large government interventions (Agarwal et al., 2017 and Gabriel, Iacoviello, and Lutz, 2020).

[17] The rental yield is constructed as the ratio of the median (annualized) rent and the median price in the postcode, based on Corelogic postcode-level indices.

3.3 Time-Series Evolution of the Share of Landlords

Given the high share of landlords in 2017-2019, and the declining path of interest rates in the previous fifteen years, we turn to studying changes in the share of landlords over time. In the years from 2002 to 2004, approximately 13% of Australian tax filers report income or expenses related to rental properties. In 2017-2019, 17% of filers report rental income or expenses. This represents a 30% relative increase.

Figure 3 depicts the time-series evolution of the share of landlords in more detail. Panel (a) shows that, while there is a small increase in the early 2000s, the share of landlords jumps in 2009-2010, and keeps gradually increasing between 2010 and 2014. This pattern is remarkably correlated with declines in interest rates, shown in Figure 1.

Panel (b) shows the distribution of the share of landlords by postcode of residence in 2002-2004 and 2017-2019. Over time, the entire distribution shifts to the right: the 25th percentile moves from 10% to 13.5%, the median moves from 13% to 16%, and the 75th percentile moves from 16% to 19%; 90% of postcodes experience an increase in the share of landlords.[18]

Figure 4 shows changes in the share of landlords and in average rental income (for all individuals, including non-landlords) across age groups and income quintiles, and for the entire period between the years from 2003 to 2005 and the years from 2017 to 2019. In relative terms, the share of landlords for retirement-age individuals with income between the 20th and the 60th percentile increases by 80% (roughly 9-10% in absolute terms). Average rental income for the same group (across both landlords and non-landlords) increases by 120%. Smaller increases are present for middle-age individuals with middle-income, who have a relative increase in the share of landlords of 15% (2% in absolute terms), and an increase in rental income of 60%. The fraction of young landlords decreases, especially in the lower income brackets.

The time series patterns of the shares of landlords across age groups are depicted in the

[18]The increase in the share of landlords across postcodes is also not explained by mechanical effects, such as the inflow of migrants. Figure A.3 in the Appendix shows that the increase has negligible association at the postcode level with the fraction of individuals who immigrated over the previous 5 years.

left panel of Figure A.4 in the Appendix. The fraction of retirement-age landlords, pooled across all income groups, increases in 2009, and then further grows in the following years, reaching a maximum of 8% above the 2004 level in the last years of the sample. This is roughly a 60% relative increase, consistent with what shown in Figure 4. The share of middle-age landlords (red squares) increases more moderately, beginning in 2009. Similar patterns across age groups are present when considering average rental income (for all individuals, including non-landlords), as depicted in the right panel of Figure A.4.

3.4 Competing Mechanisms

Several mechanisms can explain the negative association between the share of landlords and fluctuations in interest rates. The first mechanism we consider is *reaching for income*. Households close to, or in retirement age are most likely to use asset portfolio returns to pay for consumption needs. Previous research shows that these individuals have a preference for consuming investment income, rather than capital gains (see e.g., Graham and Kumar, 2006 and Di Maggio, Kermani, and Majlesi, 2020). Capital gains liquidation may generate monetary, attention, and psychological costs, and matching consumption to income flows may act as a self-control device.[19]

When rates are high, retiree investors earn substantial income from money market accounts and bonds, and can use such income to pay for consumption needs. A drop in rates reduces investment income, and may lead to reaching for income, which is an increase in the demand for assets offering high income yields in the new low-rates environment. Indeed, Jiang and Sun (2019) and Daniel, Garlappi, and Xiao (2021) show that surprise rate cuts by central banks result in an increase in demand for high-dividend yield stocks among retirees.

The reaching for income channel is a particularly fitting explanation for the stylized evidence in the previous sections. Retirees are the group driving the increase in the share of landlords.

[19] Baker, Nagel, and Wurgler (2007) show that household consumption is significantly more responsive to dividend payouts than unrealized capital gains.

Rental properties in Australia are high-income yield assets, and have provided nearly constant yields in a falling interest rates environment. It is interesting that, in order to get access to these yields, retirees may be willing to accept the frictions related to ownership of a highly illiquid and lumpy asset. We explore this trade-off using a quantitative portfolio model in Section 6.

While reaching for income is a compelling explanation, there are other alternative channels through which lower rates, or other contemporaneous economic trends, may stimulate investment in rentals. First, lower rates are associated with higher house prices. Investors' decisions to purchase rentals may then have been driven by the sustained price growth over the years from 2002 to 2018, rather than by lower rates *per se*. Expectations of future price growth are influenced by recent price growth, and investors may purchase rental properties with speculative motives (Agarwal, Hu, and Huang, 2016, Chinco and Mayer, 2016, Armona, Fuster, and Zafar, 2019, and Bayer et al., 2020). Moreover, higher house prices relax investors' collateral constraints and create wealth effects. Homeowners interested in purchasing smaller properties to rent out may use their increasing home equity to fund purchases.[20] Also, as investors become wealthier they may become more willing to take risk in their portfolio, and increase the share of risky assets, including rental properties.

The second alternative channel is cost of debt. Real estate purchases typically involve the use of leverage. Changes in the level of interest rates determine changes in the cost of debt, and may also coincide with changes in credit spreads, mortgage underwriting standards, and lending constraints. To the extent that these effects ease borrowing for real estate investors, they may induce higher investment in rental properties.

Finally, individual investors may be *reaching for yield*. This behavior is different than reaching for income, and consists of shifting allocations towards higher risk, higher return assets when risk free rates decline, independent of whether these assets compensates investors through income or capital gains.[21] Korevaar (2023) finds reaching for yield behavior in real

[20] For instance, Gargano, Giacoletti, and Jarnecic (2022) show that, by relaxing borrowing constraints, local price growth plays an important role in shaping buyers' search behavior.

[21] Hau and Lai (2016) and Lian, Ma, and Wang (2019) find that households shift their asset allocation from

estate in the historical context of the Netherlands in the 18th century. While this channel may explain higher investment in real estate in response to lower rates, it does not predict stronger responses by retirees, or the specific focus on investment income.

In the following sections, we first propose several tests based on observational data aimed at disentangling the competing mechanisms. We then present the results of field surveys of our own design that directly investigate landlords' motives and behavior.

4 Tests of Competing Mechanisms: Observational Data

This section presents a battery of empirical tests aimed at disentangling competing economic mechanisms that may explain the relation between the share of landlords and the level of interest rates. Section 4.1 provides evidence based on postcode-level tax information on the share of landlords. Section 4.2 studies new investment activity in rentals, measured using properties quickly re-listed as rentals after purchase (buy-to-let). Section 4.3 studies heterogeneity across postcodes, and Sections 4.4 and 4.5 show results from individual tax filings.

4.1 Interest Rates and the Share of Landlords

We estimate the postcode-level association between rates and the fraction of tax filers who are landlords with the following equation:

$$FracLL_{i,t} = \gamma y_t + \mathcal{B}X_{i,t} + \alpha_i + e_{i,t}, \tag{1}$$

where $FracLL_{i,t}$ is the share of landlords in postcode i at time t, y_t is a money-market rate or a bond yield in year t, α_i is a postcode fixed effect, and $X_{i,t}$ is a vector of controls meant to capture other aggregate and postcode-level fluctuations. It includes the average daily stock

bonds to stocks when interest rates decline. Becker and Ivashina (2015) and Di Maggio and Kacperczyk (2017), among others, provide evidence that institutions engage in similar behavior, but because of performance-related incentives, rather than biases.

market return and dividend yield in year t, the Business Conditions Index of the Australian Bureau of Statistics, the mortgage rate spread (equal to the mortgage rate minus the 10-year government bond yield), postcode-level house (log) price growth, and population growth. Standard errors are double-clustered by year and postcode.

Table 2 reports estimates from equation (1). In column 1, y_t is the rate on certificates of deposit (CDs) issued by Australian banks, in column 2 it is the yield on Australian 2-year government bonds, and in column 3 it is the yield on 10-year government bonds. The point estimates of γ are negative, and highly significant. For instance, a 1% decline in the CDs rate is associated with a 0.6% increase in the share of landlords across postcodes.[22] Local house price growth has a significant, but negative coefficient. The beliefs extrapolation, collateral constraints, and wealth effects channels all predict a positive sign. The coefficient on the mortgage spread is mostly insignificant, and the inclusion of this variable does not attenuate the slopes for yields. Thus, credit spreads are unlikely to be a major confounding factor.

It is important to stress that the coefficient γ captures an association, not a causal relationship, and that its estimates cannot be used to disentangle competing channels. In the next sections, we implement additional tests directly aimed at ruling out, or providing support for, specific channels.

4.2 New Investment Activity: Buy-to-Let

This section reports tests based on purchases of rental properties by small investors. We use these test to disentangle reaching for income, or, at least, motives specific to rental investments, from other channels. Our assumption is that extrapolative beliefs, the relaxation of collateral constraints, the decrease in the cost of debt, or laxer mortgage lending standards should stimulate at the same time investment in rental properties and speculative investment (house flipping).

[22] To ensure that our results are not driven by outliers, or areas with low population density, in Table A.2 of the Appendix we repeat the same analysis for a restricted sample of postcodes, which includes only urban and suburban areas. Point estimates are virtually identical to those reported in Table 2.

We use listings data available from Corelogic (see Section 2) to identify buy-to-let and buy-to-resell (house flipping) purchases. The former are properties that are re-listed as rentals within 9 months of the purchase date, while the latter are properties re-listed for sale within 9 months of purchase. A shortcoming of the buy-to-resell measure is that it may also capture resales determined by household-level shocks or life events (e.g. death, divorce). However, previous work has shown that resales with such short holding periods are mainly driven by speculation (Bayer et al., 2020).

Figure 5 reports the time series of the volume of buy-to-let and buy-to-resell transactions. There is a large increase in the volume of buy-to-let transactions over the period of our study, with substantial increments in 2009 and in the years from 2011 to 2015. This path aligns with the evidence in Figure 3 and Figure 1, which document the increase in the share of landlords, and the decrease in rates. The same pattern is not present for the volume of buy-to-resell transactions, which remains roughly constant over the entire period.

We estimate regression specifications analogous to equation (1) to test the sensitivity of buy-to-let (panel A of Table 3) and buy-to-resell (panel B of Table 3) to the level of interest rates at the postcode level. We find negative and highly significant coefficients across the board for the relation between buy-to-let activity and interest rates (either CDs rates, or 2-year and 10-year bond yields). We instead find *positive* coefficients for buy-to-resell activity.[23]

If the channels driving our results were contemporaneous house price growth, or lower cost of debt and laxer underwriting standards, we would have expected a spike in investment activity for both rentals and house flips. If the channel is instead reaching for income, then the increase in investment activity should be limited to rentals, as is the case in the data.

Our analysis has so far relied on "low-frequency" evidence, based on annual data. However, interest rates fluctuate within the year, especially around monetary policy (Kuttner, 2001) and macro news (Gurkaynak, Sack, and Swanson, 2005) announcements, which follow monthly

[23] As in the previous section, we repeat the analysis for a restricted sample of postcodes, limited to urban and suburban areas. We report the results in Table A.3 in the Appendix. They line up with estimates in Table 3.

schedules. High-frequency tests are not possible when using tax data, since filings are available only at annual frequency. However, we can construct higher frequency series for the buy-to-let volume, and use rate shocks following policy announcements to provide tighter evidence of the link between rates and the decision to invest in rentals. Our empirical approach is similar to the local projections method in Jorda (2005).[24] More specifically, we estimate the following regression equation:

$$\Delta log(BuyToLet)_{t+h} = \alpha + \delta \Delta r_{t \to t-2} + \sum_{\ell=1}^{2} \gamma_\ell \Delta log(BuyToLet)_{t-\ell+1} + e_{t+h},$$

where $log(BuyToLet)_{t+h}$ is the log change in the volume of buy-to-let properties from month t to month $t+h$, and Δr denotes either the change in policy rates, or the "surprise" change in longer-term yields. To compute surprises we follow Amberg et al. (2022), and calculate yield changes taking place around monetary policy announcements (between the two weeks before and the two weeks after announcements). Financial markets incorporate forward looking information. Thus, changes in medium and long-term yields that take place around policy announcements are determined by surprises in policy rates or monetary policy guidance. These surprises can then be interpreted as "shocks" to the level of interest rates.

We display the results in Table 4. Panel A reports results for the change in policy rates, while Panels B and C report results for the "surprise" shocks to 2-year and 10-year bond yields. We find small responses for horizons from one to the three-months. This is not surprising, since housing is illiquid, and search time and the escrow process are likely to impose a lag between the decision to invest and actual transaction dates. Indeed, the relation between shocks and buy-to-let activity becomes significant as the horizon increases. For a 6-month lag, a 1% decrease in rates leads to a 0.30% increase in the volume of buy-to-let properties.

[24] Plagborg-Moller and Wolf (2021) and Jorda (2005) show that this approach is more robust to misspecification than impulse-responses. Instead of estimating the entire VAR we focus on the first equation, which contains our variables of interest.

4.3 Heterogeneity Across Locations

In this section we test two predictions of the reaching for income channel using heterogeneous effects across postcodes. The first prediction is that reaching for income is more likely to drive the investment decisions of individuals who are retired, or approaching retirement age. Thus, we use postcode-level fiscal data, merged with information on local demographics, to show that the increase in the share of landlords is larger in areas with older residents. This test expands the aggregate evidence discussed in Section 3.3. We estimate the following regression equation:

$$FracLL_{i,t} = \gamma_{Senior} \left(y_t \times \phi_{Senior2005,i} \right) + \mathcal{B}_X X_{i,t} + \alpha_t + \alpha_i + u_{i,t}, \tag{2}$$

where $\phi_{Senior2005,i}$ is the fraction of households with a senior household head (of age greater or equal than 40) in 2005, before the beginning of the large interest rates declines in our period. While some of these residents are not yet retirees in 2005, they are going to become retirees, or get very close to retirement age, by 2019. Thus, $\phi_{Senior2005,i}$ is a proxy for retirement-age population over the period of our study, which is not plagued by endogenous moving patterns of retirees during rate cuts. The vector of controls $X_{i,t}$ contains time-varying postcode-level controls, consisting of postcode-level house price growth and population growth. Finally, α_i and α_t are families of postcode and year fixed effects, and y_t is either the CDs rate or the yield on 2-year or 10-year bonds.

The coefficient γ_{Senior} captures the incremental effect of interest rate changes on the share of landlords in the postcode, depending on 2005 demographics. The reaching for income mechanism predicts that the increase in the share of landlords in response to a decline in rates is stronger in areas with a larger fraction of seniors. Thus, estimates of γ_{Senior} should be negative. Indeed, Table 5 shows that a 10% higher fraction of senior households translates into a 0.12%-0.16% higher increases of the share of landlords for a 1% rate drop.

The second prediction is that, if investors are reaching for income, they will prefer assets that offer higher yields. This implies that investment activity in rentals shall increase more in

areas with higher rental yields. We test this prediction with the regression equation:

$$FracBuyToLet_{i,t} = \gamma_{RY} \left(y_t \times RY_{2005,i} \right) + \mathcal{B}_X X_{i,t} + \alpha_t + \alpha_i + e_{i,t}, \tag{3}$$

where $FracBuyToLet_{i,t}$ is the fraction of buy-to-let purchases, out of all properties purchased in year t and postcode i. The variable $RY_{2005,i}$ is the average rental yield for postcode i between 2000 and 2005 (before the period of interest rate declines), and all other variables are the same as in equation (2). We are interested in the coefficient for the interaction term, γ_{RY}, which the reaching for income channel predicts should be negative. Columns 4, 5, and 6 of Table 5 report our estimates. Indeed, a 1% higher rental yield translates into a 0.5% higher sensitivity of the volume of new rental investments to a 1% change in rates.

4.4 Individual Tax Filings: Financing and Expenses

We now turn to the individual-level tax filings, which in addition to information on gross rental income, also include the related tax-deductible expenses. We use these data to explore two predictions. First, if retirement-age individuals are reaching for income using real estate, then they shall be earning positive income net of expenses from their rental properties. Second, if retirement-age individuals were instead motivated by low cost of debt or by lax underwriting standards, we should find that they used substantial leverage to purchase their rental properties.

To test the first prediction, we construct two measures of net rental income using the micro-data from individual tax filings. The first measure subtracts from gross rental income both interest expenses and capital expenditures (capex). The second measure also subtracts "other" expenses, which include non-cash items, such as depreciation. Panel (a) of Figure 6 shows, for the years 2017-2019, the fraction of retirement-age, middle-age, and young landlords who report positive net rental income after interest and capex (red bars) and after all expenses (blue bars). The differences across age groups are striking. Approximately 90% of retirement-age individuals earn positive income after interest and capex, and 65% earn positive income even

after accounting for all expenses, including non-cash items. These fractions are equal to only 70% and 25% for landlords in the youngest age group. Thus, retirement age landlords are more likely to extract income from their properties.

We then turn to exploring the use of leverage. Panel (b) of Figure 6 shows the distribution of interest expenses, as a fraction of total expenses, across the three age groups. Approximately 50% of retirement-age landlords have no interest expenses, while for the median landlord in the middle-age and youngest group, interest expenses represent 50% of total expenses. Thus, retirement-age landlords have not taken advantage of low mortgage rates or lax credit market conditions to finance the purchase of rentals.

Panel (c) shows the fraction of total expenses driven by capex. We find that retirement-age individuals also have the lowest level of capital expenditures, with more than 60% reporting zero capex. While also a large fraction of middle-age and young landlords report no capex, the expenses are overall higher for these age groups. This evidence is consistent with retirement-age landlords being focused on rental income extraction, rather than remodeling and capital improvements. Finally, in panel (d) of the figure we focus on the residual component, consisting of other expenses, including non-cash expenses such as depreciation. This is the largest component for retirement-age individuals, but mainly because these landlords have lower interest and capital expenditures than the other groups, as shown in panels (b) and (c).

4.5 Individual Tax Filings: Income Composition

Finally, we use the individual tax filings data to explore the evolution of investment income composition over time for different age groups. We estimate the following regression equation:

$$y_{i,\tau} = \sum_{\tau=2005}^{2019} \delta_{\tau \times Young} \Big(I_\tau \times I_{20 \text{ to } 39} \Big) + \sum_{\tau=2005}^{2019} \delta_{\tau \times Mid} \Big(I_\tau \times I_{40 \text{ to } 59} \Big) + \\ + \sum_{\tau=2005}^{2019} \delta_{\tau \times Retiree} \Big(I_\tau \times I_{60+} \Big) + \alpha I_{20 \text{ to } 39} + \beta I_{41 \text{ to } 60} + \mathcal{B} X_i + \eta_l + e_{i,\tau}, \tag{4}$$

where $y_{i,\tau}$ is either the interest, dividend, or rental income share of gross investment income (defined as the sum of interest, dividend, and rental income) of individual i in year τ, I_τ is a fiscal year dummy, $I_{20\ to\ 39}$, $I_{40\ to\ 59}$ and I_{60+} denote dummies equal to one if the individual is 20 to 39 years old (young), 40 to 59 (middle-age) or 60 and older (retiree), X_i is a vector of controls, including gender, partner status, and occupation category, and η_l is a location fixed effect, based on the area of residence (see Section 2) of individual i. Standard errors are double-clustered by area of residence and fiscal year. Our estimates are based on the sample of all individuals, including non-landlords. Results are reported in Figure 7. Within each age group and each year, the point estimates across the three panels add up to one.

For the retirement-age group (green-squares), the relative contribution of rental income increases by roughly 10% between 2008 and the end of the sample. This increase coincides with a 10% decrease in the contribution of interest income, while the contribution of dividends is roughly unchanged. The pattern is consistent with the predictions of the reaching for income mechanism. Retirement-age individuals shift the composition of investment income away from declining interest payments and toward rental income.

The evidence for middle-age individuals (red squares) is less clear-cut. There is an increase of roughly 2.5% in the share of rental income, a decrease of roughly 12% in dividend income, and an increase in the share of interest income of 10%. For the youngest group (blue squares), we find 10% and 20% decreases for rental and dividend income, and a 30% increase in interest income.[25] It is possible that both young and middle-age individuals have shifted their financial portfolios to high-growth stocks that pay low dividend yields.

The decrease in dividend income for young and middle-age individuals, and the lack of changes for retirees, suggest that none of these groups has been systematically expanding

[25] In Figure A.5 in the Appendix, we repeat the same analysis, restricted to the sample of landlords. The contribution of rents to investment income has increased for all groups. However, the largest increase is for retirement-age landlords (10%) and the smallest is for the youngest landlords (3%). Retirement-age landlords also see the largest reduction in the contribution of income from interest-paying securities (-8%), while the youngest landlords see the smallest decrease (-1%). Interestingly, the contribution of dividend income falls by approximately 2% over the period of our study for all landlords.

allocations to real estate through Real Estate Investment Trusts (REITs), which typically pay high dividends. This is not surprising, since the Australian REITs market is relatively small.

5 Survey Evidence on the Mechanism

We complement the evidence from observational data with two field surveys, distributed to two different samples of individual landlords who purchased rental properties between 2006 and 2019. In the first survey, we ask about the respondents' motives for purchasing their rental properties. In the second, we ask how rental income is used, what were the respondents' sources of investment income before purchasing their rentals, and how the down payments for the rentals were funded. The questionnaires for both surveys are in Appendix B.

Combining the two questionnaires into a long survey would have been detrimental, due to survey fatigue. Moreover, when the target population comprises hard-to-reach individuals (e.g. small individual landlords), it is common to run multiple surveys (Chinco, Hartzmark, and Sussman, 2022). Surveys can be effective at explicitly identifying the drivers of individual behavior, and are increasingly used in financial economics research to study investors' decision-making processes and motives.[26]

5.1 Survey 1: Competing Motives

The first survey targets members of the Australian Landlords Association (ALA), which represents a group of small, individual landlords who are Australian residents. The survey consists of 3 sections, and was administered by email between October 9 and October 30, 2023.[27] Of the 900 ALA members invited to take the survey, 296 started the survey, and 264 completed it. Thus, both our response rate (32.89%) and attrition rate (10.81%) are in line with what

[26] See Stantcheva, 2023, Choi and Robertson, 2020, Giglio et al., 2021, Liu et al., 2022, Bauer, Ruof, and Smeets, 2021, Brauer, Hackethal, and Hanspal, 2022, Chinco, Hartzmark, and Sussman, 2022, Gargano and Rossi, 2023.

[27] Since several meta-studies have shown that sending reminders can increase response rates (see Fan and Yan, 2010), we sent a first reminder email after 15 days and a second reminder email the day before the end date.

typically observed in these studies (Stantcheva, 2023).

The first section of the survey begins by asking respondents whether they are landlords, and when they purchased their rental property (or properties): 76% of respondents bought a rental property in the period covered by our study (between 2006 and 2019). We select this group of respondents as the sample for our analysis. The section then continues with the main questions of the survey, which ask about the motives for purchasing rental properties.

The second section contains multiple choice questions on risk preferences and financial literacy (based on Lusardi and Mitchell, 2011), and the third section contains multiple choice questions on other characteristics (age, income sources, location and source of the rental properties). Figure A.6 in the Appendix shows that respondents have neutral attitudes towards taking risk, and give sensible answers to financial literacy questions. Figure A.7 shows the distribution of other characteristics. The majority of landlords have age greater than 60 years old, and earn rental income above AUD 30,000 per year. Roughly half of the respondents earn annual income between AUD 30,000 and AUD 80,000, or between AUD 80,000 and AUD 180,000. Thus, the typical landlord who purchased between 2006 and 2019 is in retirement age, has middle-income, and earns substantial rental income from her rental(s). This is consistent with the empirical evidence discussed in the previous sections.

As mentioned, our main focus are the questions on the motives for purchasing rental properties. We use these questions to disentangle competing economic mechanisms driving individual decisions. Following Stantcheva (2023) and Bergman et al. (2020), we first include an open-ended question asking to describe the reason(s) for purchasing, and then a menu of close-ended questions. This approach has the advantage of eliciting respondents' opinions without priming them with a given set of options, and of alleviating concerns regarding question framing.

5.1.1 Open-Ended Question

The open-ended question asks respondents to describe in their own words the motive(s) driving the decision to purchase a rental property. We summarize keywords used in the answers through

word clouds (in which the font size and color are based on word frequency). Figure 8 reports the output for retirees and non-retirees. For retirees, the words "retirement" and "income" are the most frequent, and are three times more frequent than the third most frequent word ("rental"). For non-retirees, the word income is overshadowed by several other terms, including "capital" (which is the most frequent word together with "future" and "retirement") and "growth".

Recent advances in textual analysis allow to formally test the prevalence of certain words, or word groups in a paragraph of text (Ferrario and Stantcheva, 2022). We use keyness analysis (Gabrielatos, 2018) to test the null that the words "income" and "capital" have the same relevance for retirees and non-retirees. We reject the null of equal relevance at the 1% significance and find that "income" ("capital") has the highest keyness score for retirees (non-retirees) with a χ^2 stat of 10.71 (6.67).

A limitation of analyzing frequencies of single words is that it might overestimate motives that are described by a more limited set of words. Following Ferrario and Stantcheva (2022), we manually create an "income" and a "capital" topic, which include wider ranges of related words.[28] We find again striking differences across groups. Among those mentioning the income topic, 61% are retirees and 39% are non-retirees. Out of all respondents mentioning the capital topic, 67% are non-retirees and 33% are retirees. Moreover, 38% of retirees mention the income topic, but not the capital topic, and only 11% do the opposite. This finding is reversed for non-retirees: 33% only mention the capital topic, and 17% do the opposite.

5.1.2 Scoring (Close-Ended) Questions

In the menu of scoring questions, we provide a list of reasons, or motives, to invest in rental properties, and ask respondents to assign to each motive a score from 1 (very irrelevant) to 5 (very important), based on their own views at the time of purchasing their rental property (or

[28]The income topic includes the following words: income, passive, cash, cashflow, flow, stream, and yield; the capital topic includes wealth, capital, grow, gain, growth, appreciation, appreciating, appreciate, and money.

properties).[29] The motives are: a) investment income, b) capital gains, c) increased equity in the primary residence, d) low mortgage rates, e) low returns on saving accounts, f) negative gearing, g) safety of real estate as an investment, and h) other. To eliminate the distorting effects of ordering bias (whereby respondents pay more attention to the motives appearing at the top of the list), we randomize the order in which the motives are listed for each participant, except for "other", which always appears at the bottom of the list.

Figure 9 shows the distribution of scores allocated to each motive, separately for respondents who are and are not retirees. The investment income motive receives scores of 4 and 5 from 80% of retirees (45% of retirees assign a score of 5), and from only 51% of non-retirees. The "capital gains" motive receives score of 4 and 5 from 65% of retirees, and from more than 90% of non-retirees. Higher equity in the primary residence has average score below 3 for both retirees and non-retirees. Low mortgage rates and negative gearing (using negative income from rental properties as a tax shield) receive mostly scores below 4 from retirees, but scores of 4 and 5 from roughly 40% and 55% of non-retirees. Finally, 55% of retirees and 45% of non-retirees assign scores of 4 and 5 to low returns on saving accounts. Many respondents in both groups also assign scores of 4 and 5 to the safety of real estate as an investment asset.

Table 6 provides statistical tests for differences in scores across motives and across landlord groups (retirees and non-retirees). We first test, for each motive, the null that retirees and non-retirees assigned the same score. Because of the ordinal nature of the data, we perform a Wilcoxon rank-sum test. We find that retirees assign higher scores to the income motive, and that the difference in scores between retirees and non-retirees is highly statistically significant (t-stat of 4.1). Retirees also assign higher scores than non-retirees to the "low returns on savings" motive (t-stat of 1.9), and significantly lower scores than non-retirees to capital gains (t-stat of -3.7), negative gearing (t-stat of -3.1), and low mortgage rates (t-tstat of -2.2). We find no difference for the "equity from primary residence motive". However, the average score

[29] As suggested by Dillman, Smyth, and Christian (2014), using a bipolar ordinal scale as opposed to a unipolar scale (i.e., very important, somewhat important, slightly important, and not important at all) has the advantage of not priming respondents in a specific direction.

for this motive is low for both groups (2.75 for retirees and 2.89 for non-retirees), which suggests that this is not considered a key reason for purchasing rental properties.

We then run tests (using the Wilcoxon signed-rank test) that compare the score of the income motive against the score of each alternative motive, within groups of respondents (retirees and non-retirees). For retirees, the income motive has higher score than each other motive, and differences are statistically significant, with one exception. In the comparison against the safety of real estate, investment income has a higher score, but the difference is not statistically significant. For non-retirees, the score of the income motive is significantly lower than the scores of capital gains (t-stat of -6.15), and of the safety of real estate (t-stat of -5.3).

Summing up, based on the survey results the goal of earning rental income has been the main driver of the decision to invest in rentals for retirees who purchased between 2006 and 2019. Moreover, retirees assign low scores to the competing channels discussed in the previous sections, such as the increase in home equity in their residences, low mortgage rates, and tax benefits (consistent with the evidence in Section 4.4).

5.2 Survey 2: Rental Income and Consumption

In the second survey, we directly test two key predictions of the reaching for income mechanism. First, retirees should use rental income for consumption, and second, when becoming landlords, retirees should reallocate their wealth from cash savings (for which interest rates payments have fallen) to real estate. Since both observational data and the ALA survey show that the income motive is most important for retirees, we restrict the sample to retiree landlords only (those who are 60 or older). The survey was distributed by Qualtrics to a proprietary panel of respondents, between February 25 and March 5, 2024.[30] The final sample includes 240 respondents.

The structure of the survey is similar to that of the ALA survey. The second and third sections, containing questions on preferences, financial literacy, and characteristics, are identi-

[30] Qualtrics is used frequently by academic researchers (see Stantcheva, 2023), and is a leader in survey tools, having access to more than 90 million panelists worldwide: `https://www.qualtrics.com/au/research-services/`.

cal. In the first section, we maintain the same initial questions asking respondents if they are landlords and if they purchased between 2006 and 2019. Only the test-specific questions are different. Figures A.8 and A.9 report the distributions of answers to preferences and financial literacy questions, and the distributions of other characteristics. These all line up with what observed for the ALA survey.

In our main tests, we begin by providing, with both an open-ended and a close-ended question, an additional independent assessment of the importance of the income motive, to corroborate the results from the ALA survey. The open-ended question asks *"Why did you purchase this rental property?"*. Figure A.10 summarizes keywords in the answers using word clouds, and is remarkably similar to the analogous picture for the sample of retirees from the ALA Survey. The words "retirement" and "income" are the most frequent, followed by "future", "money" and "rental". The upper left panel of Figure 10 displays the distribution of scores for the close-ended question, which asks: *"How important was it for you to earn investment income, in the form of rent payments?"*. Scores range again from 1 (very irrelevant) to 5 (very important). Most respondents assign scores of 4 and 5 (important and very important). We test that the mean of the distribution (3.96) is statistically different from 3 (corresponding to the "neutral" option) using the Wilcoxon signed-rank test and obtain a t-stat of 10.31.

The remaining questions focus on the new tests. The intermediate panel in the top row of Figure 10 shows the results from the question *"Did you think that rental income would be a convenient way to pay for consumption in retirement?"*. Approximately 65% of respondents select 4 or 5. The mean of the distribution is 3.75, which is statistically different from 3 at the 1% level. Thus, consistent with the predictions of the reaching for income mechanism, rental payments are used for consumption.

Then, the last panel on the top row of Figure 10 reports answers to the question *"What did you find most appealing about rental income?"*. For this and the following two questions, respondents were allowed to choose up to two options. The most frequently selected response is "Monthly frequency of payments" (46%), followed by "Safety and reliability of payments"

(32%). The option "Larger payments than other investments" ranks third capturing 14% of responses. The results confirm the hypothesis that rental income is a convenient source of recurring cash flows. Individuals typically budget at the monthly frequency (Browning, Crossley, and Winter, 2014), to match the timing of recurring major expenses, like utilities and loan payments. Monthly rental payments are attractive because they fit into individuals' budgeting habits. Only 4% of responses select the "Other" option indicating that the set of pre-determined responses does not miss any important alternatives. To avoid priming, we also include the option "Rental income was not an important factor in my decision". However, this option receives only 5% of responses.

The remaining panels of Figure 10 focus on our second key test. We ask *"What were your main source(s) of investment income before purchasing the property?"* and *"How did you fund your down payment?"*. We use these questions to test whether interest paying accounts were an important source of investment income before the purchase, and whether rental properties were purchased with funds from these accounts. Indeed, "saving accounts" appear to be the main source of investment income before buying a rental, with 35% of responses. Moreover, the main source of funds for the down payment is "Cash from saving accounts", selected in 48% of responses. Notably, all other options[31] receive less than 10% of responses each. These results confirm the evidence from individual tax filings, which shows that retirees shifted their asset allocation from interest paying accounts to real estate (Figure 7).

6 Quantitative Portfolio Model

Reaching for income is driven by the preference for consuming income, rather than cash obtained from liquidating portfolio holdings and realized capital gains. In this section, we formalize this channel in the context of a simple quantitative portfolio model. We show that the preference for consuming income changes the trade-off between being, and not being a landlord when interest

[31] Respondents could also select "Sale of other properties", "Liquidating some financial investments (stocks or bonds)", "Other windfalls or job termination payments", "Inheritance", and "Other".

rates are low, specifically for retirees who have middle-income and median levels of wealth.

We extend a standard life-cycle portfolio model (see Gomes, 2020 for a review of the literature) in which an individual with constant relative risk aversion (CRRA) preferences and finite life earns a stream of labor or pension income, and makes optimal consumption, saving, and asset allocation decisions. The individual retires at age 68 (typically the upper bound for retirement age in Australia), and receives bequest from her terminal wealth at age 83.[32] The available investment assets are the stock market, a risk-free account, and a rental property.[33] We deviate from existing frameworks by introducing the preference for consuming income, which we model as a cost incurred when liquidating and consuming invested wealth. This is a reduced form for both monetary, attention, and psychological costs from liquidating assets.[34]

We first solve the optimization problem of an individual who is not a landlord, and invests her financial wealth in stocks and the risk-free account. We then solve the problem of an individual who is a landlord, and owns her rental property with no leverage. This assumption is consistent with evidence from the data, which shows that most retirees own rentals with no or little leverage (see Section 4.4). Both individuals choose consumption and the share of liquid wealth invested in stocks every period. However, unlike the non-landlord, the landlord earns rental income each period, and her terminal wealth is influenced by the terminal resale value of the rental property. Rental income is exposed to transitory shocks, which are correlated

[32]This is equal to life expectancy in 2020-2022: https://www.abs.gov.au/statistics/people/population/life-expectancy/latest-release

[33]The life-cycle models of Flavin and Yamashita (2011), Cocco (2005), Yao and Zhang (2005), Chetty, Sandor, and Szeidl (2017), and Vestman (2019) also feature housing. However, they model owner-occupied housing rather than rental investments, and focus either on explaining the decision to rent or own, or on the potential crowding out effect of homeownership on stock market participation.

[34]Daniel, Garlappi, and Xiao (2021) also develop a model featuring a preference for consuming income. However, there are several major differences between their setting and the quantitative model presented in this section. Their model is a two-period general equilibrium framework with the aim of studying the effects of monetary policy, operating through reaching for income, on equity risk premia. Our model is a quantitative portfolio framework, with the goal of studying how the preference for income affects the decision to become a landlord (which is not explored by Daniel, Garlappi, and Xiao, 2021), and of providing a quantitative assessment. Indeed, while our model is not general equilibrium, it is calibrated to the data and features realistic state variables dynamics. Finally, while in the general equilibrium model consumption spending has to be strictly smaller or equal than income, in our model the individual can consume from invested wealth, but experiences a cost. We believe this is a more realistic assumption, in line with the spirit of our calibrated model.

with transitory shocks to labor income before retirement.[35] The optimization problems for the non-landlord and the landlord are presented in Sections C.1 and C.2 of the Appendix, while Section C.3 discusses the calibration of the stochastic processes and model parameters.

In the model, the rental property is a risky asset with returns uncorrelated with the stock market. It can improve portfolio allocation, through diversification. However, it is also lumpy, and absorbs a large amount of invested wealth, which counteracts diversification benefits. Moreover, it is illiquid, and its purchase generates transaction costs.

As mentioned above, individuals have a preference for paying for consumption using income, rather than wealth. If consumption spending exceeds total income in period t, and the individual consumes from her wealth, there is a wedge between consumption spending and actual consumption received. We can interpret this wedge as a cost from consuming wealth. More formally, given consumption spending $c_t^{'}$, actual consumption c_t is equal to:

$$c_t = \begin{cases} c_t^{'} & if \quad c_t^{'} \leq TotIncome_t, \\ c_t^{'} - \phi\left(c_t^{'} - TotIncome_t\right) & if \quad c_t^{'} > TotIncome_t. \end{cases} \tag{5}$$

If consumption spending in period t exceeds total income in the same period, a fraction ϕ of the gap between spending and total income is lost. Then, when $\phi > 0$, the individual has a preference for consuming income. Note that total income is equal to labor or pension income, plus investment income (interest, dividends, and rents in the case of the landlord). Due to the high yield from rental properties, a landlord with the same wealth and income as a non-landlord has higher total income, and is thus less likely to suffer the loss induced by ϕ.

We use the model to study, holding current income and wealth constant, how ϕ impacts the trade-off between investing in liquid assets only, and becoming a landlord.

[35] We do not directly model owner-occupied housing (neither for the non-landlord, nor for the landlord). Instead, as in Campanale, Fugazza, and Gomes (2015), we model housing costs indirectly, as part of a fixed fraction of income absorbed by "expenses". While this is a significant simplification, if anything it makes rental housing more attractive, since it ignores potential correlations between rental income and own-house consumption, and between the terminal value of the rental property and that of the owner-occupied home.

We calibrate market variables to 2017-2019 values (see Section C.3), and thus set the risk-free rate to 2%. We consider two individuals who are 65, have the same current labor income, the same total invested wealth, and the same calibration of state variables dynamics and parameters in an initial period $t0$. The first individual is not a landlord, while the second is a landlord who has just purchased her rental property.[36]

Our focus are differences in time $t0$ discounted utility between the two individuals. Figure 11 displays these "utility gaps", as percentage differences in the discounted utility of the landlord and the non-landlord. Positive values indicate higher utility for the landlord. We calculate the gaps for different values of the individuals' income preference (ϕ) and invested wealth.

The rental property price is AUD 400,000, which is the median price of buy-to-let properties in the data in 2017. Labor/pension income is AUD 40,000, which is in the range between the 40th and the 60th percentile for individuals of age 65. We report results for three different values of invested wealth: AUD 440,000, AUD 640,000, and AUD 840,000. These are the median, the 60th and the 75th percentile of wealth (excluding owner-occupied housing) for retirees in 2017, based on data from the Household, Income and Labour Dynamics in Australia (HILDA) survey. They correspond to 110%, 160%, and 240% of the house price. We consider both a calibration in which the transaction cost for the rental is zero (blue bars), and one in which it is equal to 5% of the price (red bars). The second calibration is more realistic, since in Australia a buyer pays both transaction taxes (stamp duties), and the buyer's real estate agent, if she uses one.[37]

Across all wealth levels, the relative value of being a landlord increases sharply with the parameter ϕ. This is consistent with the income consumption motive documented in the pre-

[36] We define initial invested wealth as W_{t0}, initial labor income as Y_{t0}, initial liquid wealth as θ_{t0} and the initial house price P_{t0}. Then, wealth for the non-landlord (NL) and landlord (L), is $W_{NL,t0} = W_{L,t0}$ and income is $Y_{NL,t0} = Y_{L,t0}$. The non-landlord only holds liquid financial assets, so that $W_{NL,t0} = \theta_{NL,t0}$. On the other hand, the landlord has just purchased her rental property, and thus her invested wealth is $W_{L,t0} = \theta_{L,t0} + P_{t0} - tc$, where tc is the transaction cost attached to the house purchase. As mentioned above, the landlord owns her property with no leverage.

[37] Stamp duties range from 2% to 6% depending on the cost of the property and the state where it is located. Buyer agent fees range between 1% and 3%, depending on the cost of the property.

vious sections having large effects on retirees' utility. However, there are differences across wealth groups. We believe that this shows how the preference for consuming income is crucially important in explaining the decision to become a landlord for middle-income retirees with intermediate levels of wealth.

Individuals with the highest wealth level (AUD 840,000) have higher discounted utility as landlords, even when transaction costs are taken into account and when ϕ is set equal to zero (there is no preference for consuming income). Due to their large wealth, the asset allocation of these retirees is not skewed by the lumpiness of the house. Their portfolio is balanced between rental housing and liquid assets. Moreover, mechanically, they are less affected by transactions costs, since these costs are a fixed fraction of the house price, and thus are less onerous when wealth is higher. Similar effects would occur if we considered retirees with lower wealth, but higher labor/pension income. These individuals can save income into liquid wealth, and thus can easily rebalance their portfolio. Moreover, because of their higher income level, they are less likely to be bound by the friction ϕ.

The situation is very different for retirees with median income and with the lowest wealth level of AUD 440,000. As mentioned above, this wealth level matches median invested wealth for individuals of age 65. For this group, becoming a landlord leads to substantial drops in discounted utility, unless ϕ is large. This is due to the lumpiness of the rental property, and to transaction costs. Indeed, when they are landlords, these retirees have 90% of their invested wealth allocated to the rental property. They dislike this asset allocation, and they would rather rebalance toward financial assets. Accounting for transaction costs makes rentals even less attractive. However, when ϕ is large, the benefit from avoiding wealth liquidation for consumption out-weights asset allocation considerations. For individuals with intermediate wealth level (AUD 640,000), the rental property is unattractive in the presence of transaction costs and when there is no preference for consuming income ($\phi = 0$). However, positive values of the ϕ reverse this consideration, and make being a landlord optimal.

Overall, the preference for consuming income plays a crucial role in explaining the decision

of becoming a landlord when interest rates are low for middle-income retirees across most of the wealth distribution.

7 Implications of Reaching for Rental Income

7.1 Homeownership Rate

The impact of long-term investors on the housing market has recently been the object of policy debates and academic research. The homeownership rate is an important outcome that may be directly influenced by an increase in the volume of small investors. Government policies encourage homeownership across many countries, and there is evidence that homeownership is associated with better economic outcomes (Sodini et al., 2023).

If the increase in the share of retiree landlords documented in our study takes place at the same time as a substantial increase in the housing stock, and landlords mainly purchase newly constructed properties, the effects on the homeownership rate might be modest. The same is true if new landlords purchase properties from existing landlords, or corporations. On the other hand, if landlords mainly purchase homes that are owner-occupied, and turn them into rentals, then an increase in the share of landlords may lead to a decrease in homeownership.

Panel (a) of Figure 12 displays a bin scatter plot depicting the association across postcodes between the increase in the percentage of buy-to-let transactions (out of all sales) from 2006 to 2019, and the homeownership rate. We find that a 10% increase in buy-to-let volume is associated with a 5% larger drop in the homeownership rate at the postcode level.

We dig deeper into this evidence in Table 7. Using the sample of buy-to-let transactions, we estimate the following regression equation:

$$\mathbb{1}(Owner\_Occupied)_i = \beta y_t + \mathcal{B}_X X_{p,t} + \alpha_p + \epsilon_i, \tag{6}$$

where $\mathbb{1}(Owner\_Occupied)_i$ is a dummy equal to one if a buy-to-let property was purchased

from an owner-occupier, and y_t is the level of rates (6-month CDs, 2-year bonds, 10-year bonds) in the month in which the transaction takes place. The vector $X_{p,t}$ contains postcode-level (p) time varying controls, including lagged price, rent and population growth in the year before the transaction, while α_p is a family of postcode fixed effects.

We find that estimates of β are statistically significant and negative, both when estimating equation (6) with OLS (linear probability model) and when using Logit. Thus, lower rates are associated with a higher likelihood of owner-occupied properties transitioning into the rental market, which is consistent with a drop in the homeownership rate.

To further corroborate this conjecture, we also provide evidence from the surveys discussed in Section 5. In both surveys, we ask landlords who purchased their rental properties between 2006 and 2019 whether they bought an owner occupied property, a new construction, a rental property from a landlord, another type of property, or if they do not know. Panels (b) and (c) of Figure 12 refer to respondents from ALA and from Qualtrics, respectively. Both panels display a remarkably similar pattern. In the ALA survey, out of those who know the previous use of their property, 46% report to have purchased an owner-occupied unit, and only 26% (22%) report to have purchased a rental property from a landlord (a newly built home). In the Qualtrics survey, 53% report to have purchased an owner-occupied unit, and only 21% (23%) report to have purchased from a landlord (a newly built home).

We have previously shown that lower rates are associated with an increase in the fraction of individual landlords (more specifically, middle-income retirement-age landlords), and an increase in buy-to-let activity. Combined with the results in this section, our findings suggest that lower rates, by stimulating new landlords' entry, reduce the homeownership rate.

7.2 Income Exposure to Local Economic Shocks

While previous work has extensively explored labor income dynamics and risk (see Meghir and Pistaferri, 2011 for a review of the literature), less is known about rental income.

Note that the behavior of rental income is likely different from that of investment income in general. Interest and dividend payments from a diversified portfolio of assets have low exposure to economic shocks specific to the region in which an individual lives. Rental income is instead highly correlated with local economic shocks. Individual landlords are unlikely to hold multiple properties and to diversify their real estate assets across locations. Moreover, rental properties tend to be located close to the primary residence of the landlord. In the ALA and Qualtrics surveys, we find that only 15-16% of respondents who bought their property (or properties) between 2006 and 2019 own rentals outside their state of residence (see Figure A.7 and Figure A.9 in the Appendix). Roughly half of the respondents only own rental properties in the metropolitan area where they live.[38]

As shown in Figure 2, rental income accounts for a large fraction of total income for middle-income and retirement-age landlords. Thus, these landlords are likely highly exposed to local shocks. To estimate the magnitude of this effect, we turn to the data on individual tax filings, and to the specific setting of Perth, the capital city of Western Australia, in which most business activities are directly or indirectly tied to mining. Iron ore is one of the region's main exports, and local economic activity is strongly influenced by the price of the commodity. This is in turn determined by international demand, mainly from the Chinese steel industry. In general, fluctuations in iron ore prices are poorly correlated with fluctuations in stock prices and other macroeconomic factors.[39]

We then use fluctuations in iron ore prices as a source of local economic shocks in Western Australia, and estimate their impact on individual income, and its components, with the following regression equation:

$$\log(Inc_{i,t}) = a + b\log(P_{IronOre,t-1}) + BX_i + e_{i,t}, \tag{7}$$

[38]The Rental Investors Surveys, run by the Australian Bureau of Statistics in the 90s (until 1997) found similar results: only 11% of landlords owned properties in a different state than their primary residence.

[39]Figure A.11 in the Appendix reports year-over-year price changes in iron ore spot prices in the main Chinese import hub (the port of Tianjin), over the period from 2003 to 2019.

in which $\log(Inc_{i,t})$ is the log of total income, or of one of the components of income, for individual i in fiscal year t, $log(P_{IronOre,t-1})$ is the log of the average iron ore price over a 12 months period, lagged by one year, and X_i is a vector of individual controls, including age, partner status, occupation code, and gender. We report separately estimates for middle-age (panel A) and retirement-age (panel B) individuals in Table 8.

We find a strong and positive relation (column 1) between rental income and iron ore prices, for both middle-age and retirement-age individuals. Point estimates are similar across the two groups, and suggest that a 10% change in iron ore prices coincides with a 2.5% change in individual rental income. There is no relation between fluctuations in iron ore prices and dividend (column 2), or interest (column 3) income. The sensitivity of income from salary and pensions (column 4) differs between middle-age and retirement-age individuals, as we may expect. There is a positive and significant relation for middle-age individuals, who are part of the local workforce. There is no relation for the retirement-age group.

Finally, we set the dependent variable equal to the log of the individual's total income, and expand the specification in equation (7) to also include an interaction term between the log price of iron ore and a dummy equal to one if the individual is a landlord (column 5). The interaction captures the incremental effect on total income for landlords, with respect to the baseline for non-landlords. For middle-age individuals, a 10% fluctuation of iron ore prices changes the total income of non-landlords by 0.65%, consistent with our previous estimates. However, for landlords, total income changes by an additional 0.63%. For retirement-age individuals, the effect of fluctuations of iron ore prices on the total income of non-landlords is not significant, consistent with our previous results. For landlords, the coefficient is positive and significant: a 10% change in iron ore prices leads to a 1.1% change in total income. Thus, retiree landlords are as exposed to local shocks as middle-age landlords, and twice as exposed as middle-age individuals who are not landlords. Reaching for rental income substantially increases retirees' exposure to local economic fluctuations.

8 Conclusions

There is limited empirical evidence on individual small landlords. Using fiscal data from Australia, we document a substantial increase in the share of landlords in the last twenty years. In particular, for middle-income retirement-age individuals, the share of landlords has increased by 80% (from 12% to 21%). We argue that this pattern is explained by declines in interest rates, and by *reaching for income*. The reaching for income mechanism is driven by the preference for consuming investment income, rather than realized capital gains. When rates paid by saving accounts, money market funds and low-risk bonds decline, those who are reliant on investment income for consumption spending (e.g. retirees) may rebalance their wealth toward assets with higher income payments (e.g. real estate).

We conduct several empirical tests to show that the increase in the share of landlords is unlikely to be just driven by house price growth or lower cost of debt. First, we do not find a contemporaneous increase in speculative investment (house flipping). Second, we find that investments in rentals are concentrated in areas that offer higher rental yields (income per dollar invested). Third, we show that most retirees purchase rental properties with no leverage, and are extracting positive income from their properties, while younger investors make use of leverage, and earn negative income because of higher expenses. Finally, we study the composition of gross financial income over time, and find that, as interest rates drop, retirement-age individuals substitute dwindling interest rates payments with real estate income.

To directly identify investors' motives, we administer field surveys to samples of small Australian landlords. Responses to both open-ended and close-ended questions align with key predictions of the reaching for income mechanism. First, retirees rank the desire to earn rental income higher than any other competing motivation for purchasing rental properties. Second, retirees use rental income to pay for their consumption needs. Finally, rental properties are purchased with funds previously allocated to saving accounts, which respondents identify as a major source of investment income before the purchase of their rentals.

We then show that incorporating the preference for consuming from income, rather than wealth, in a quantitative portfolio model changes the trade-off between being a landlord and investing wealth in liquid assets only. In the model, middle-income retirees with wealth below the 75th percentile invest in rentals only if they have preference for income, because of the lumpiness and high transaction costs of rental properties.

Reaching for income through rentals has also broader implications for housing markets and retirees. First, new individual landlords most frequently purchase their properties from owner-occupiers. Thus, reaching for income reduces the homeownership rate. Second, higher reliance on rental income makes retirees' income streams more exposed to local economic shocks.

Our findings provide novel evidence on the behavior of individual investors in real estate, and on the effects of interest rates fluctuations on rental investments and on the housing market.

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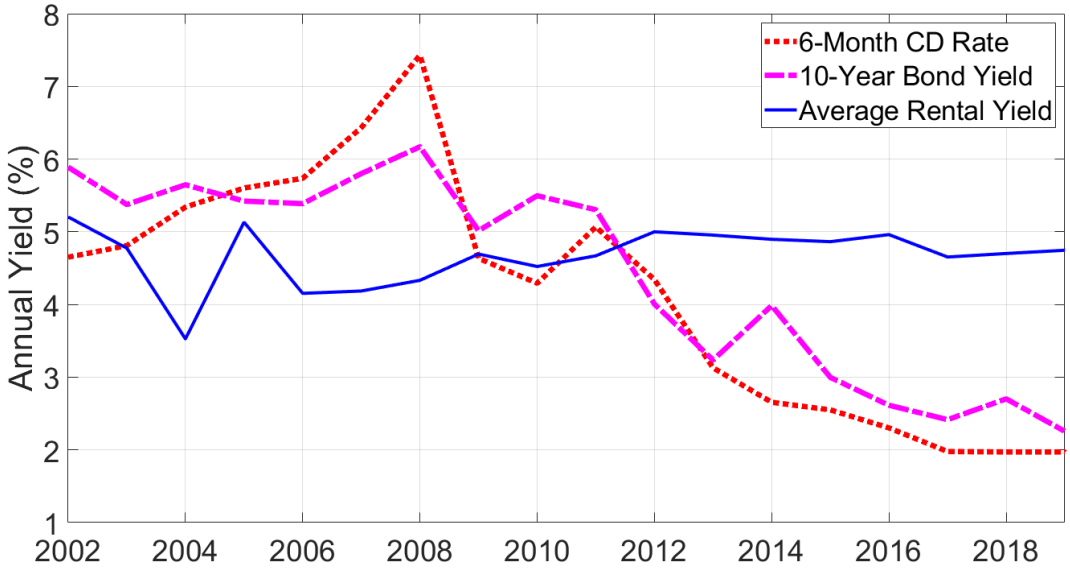
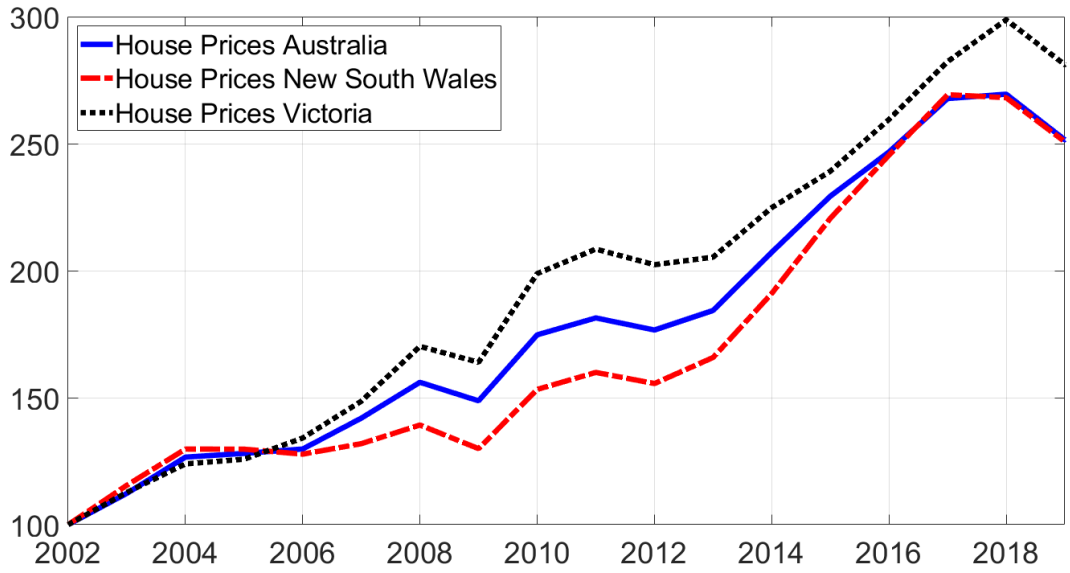
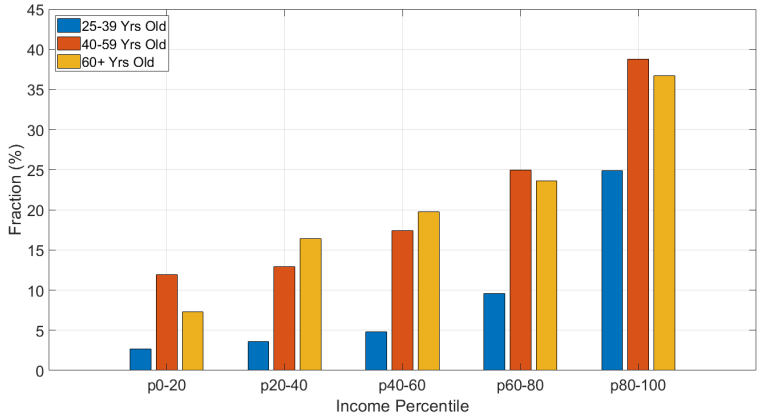


(a) Annualized Yields

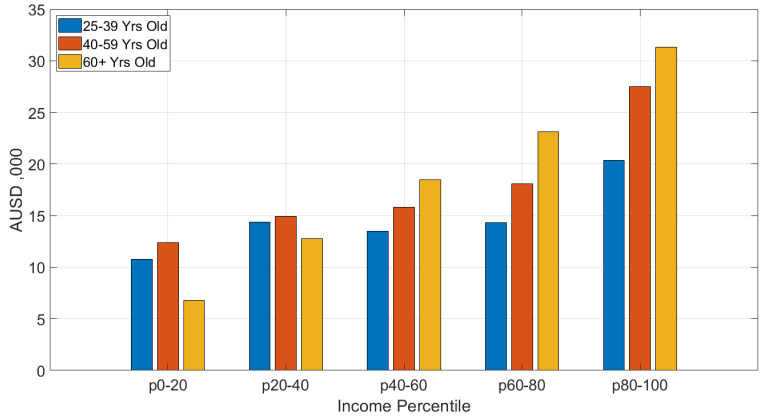


(b) House Price Indices

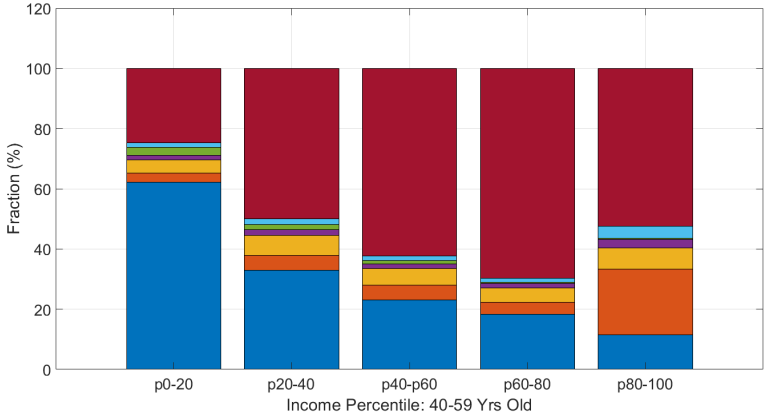
Figure 1: Panel (a) of the figure reports the time series of annualized 6-month certificates of deposit rates, 10-year government bond yields, and average rental yields, for the years from 2002 to 2019. Average rental yields are calculated as the average across postcodes, and postcode yields are computed as the ratio of median annual rent over the median house price in the postcode (based on indices provided by CoreLogic). Panel (b) reports the evolution of house price indices for Australia, New South Wales, and Victoria over the period from 2002 to 2019. The index for Australia is a value weighted mean of median house prices across all the main metropolitan areas in the country. All house price indices are normalized to be equal to 100 in 2002.



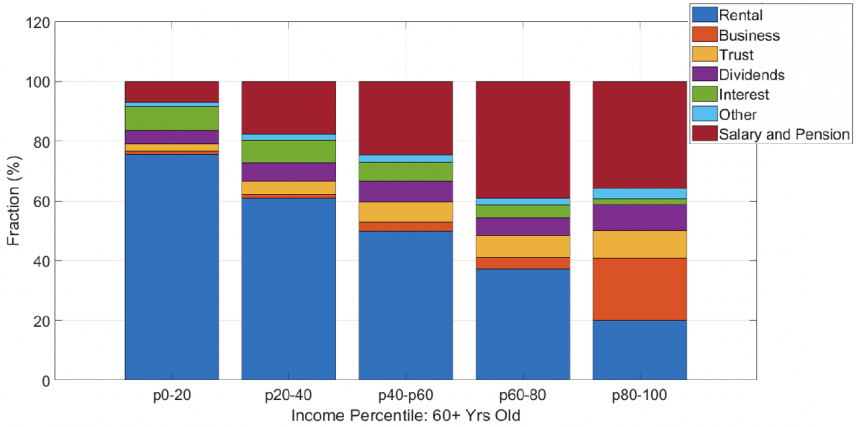
(a) Fraction of Landlords, by Income within Age (2017-2019)



(b) Landlords' Rental Income, by Income within Age (2017-2019)

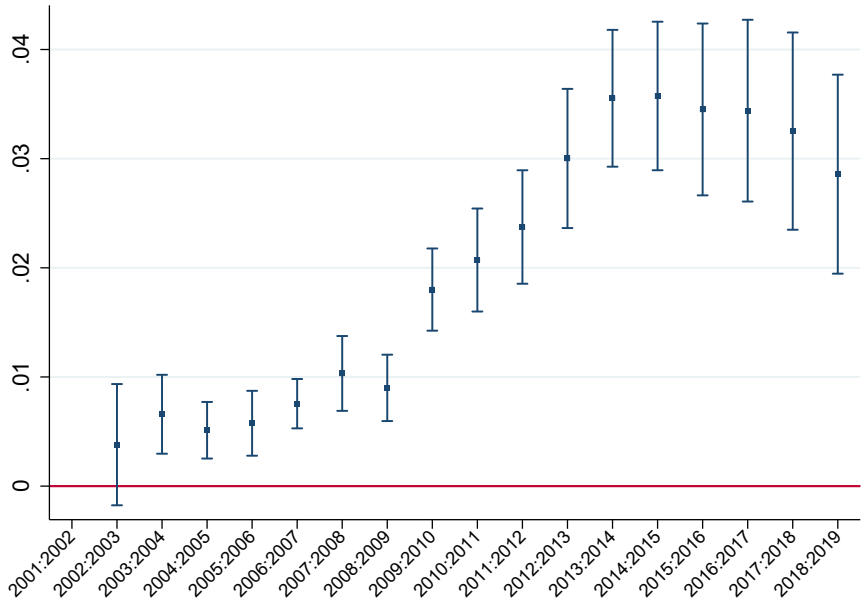


(c) Income Composition, for Middle Age Landlords (2017-2019)

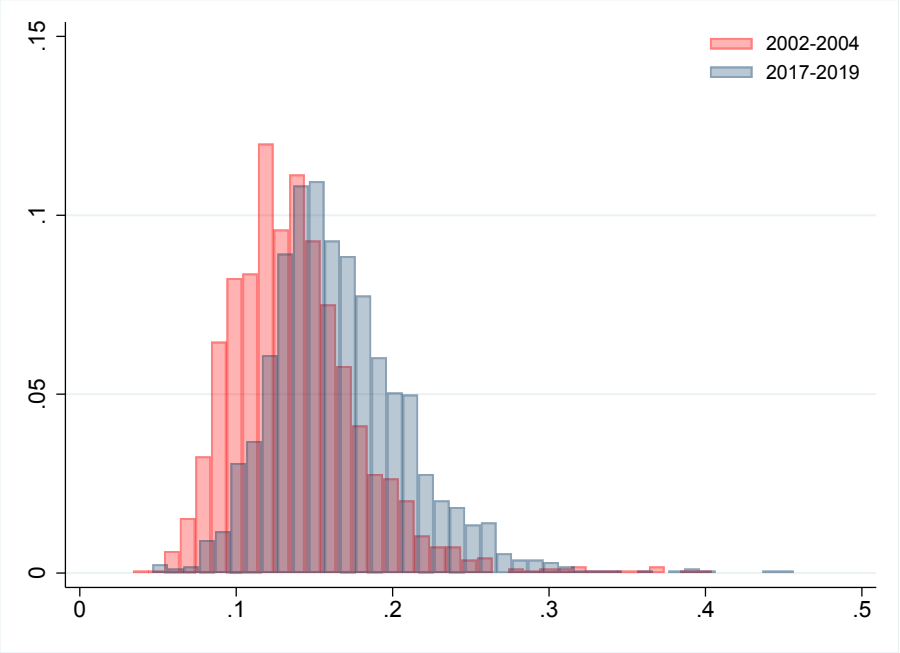


(d) Income Composition, for Retirement Age Landlords (2017-2019)

Figure 2: Panel (a) shows the fraction of landlords while Panel (b) shows the average rental income of landlords. These statistics are computed within income quintiles for three age groups: 25 to 39 (young), 40 to 59 (middle-age), and 60 and older (retirement-age). The bottom panels show the composition of gross income for landlords, across income quintiles for middle-age (40 to 59) individuals in panel (c), and retirement-age individuals (60 and older) in panel (d). The results are based on ATO individual tax filings for the years from 2017 to 2019. All income values are in terms of 2019 Australian Dollars.



(a) Share of Landlords: Time-Series

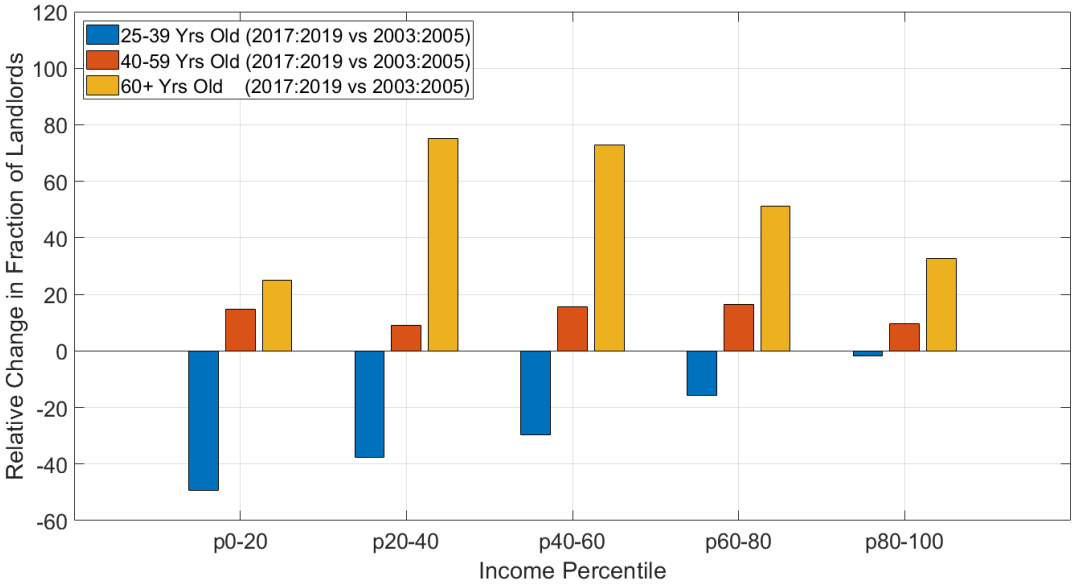


(b) Share of Landlords by Postcode (2002:2004 and 2017:2019)

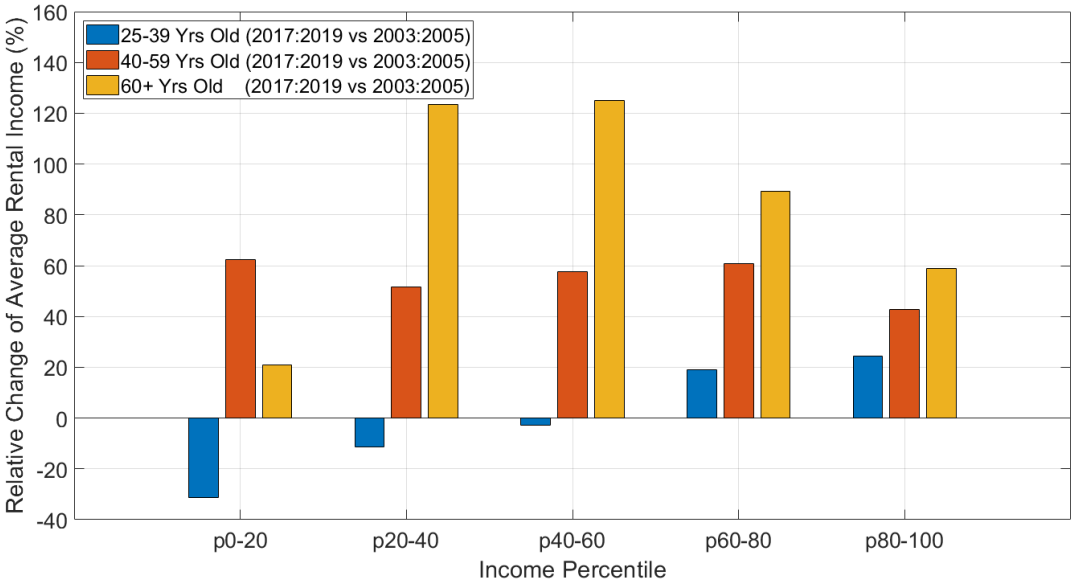
Figure 3: Panel (a) shows estimates of the coefficients δ_t from the following regression equation:

$$y_{j,t} = \sum_{t=2003}^{2019} \delta_t + \mathcal{B}X_{j,t} + \alpha_j + e_{j,t},$$

where $y_{j,t}$ is the share of landlords in postcode j and year t; $X_{j,t}$ is postcode-level population growth, and α_j are postcode fixed effects. Results are based on tax filings for the entire Australian population, aggregated at the postcode level. Panel (b) shows the distribution of the fraction of landlords across postcodes for the years from 2002 to 2004 (red bars), and from 2017 to 2019 (blue bars).



(a) Relative Change in the Share of Landlords (2015:2019 vs 2003:2007)



(b) Relative Change in Average Rental Income (2015:2019 vs 2003:2007)

Figure 4: The figure shows the relative change in the share of landlords (panel a) and in average rental income (panel b) between the years from 2003 to 2005 and the years from 2017 to 2019. Average rental income is calculated over the entire sample of tax filers, including non-landlords. The statistics are computed within income deciles for three age groups: 25 to 39 (young), 40 to 59 (middle-age), and 60 and older (retirement-age). The results are based on ATO individual tax filings.

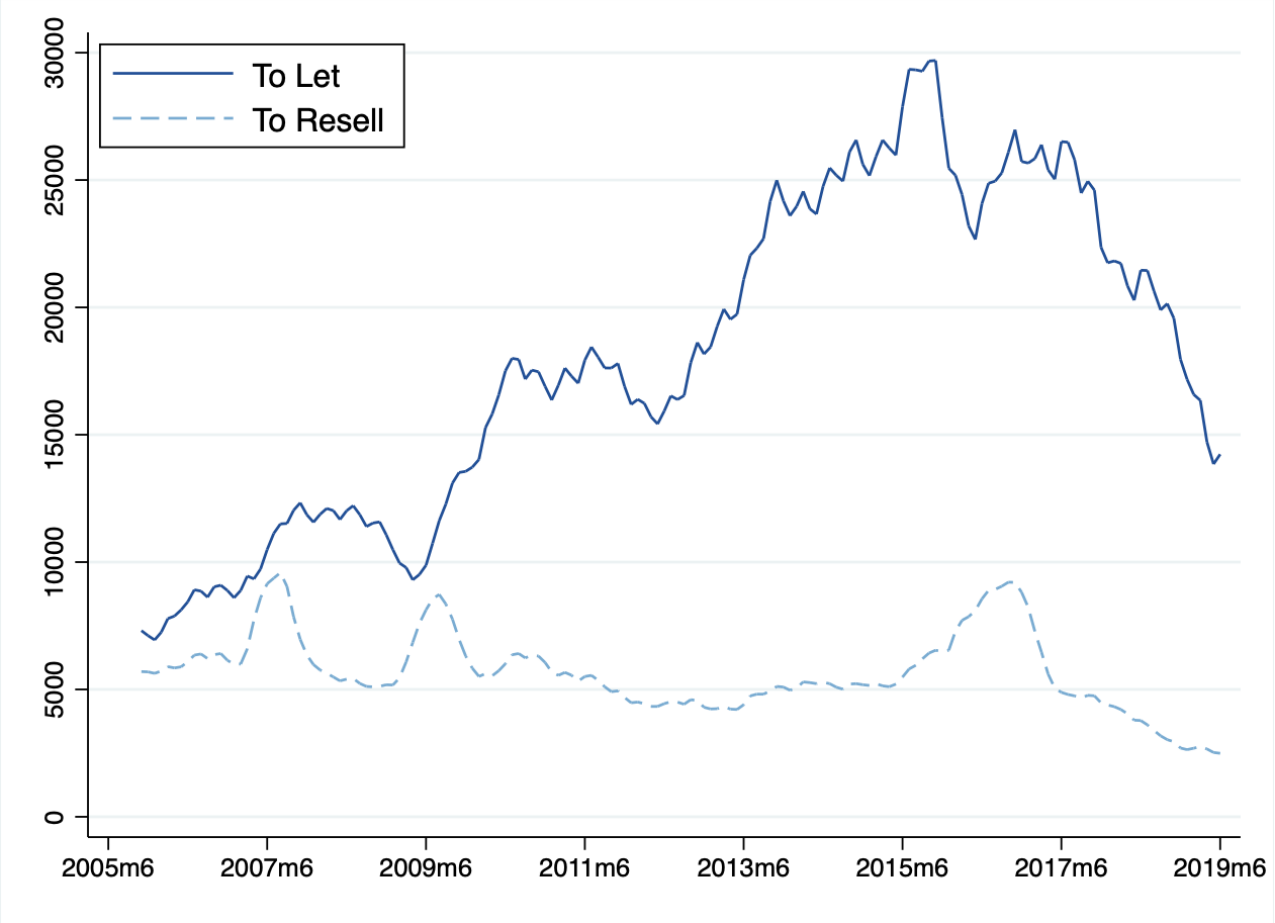
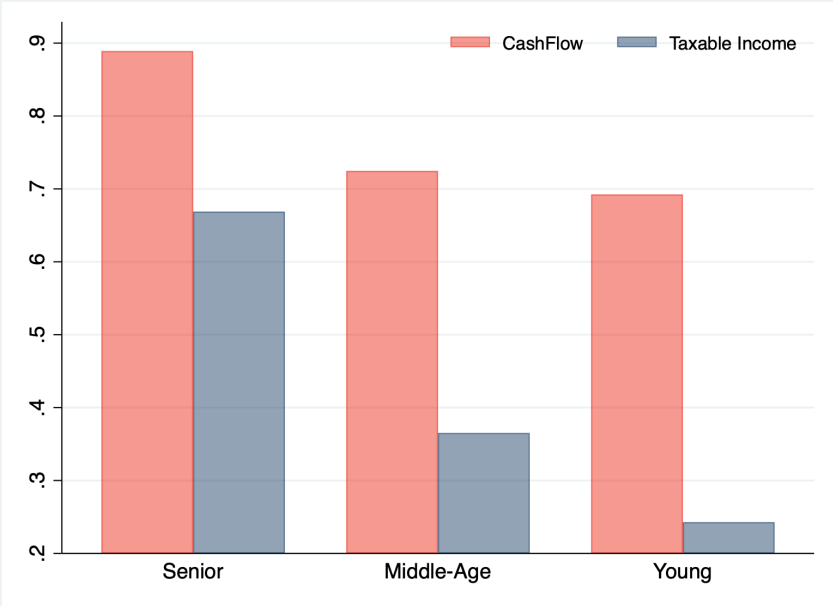
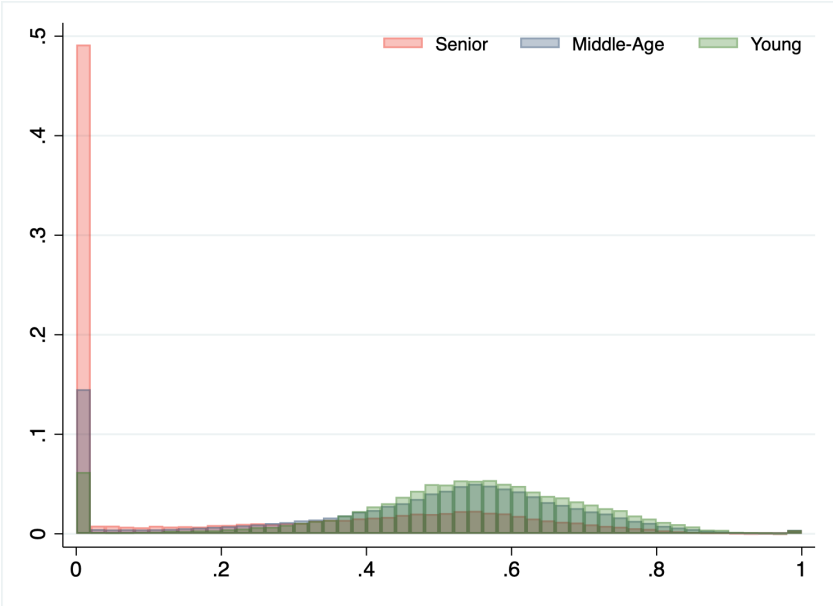


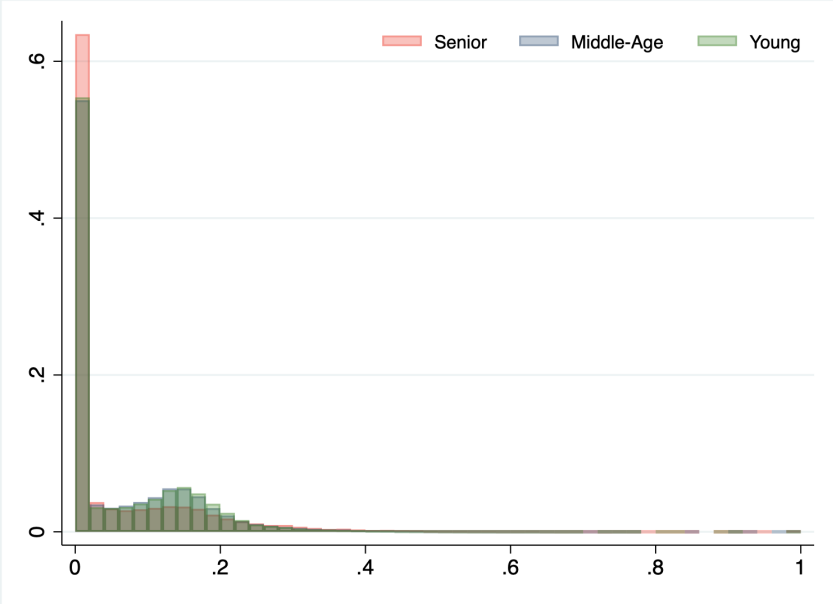
Figure 5: The figure shows the 6-month moving sum of the number of buy-to-let (blue solid line) and buy-to-resell (blue dashed line) properties. We identify a property purchase as a *buy-to-let* if the property is re-listed for rent within 9 months from the sale. We identify the purchase as a *buy-to-resell* if the property is either listed for sale or sold within 9 months from the sale. The results are based on listings and sales data available from Corelogic.



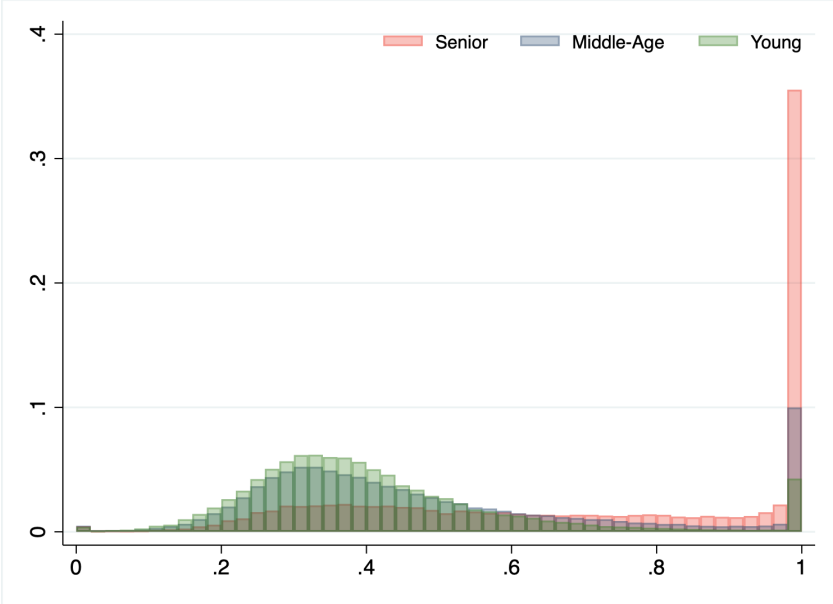
(a) Share of Individuals Declaring Positive Rental Income



(b) Interest



(c) Capital Works



(d) Other Expenses

Figure 6: Panel (a) displays the fraction of individuals across age groups declaring positive rental cash-flows (i.e., the difference between gross rental income and the sum of interest and capital works) and taxable income (i.e., the difference between gross rental income and the sum of interest, capital works and other expenses). Panels (b), (c) and (d) display the distribution of interest payments, capital works, and other expenses, as a fraction of total deductions (interest payments + capital works + other expenses) across age groups. The three age groups are: 25 to 39 (young), 40 to 59 (middle-age), and 60 and older (senior, or retirement-age). The results are based on ATO individual tax filings from 2017 to 2019.

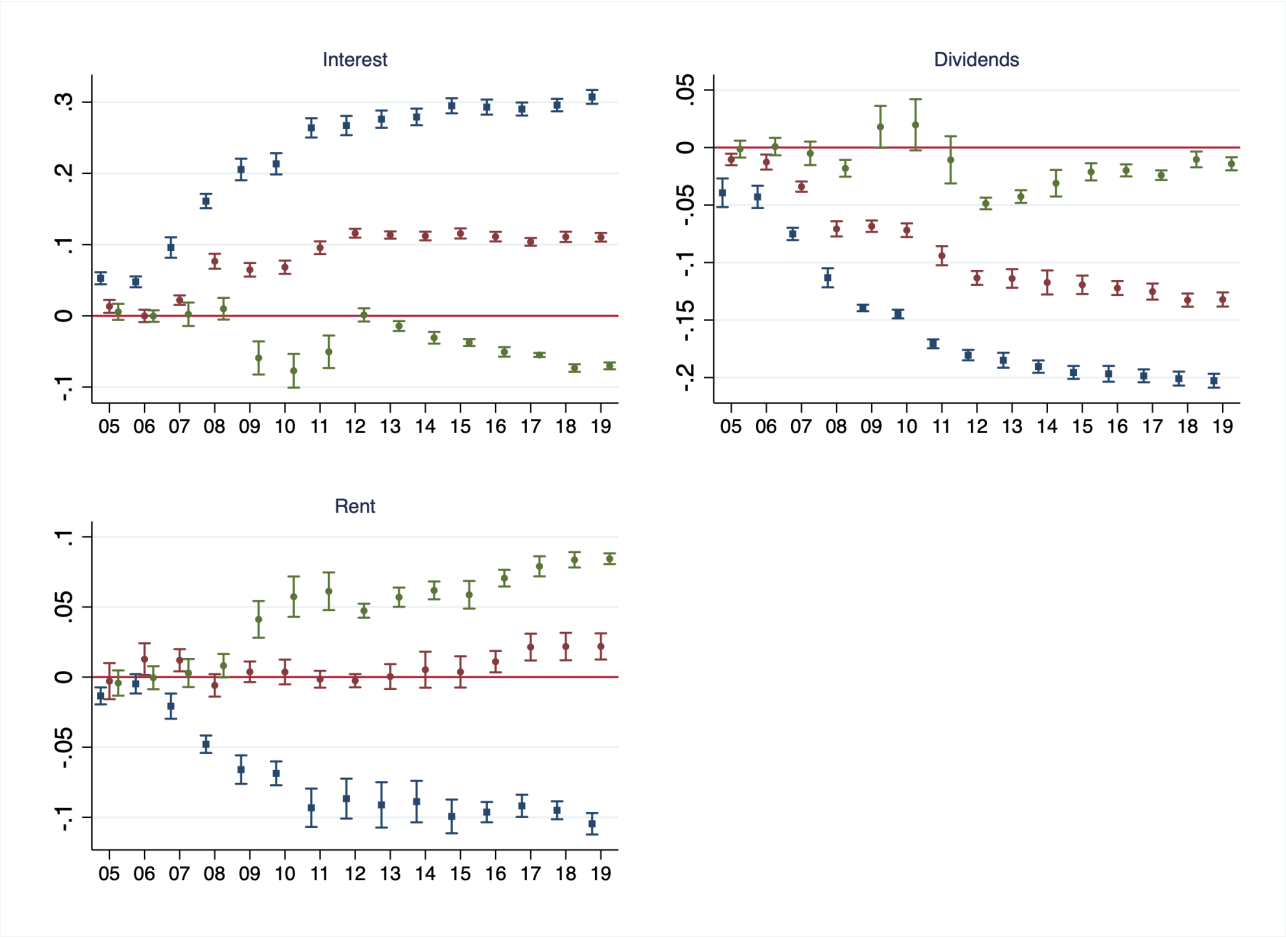


Figure 7: The figure displays estimates of the parameters $\delta_{\tau \times Young}$ (blue), $\delta_{\tau \times Mid}$ (red) and $\delta_{\tau \times Retiree}$ (green) from the following regression equation, estimated on data from individual tax filings:

$$y_{i,\tau} = \sum_{\tau=2005}^{2019} \delta_{\tau \times Young}\Big(I_\tau \times I_{20\ to\ 39}\Big) + \sum_{\tau=2005}^{2019} \delta_{\tau \times Mid}\Big(I_\tau \times I_{40\ to\ 59}\Big) + \sum_{\tau=2005}^{2019} \delta_{\tau \times Retiree}\Big(I_\tau \times I_{60+}\Big) + \\ + \alpha I_{20\ to\ 39} + \beta I_{41\ to\ 60} + \mathcal{B}X_i + \eta_l + e_{i,\tau}$$

where $y_{i,\tau}$ is either the interest (top left), dividend (top right) or rental (bottom left) fraction of gross investment income (defined as the sum of interest, dividend, and rental income) of individual i in year τ, I_τ is a fiscal year dummy, $I_{20\ to\ 39}$, $I_{40\ to\ 59}$ and I_{60+} denote dummies equal to one if the individual is between 20 and 39 years old, 40 to 59 years old or 60 years old or older, X_i is a vector of controls, including gender, partner status and occupation category, and η_l is a location fixed effect, based on the area of residence (see Section 2) of individual i. Standard errors are double-clustered by area of residence and fiscal year.

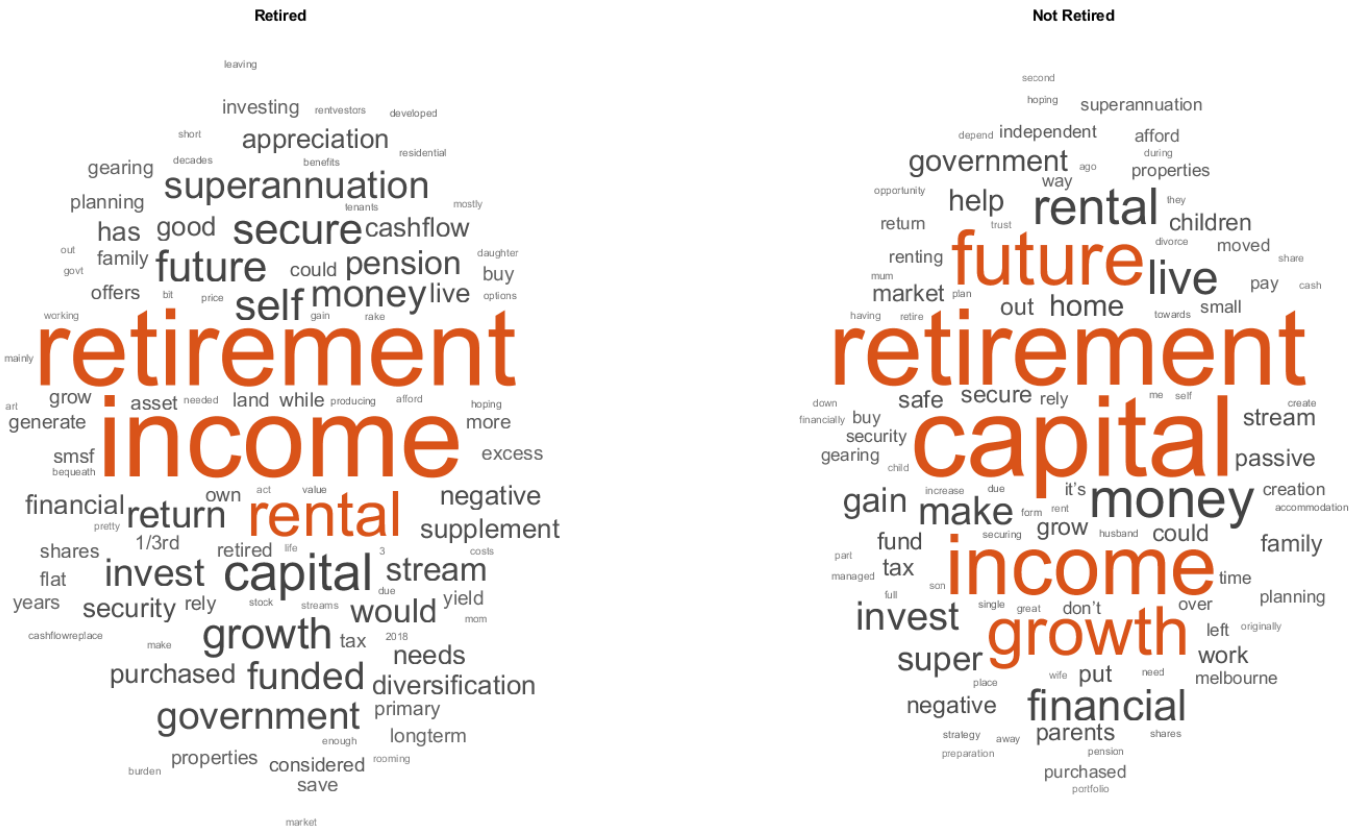


Figure 8: The figure shows word clouds for the answers to the open-ended question on the reason for purchasing rental properties in the ALA Survey (Q2 in Section 1 of the Survey, see Appendix B). We report two separate clouds, for respondents who are (left) and are not (right) retirees. The sample is restricted to those who bought their rental properties (or properties) between 2006 and 2019.

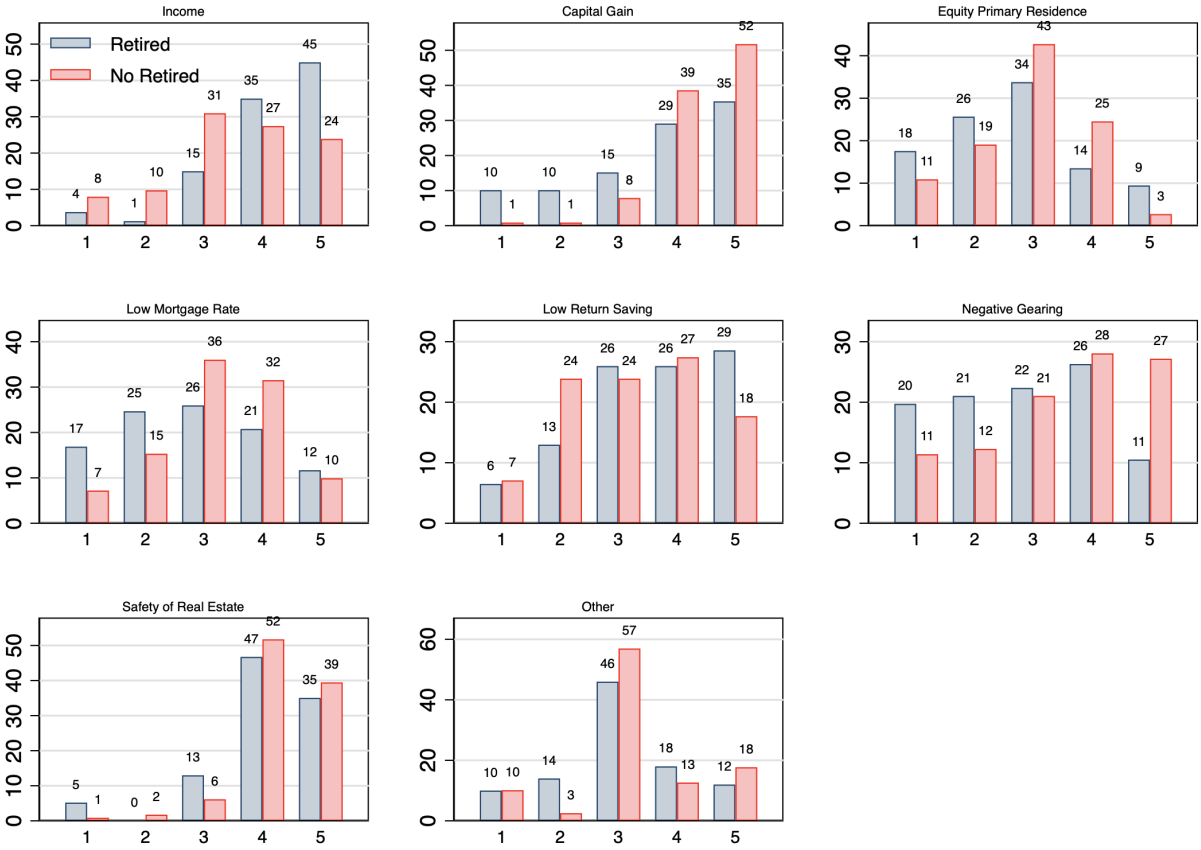


Figure 9: The figure displays the distribution of responses to the close-ended scoring questions from the ALA Survey (see Section 5), asking to evaluate the importance of different motives for purchasing rental properties (Q3 in section 1 of the survey, see Appendix B). The sample is restricted to landlords who purchased their rental property (or properties) between 2006 and 2019. We report results separately for landlords who are and are not retirees.

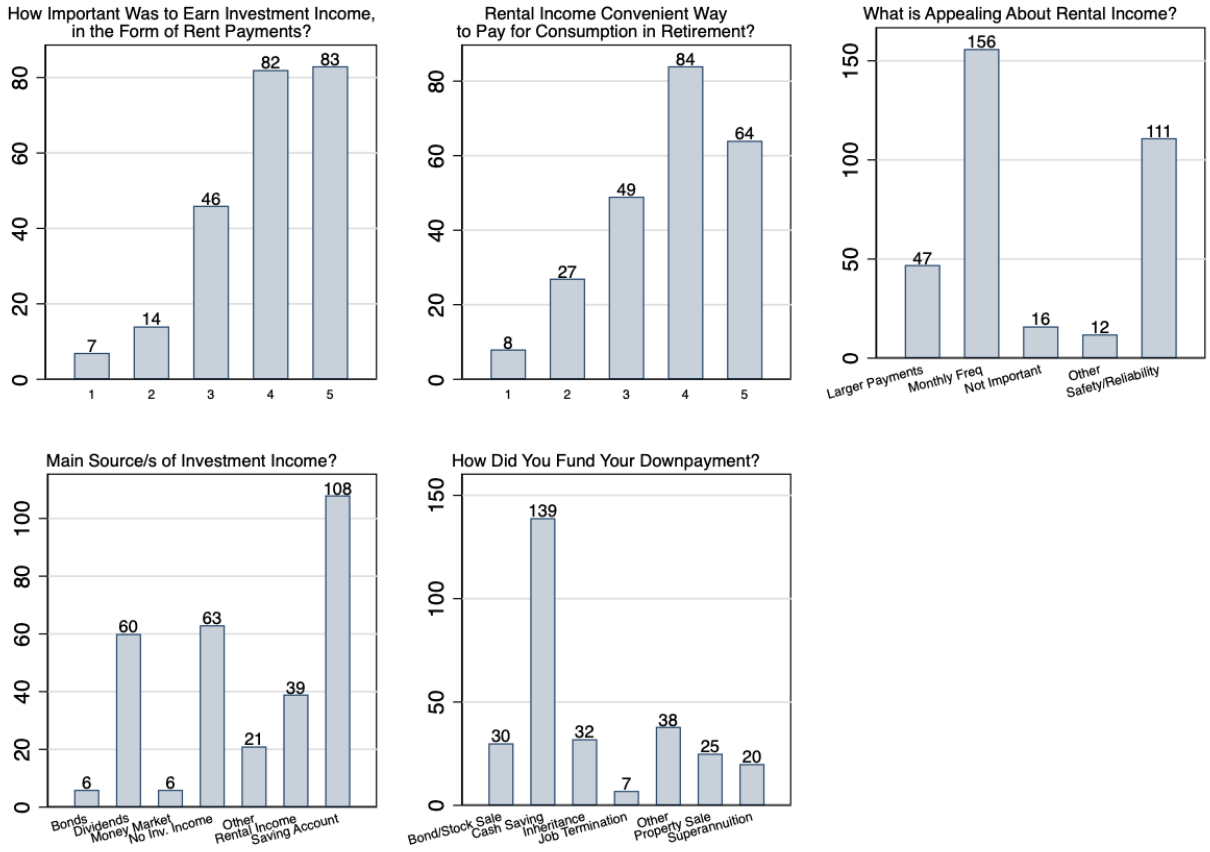
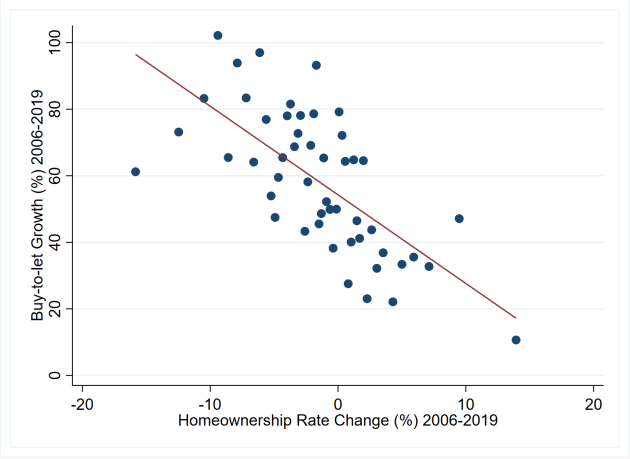
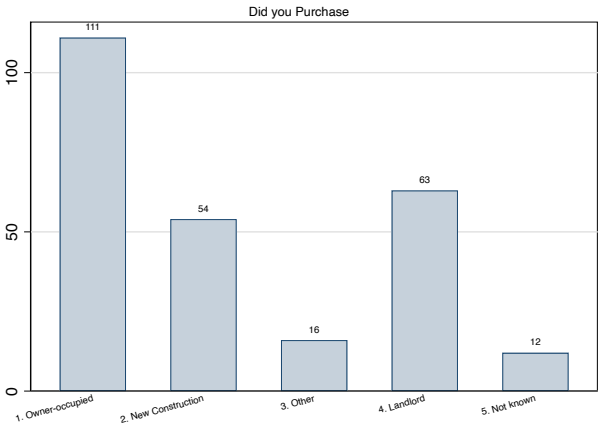


Figure 10: The figure displays the distribution of responses to the questions in section 1 of the Qualtrics Survey (see Section 5 and Appendix B).

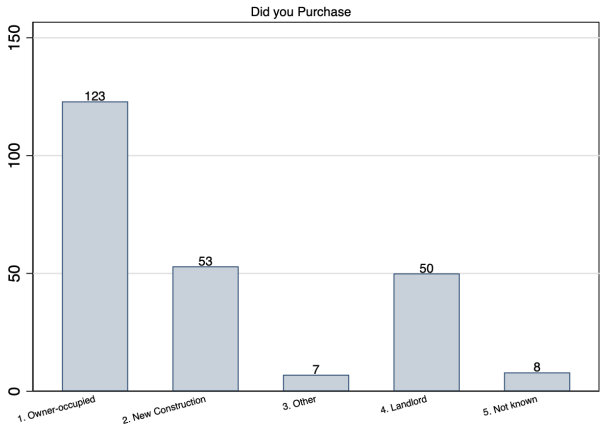
Figure 11: The figure displays calculations based on the quantitative portfolio model, for individuals who are 65 year old. The model is calibrated to match market conditions in 2017-2019. The panels report values of the utility gap for different values of the parameter ϕ. The utility gap is the percentage difference in discounted utility (at age 65) between an individual who is a landlord and an individual who is not a landlord. The non-landlord holds her entire wealth in liquid financial assets (stocks and money market account). The landlord has allocated 400,000 AUD of her wealth to the purchase of the house in the current period (age 65) and holds the remainder of her wealth in liquid financial assets. The blue bars are for a landlord who has just purchased the house with no transaction costs, while the red bars account for 5% transaction costs. All results are for current income equal to 40,000 AUD. Total invested wealth is equal to 440,000 AUD (110% of the rental house price) in the first panel from the left, 640,000 AUD in the panel in the middle (160% of the rental house price) and 840,000 AUD in the panel on the right (210% of the rental house price).



(a) Homeownership and Buy-to-Let Activity



(b) Who Did You Purchase From? (ALA Survey)



(c) Who Did You Purchase From? (Qualtrics Survey)

Figure 12: The figure displays evidence of the effect of new landlords on homeownership rates. Panel (a) shows a binned scatter plot documenting the association between changes in buy-to-let activity and changes in the homeownership rate, at the postcode level. The y-axis is the percentage growth in the volume of buy-to-let transactions between 2006 and 2019. The x-axis is the change in the homeownership rate between 2006 and 2019. The panels on the bottom display the distribution of responses in the ALA (panel b) and Qualtrics (panel c) surveys (see Section 5) to a question asking who did a landlord purchase her property from (Q7 in section 3 of the survey, see Appendix B).

Table 1: **Summary Statistics**

Panel A: Non Financial Income

	Avg	Std	1st	10th	25th	50th	75th	90th	99th
Salary	49.26	57.04	0	0	5.67	40.12	71.44	107.31	239.40
Pension	1.86	7.56	0	0	0	0	0	4.85	35.48
Business	9.79	688.62	0	0	0	0	0	0	169.45
Trust	4.68	36.07	0	0	0	0	0	1.03	102.95
Other	2.19	22.95	0	0	0	0	0	1.05	45.84

Panel B: Financial Income

	Avg	Std	1st	10th	25th	50th	75th	90th	99th
Rental	3.13	12.79	0	0	0	0	0	10.03	50.69
Dividends	1.88	24.65	0	0	0	0	0	0.82	37.44
Interest	1.08	5.49	0	0	0	0	0.22	1.90	20.40
Capital Gains	3.50	67.35	0	0	0	0	0	0	56.81
Total	77.36	697.54	0.04	13.84	29.32	53.59	87.91	137.68	412.36

This table reports summary statistics for the individual tax filings in our sample. All variables are expressed in terms of 2019 Australian Dollar (in thousands). For each variable, we report the mean, standard deviation, and the $1st$, $10th$, $25th$, $50th$, $75th$, $90th$ and $99th$ percentiles. *Salary* includes salary or wages (income item 1 of the tax form) plus allowances (item 2) and employment termination payments (item 3); *Pension* includes government pensions and allowances (item 6 of the tax form), plus annuities and superannuation income streams (item 7); *Business* includes the sum of income from primary (item P8, sum of labels C, E, N, G and I) and non-primary production (item P8, sum of labels D, B, F, O, H and J); *Trust* represents the sum of income from partnerships and trusts (item 13); *Other* represents the sum of foreign income (item 20, label M) and other sources of income; *Rental* represents gross rental income (item 21, label P); *Dividends* represents total dividends received, including unfranked (item 11, label S) and franked amounts (item 11, label T); *Interest* represents gross interest income (item 10); *Capital Gains* represents total capital gains (item 18, label H).

Table 2: **Interest Rates and Fraction of Landlords**

	(1)	(2)	(3)
CD_{6m}	-0.614***		
	(-10.30)		
$Bond_{2yr}$		-0.705***	
		(-10.26)	
$Bond_{10yr}$			-0.894***
			(-6.80)
Postcode HP	-0.006***	-0.006***	-0.008***
	(-3.21)	(-3.23)	(-3.42)
Mtg Credit Spread	0.428***	0.158	-0.164
	(3.71)	(1.15)	(-0.67)
Stock Div Yld	-1.549***	-1.643***	-1.431***
	(-5.09)	(-5.43)	(-3.44)
Stock Mkt Ret	-0.015*	-0.012	-0.016
	(-1.97)	(-1.47)	(-1.58)
Bus Cond Index	-0.004	-0.007	-0.013
	(-0.27)	(-0.54)	(-0.61)
Postcode Pop.	-0.026***	-0.028***	-0.032**
	(-4.17)	(-4.34)	(-4.07)
Postcode FE	YES	YES	YES
R^2_{adj}	0.907	0.907	0.901
N	30,690	30,690	30,690

This table reports estimates of the coefficients from regression equation:

$$FracLL_{i,t} = \gamma y_t + \mathcal{B}X_{i,t} + \alpha_i + e_{i,t}$$

where $FracLL_{i,t}$ is the share of landlords (out of all tax-filing residents) in postcode i in fiscal year t; y_t is either the rate on 6-month CDs issued by Australian banks, or the yield on 2-year or 10-year Australian government bonds; α_i is a postcode fixed effect and $X_{i,t}$ is a vector of controls, including Stock Div Yld , the stock market dividend yield in year t; Stock Mkt Ret, the stock market return over year t; Bus Cond Index, the average value in year t of the Business Conditions Index published by the Australian Bureau of Statistics; Mtg Credit Spread, the mortgage credit spread in year t; Postcode Population, the growth in the number of residents in postcode i, between year $t-1$ and t and Postcode HP, the log house price growth in postcode i between year $t-1$ and t. Standard errors are double clustered by fiscal year and postcode.

Table 3: **Interest Rates and Investment Activity**

	(1)	(2)	(3)
	Panel A: Buy-to-Let		
CD_{6m}	-1.574***		
	(-6.31)		
$Bond_{2yr}$		-1.778***	
		(-6.04)	
$Bond_{10yr}$			-2.176***
			(-4.47)
Controls	YES	YES	YES
Postcode FE	YES	YES	YES
R^2_{adj}	0.625	0.619	0.598
N	17,916	17,916	17,916
	Panel B: Buy-to-Resell (House Flipping)		
CD_{6m}	0.185**		
	(2.22)		
$Bond_{2yr}$		0.231**	
		(2.45)	
$Bond_{10yr}$			0.337**
			(2.42)
Controls	YES	YES	YES
Postcode FE	YES	YES	YES
R^2_{adj}	0.145	0.146	0.147
N	17,916	17,916	17,916

This table reports estimates of the coefficients from the regression equation:

$$FracInv_{i,t} = \gamma y_t + \mathcal{B}X_{i,t} + \alpha_i + e_{i,t}$$

where $FracInv_{i,t}$ is the fraction of buy-to-let (Panel A) or buy-to-resell (Panel B) purchases out of all transactions in postcode i in fiscal year t. We identify a transaction as a *buy-to-let* if the property is listed for rent within 9 months from purchase. We identify it as a *buy-to-resell* if the property is either listed for sale or sold within 9 months from purchase. y_t is either the rate on 6-month CDs issued by Australian banks, or the yield on 2-year or 10-year Australian government bonds; α_i is a postcode fixed effect and $X_{i,t}$ is a vector of controls, including Stock Div Yld , the stock market dividend yield in year t; Stock Mkt Ret, the stock market return over year t; Bus Cond Index, the average value in year t of the Business Conditions Index published by the Australian Bureau of Statistics; Mtg Credit Spread, the mortgage credit spread in year t; Postcode Population, the growth in the number of residents in postcode i, between year $t-1$ and t and Postcode HP, the log house price growth in postcode i between year $t-1$ and t. Standard errors are double clustered by year and postcode.

Table 4: **Buy-to-Let Activity at Higher Frequency: Local Projections**

			Panel A		
	$h=1$	$h=3$	$h=6$	$h=9$	$h=12$
Δr_{policy}	0.032	0.021	-0.056	-0.194***	-0.223***
	(0.55)	(0.29)	(-0.96)	(-3.35)	(-3.71)
R^2_{adj}	0.20	0.36	0.13	0.37	0.38
N	166	164	161	158	155
			Panel B		
	$h=1$	$h=3$	$h=6$	$h=9$	$h=12$
$Shock_{2Yr}$	-0.105	-0.053	-0.305**	-0.361**	-0.302**
	(-0.89)	(-0.33)	(-2.19)	(-2.12)	(-2.27)
R^2_{adj}	0.20	0.36	0.15	0.36	0.31
N	166	164	161	158	155
			Panel C		
	$h=1$	$h=3$	$h=6$	$h=9$	$h=12$
$Shock_{10Yr}$	-0.078	0.010	-0.292**	-0.455***	-0.228*
	(-0.64)	(0.06)	(-2.18)	(-3.01)	(-1.79)
R^2_{adj}	0.20	0.36	0.14	0.37	-0.38
N	166	164	161	158	155

This table reports estimates of the coefficients from the regression equations:

$$\Delta log(BuyToLet)_{t+h} = \alpha_r + \delta_r \Delta r_{t \to t-2} + \sum_{\ell=1}^{2} \gamma_{\ell,r} \Delta log(BuyToLet)_{t-\ell+1} + e_{t+h} \qquad \textit{Panel A}$$

$$\Delta log(BuyToLet)_{t+h} = \alpha_s + \delta_s s_{t \to t-2} + \sum_{\ell=1}^{2} \gamma_{\ell,s} \Delta log(BuyToLet)_{t-\ell+1} + u_{t+h} \qquad \textit{Panels B \& C}$$

where $BuyToLet$ denotes the number of buy-to-let transactions in month t; r denotes the Australian monetary policy rate and s_t is the shock to yields around policy announcements for the 2-year government bond (Panel B) or for the 10-year government bond (Panel C).

Table 5: **Differences Across Locations**

	(1)	(2)	(3)	(4)	(5)	(6)
	Fraction of Landlords			Fraction Buy-to-Lease		
$\text{CD}_{6m} \times Senior_{2005}$	-1.250***					
	(-5.60)					
$\text{Bond}_{2yr} \times Senior_{2005}$		-1.331***				
		(-6.27)				
$\text{Bond}_{10yr} \times Senior_{2005}$			-1.585***			
			(-7.02)			
$\text{CD}_{6m} \times RY_{2005}$				-0.535***		
				(-2.74)		
$\text{Bond}_{2yr} \times RY_{2005}$					-0.583***	
					(-2.85)	
$\text{Bond}_{10yr} \times RY_{2005}$						-0.748***
						(-2.99)
Other Controls	YES	YES	YES	YES	YES	YES
R^2_{adj}	0.91	0.91	0.91	0.57	0.57	0.57
N	30507	30507	30507	17540	17540	17540

This table reports estimates of the coefficients from the regression equations:

$$FracLL_{i,t} = \gamma_{y,Senior}\left(y_t \times \phi_{Senior2005,i}\right) + \mathcal{B}_X X_{i,t} + \alpha_t + \alpha_i + u_{i,t} \quad Columns\ 1\ to\ 3$$
$$FracBuyToLet_{i,t} = \gamma_{y,RY}\left(y_t \times RY_{2005,i}\right) + \mathcal{B}_X X_{i,t} + \alpha_t + \alpha_i + e_{i,t} \quad Columns\ 4\ to\ 6$$

where $FracLL_{i,t}$ is the share of landlords (out of all tax-filing residents) in postcode i and fiscal year t; $FracBuyToLet_{i,t}$ is, out of all properties purchased in postcode i in year t, the fraction of properties re-listed as rentals within 9 months; y_t is either the rate on 6-month CDs issued by Australian banks, or the yield on 2-year or 10-year Australian government bonds; $\phi_{Senior2005,i}$ is the fraction of individual with age greater or equal than 40 in postcode i in 2005; $RY_{2005,i}$ is the average rental yield, in percentage, for postcode i between 2000 and 2005; α_i and α_t are postcode and year fixed effect and $X_{i,t}$ is a vector of controls, including the growth in house prices and in the number of residents in postcode i between year $t-1$ and t. Standard errors are double clustered by year and postcode

Table 6: **Survey Motives for Purchasing Rental Properties: Tests**

	H_o **Retired=Not Retired**		H_o **Income = Others** *Not Retired*		H_o **Income = Others** *Retired*	
Motive	T-stat	P-value	T-stat	P-value	T-stat	P-value
Income	4.127***	0.000				
Capital Gains	-3.653***	0.000	-6.146***	0.000	2.084**	0.037
Negative Gearing	-3.116***	0.002	-0.215	0.830	6.198***	0.000
Equity From Residence	-1.429	0.153	4.081***	0.000	7.116***	0.000
Low Mortgage Rate	-2.169**	0.030	1.877*	0.060	6.416***	0.000
Low Return on Saving	1.892*	0.058	1.610	0.107	3.21***	0.001
Safety Real Estate	-1.410	0.158	-5.312***	0.000	0.927	0.354
Other	-0.907	0.364	1.699*	0.089	5.476***	0.000

This table reports statistics based on the Wilcoxon non-parametric test (Wilcoxon, 1945). We split the sample in two groups, depending on whether the respondent is or is not a retiree (based on the answer to Q1 in section 3 of the survey, see Appendix B). Columns 1 and 2 report t-stats and p-values for tests of the null that the distribution of scores for each motive is equal across the two groups of respondents. Columns 3 and 4 (5 and 6), report t-stats and p-values for tests of the null that the distribution of scores for the income motive is equal to that of each other motive, within each group of respondents (retirees or non-retirees).

Table 7: **Buy-to-Let Activity and Homeownership**

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: OLS			**Panel B: Logit**		
CD_{6m}	-0.338*			-2.824***		
	(-1.66)			(-3.49)		
				[-0.702]		
$Bond_{2yr}$		-0.507**			-3.642***	
		(-2.48)			(-4.66)	
					[-0.906]	
$Bond_{10yr}$			-0.387*			-3.322***
			(-1.67)			(-3.73)
						[-0.825]
Controls	YES	YES	YES	YES	YES	YES
Postcode FE	YES	YES	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES	YES	YES
R^2_{adj}	0.024	0.024	0.024	0.014	0.02	0.017
N	276163	276163	276163	276191	276191	276191

This table reports estimates of the coefficients from the regression equation:

$$\mathbb{1}(Owner\_Occupied)_i = \beta y_t + \mathcal{B}_X X_{p,t} + \alpha_p + \tau_t + \epsilon_i$$

where $\mathbb{1}(Owner\_Occupied)_i$ is a variable equal to 1 if the buy-to-let property transacted at time t was previously owner-occupied; y_t is either the rate on 6-month CDs issued by Australian banks, or the yield on 2-year or 10-year Australian government bonds; $X_{p,t}$ is a vector of controls for postcode p where property i is located, including price growth between month t - 12 and month t, rent growth between month t - 12 and month t, population growth between month t - 12 and month t, and growth in number of listings between month t - 12 and month t; α_p is a postcode fixed effect, and τ_t is a month fixed effect. Estimates are based on OLS in Panel A and Logit in Panel B. In Panel B we report average marginal effects in squared brackets. Standard errors are double clustered by year-month and postcode.

Table 8: **Effects of Local Shocks: Evidence from Western Australia**

	(1)	(2)	(3)	(4)	(5)
	Panel A: Middle Age (40-59)				
	Rent	Dividend	Interest	Salary/Pension	Total
Iron Ore	0.226***	0.011	0.011	0.065***	0.065***
	(6.14)	(0.24)	(0.07)	(3.23)	(4.84)
Iron Ore $\times I(Landlord)$					0.063***
					(4.66)
$I(Landlord)$					0.214***
					(3.57)
Controls	YES	YES	YES	YES	YES
R^2_{adj}	0.057	0.032	0.045	0.213	0.224
N	18110	19858	42604	68735	81428
	Panel B: Retirement Age (60+)				
	Rent	Dividend	Interest	Salary/Pension	Total
Iron Ore	0.269***	-0.036	0.179	-0.016	-0.082
	(5.87)	(-0.80)	(1.08)	(-0.54)	(-1.58)
Iron Ore $\times I(Landlord)$					0.173***
					(5.32)
$I(Landlord)$					-0.046
					(-0.31)
Controls	YES	YES	YES	YES	YES
R^2_{adj}	0.044	0.055	0.089	0.216	0.183
N	6580	15763	24521	22521	33678

This table reports estimates of the coefficients from the following two regression equations:

$$\log(Inc_{i,t}) = a + blog(P_{IO,t-1}) + BX_i + e_{i,t} \qquad Columns\ 1\ to\ 4$$
$$\log(Inc_{i,t}) = a + b_1 log(P_{IO,t-1}) + b_2\left(log(P_{IO}) \times I(Landlord_i)\right) + b_3 I(Landlord_i) + BX_i + u_{i,t} \quad Column\ 5$$

where $\log(Inc_{i,t})$ is either log gross rental income, log dividends, log interest income, log salary or pension, or log total income for individual i in fiscal year t, $P_{IO,t-1}$ is the price of iron ore in fiscal year $t-1$, $I(Landlord_i)$ is a dummy equal to one if individual i in fiscal year t is a landlord, and α_t is a fiscal year fixed effect. The vector of controls X_i includes age, partner status, occupation codes, and gender (see Section 2). The sample is restricted to individuals with residence in Perth, the capital of the state of Western Australia, and to tax filings for years from 2004 to 2019. Standard errors are clustered by year.

Appendix for Online Publication:

Individual Investors' Housing Income and Interest Rates Fluctuations

A Additional Figures and Tables

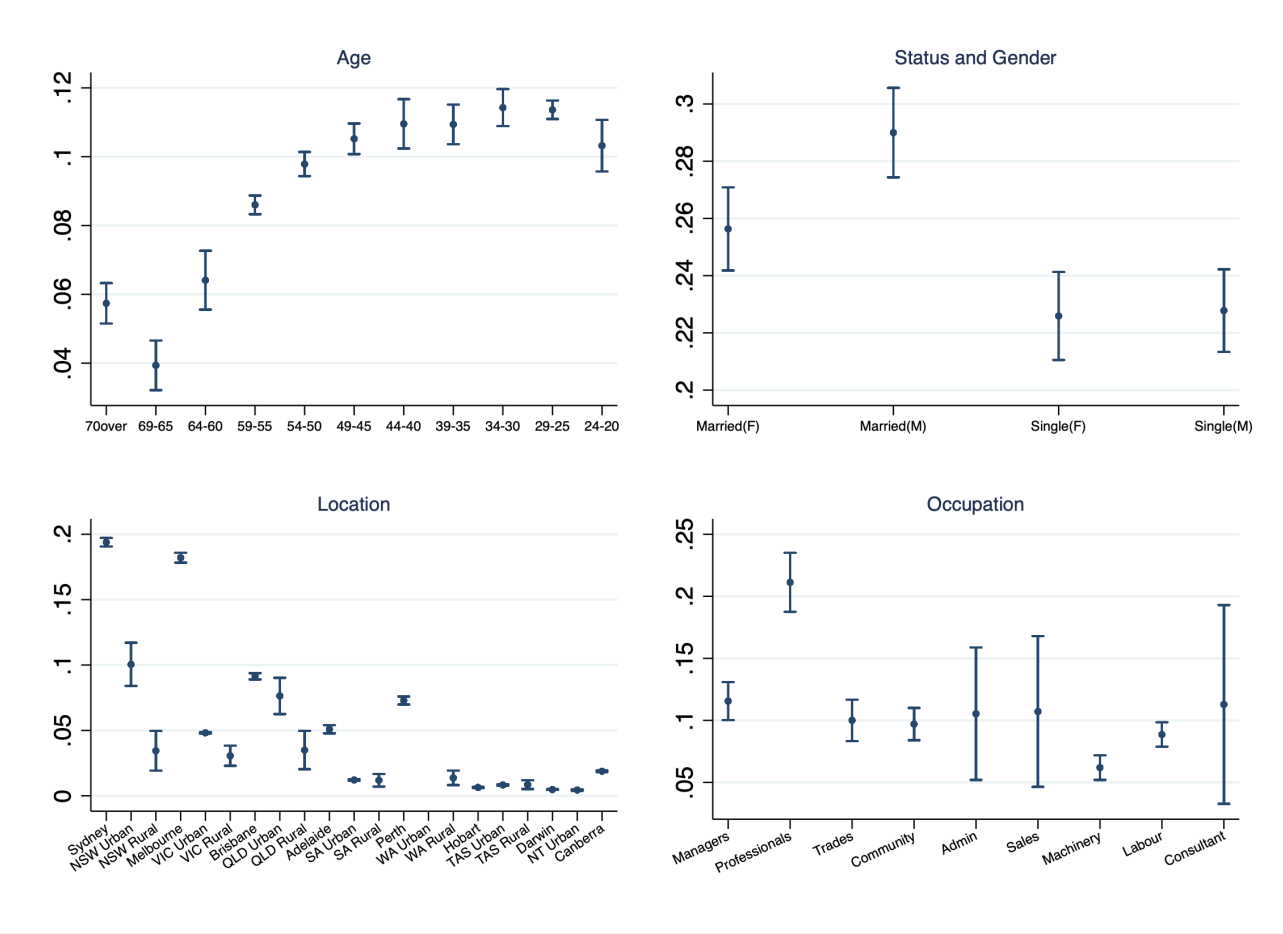


Figure A.1: The figure displays the distribution of demographic characteristics in the ATO individual tax filings. We report age, marital status and gender, location, and occupation. Individuals are grouped into 11 age categories: 70 and over, from 65 to 69, from 60 to 64, from 55 to 59, from 50 to 54, from 45 to 49, from 40 to 44, from 35 to 39, from 30 to 34, from 25 to 29 and from 20 to 24. The location of residence is reported at the level of 33 macro-areas. Occupations are divided into 9 categories, based on the first digit of the Australian and New Zealand Standard Classification of Occupations (ANZSCO): managers, professionals, technicians and trades workers, community and personal service workers, clerical and administrative workers, sales workers, machinery operators and drivers, laborers, and consultants and apprentices. For each year we compute the fraction of individuals in a given age (top-left), status and gender (top-right), location (bottom-left) and occupation (bottom-right) group. We then the report means across years and standard error bars.

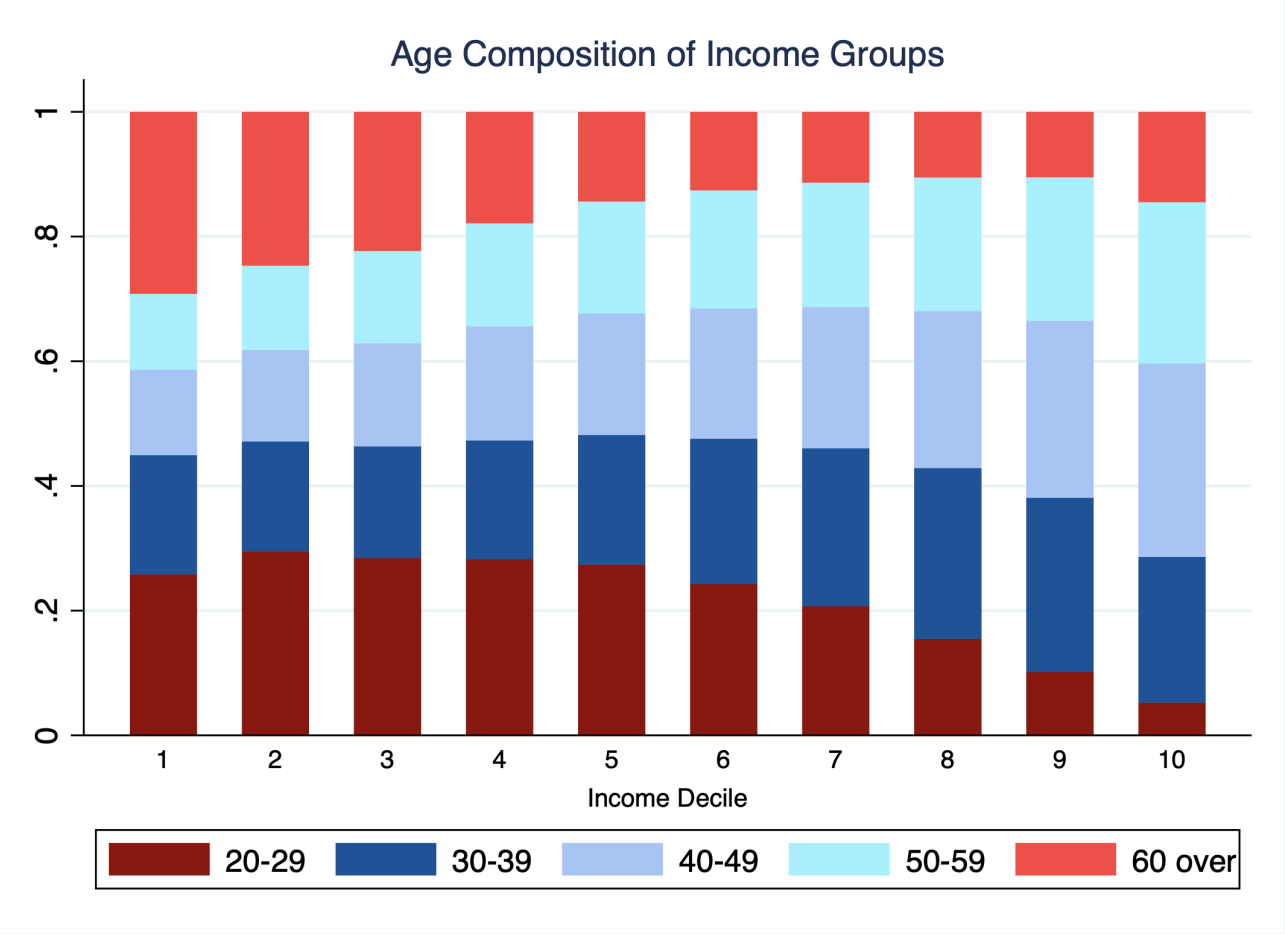


Figure A.2: This figure displays age composition across income deciles for the ATO individual tax filings.

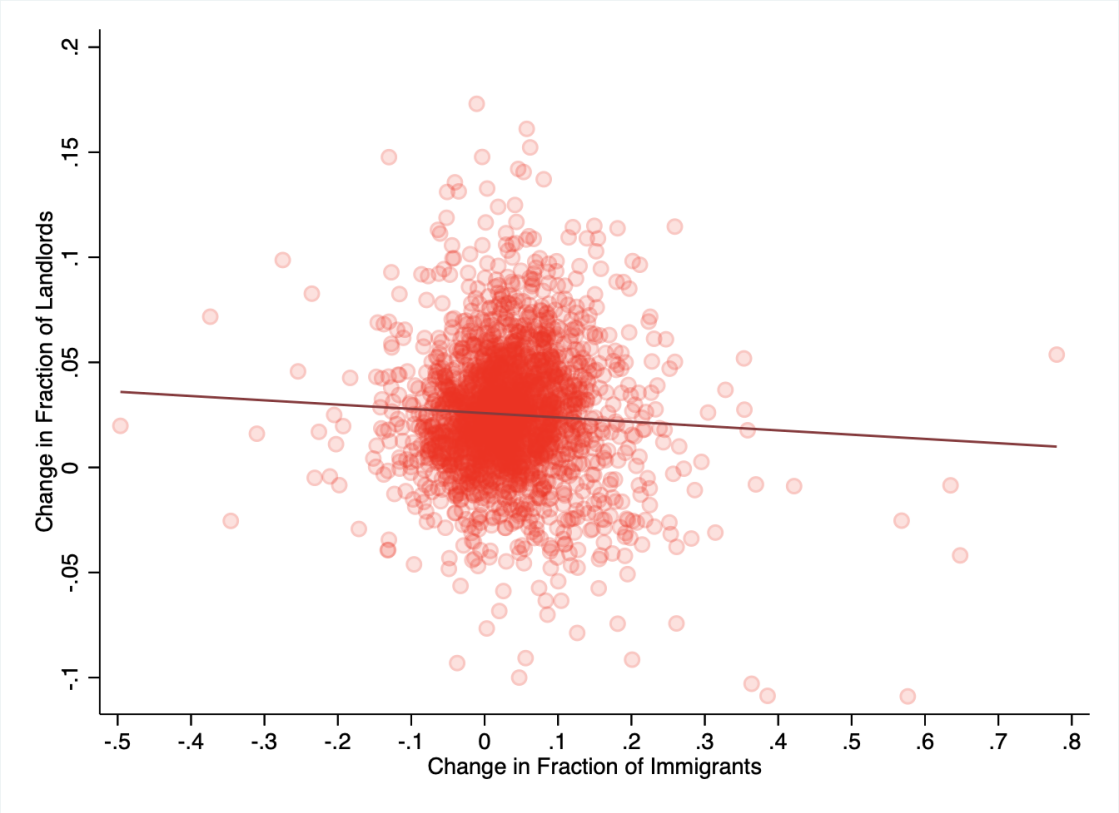


Figure A.3: The figure shows the postcode-level association between the change in the fraction of landlords from 2003-2005 to 2017-2019, and the fraction of immigrants between 2006 and 2019. Data on residents' immigration status are available from the Australian Bureau of Statistics.

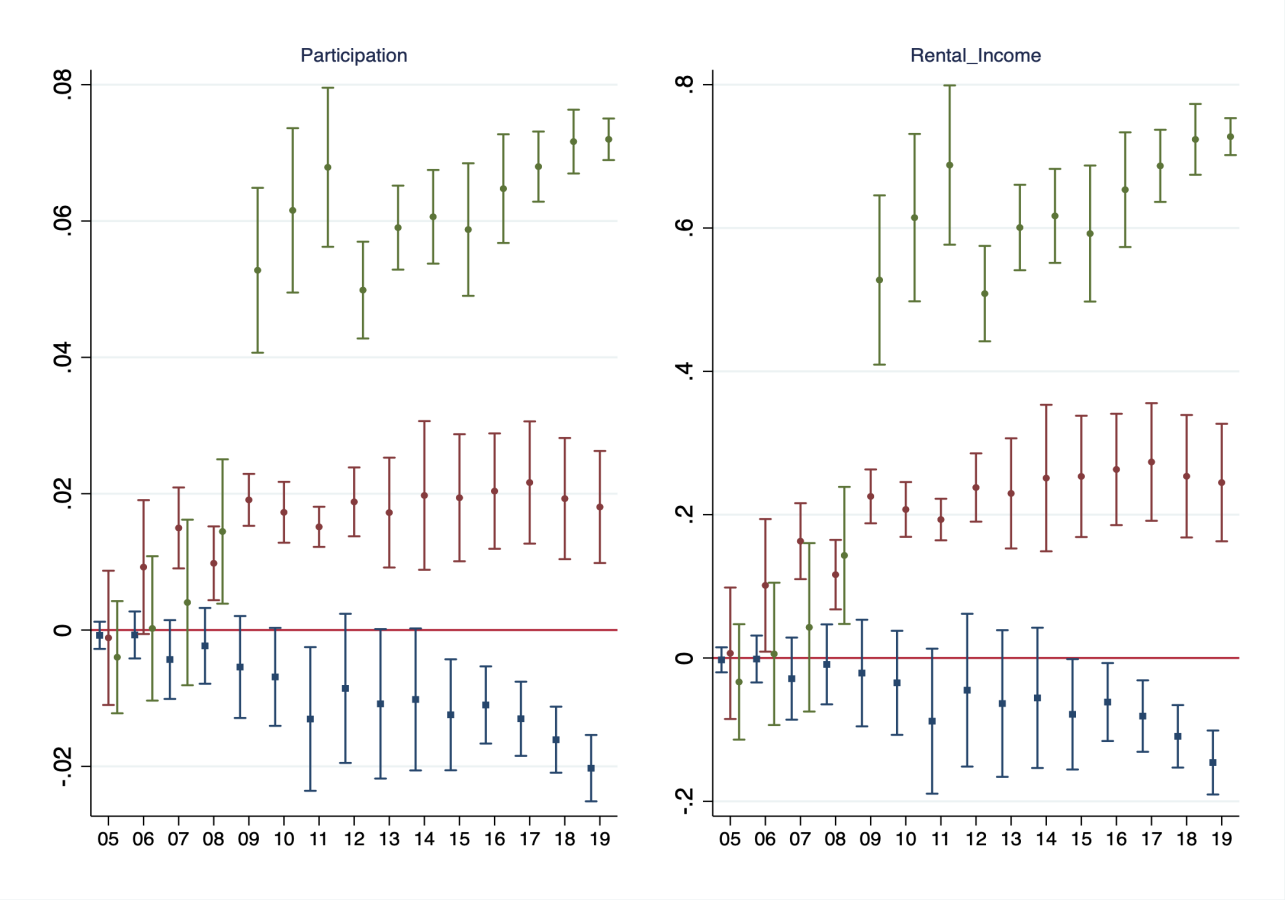


Figure A.4: The figure displays estimates of the parameters $\delta_{\tau \times Young}$ (blue), $\delta_{\tau \times Mid}$ (red) and $\delta_{\tau \times Retiree}$ (green) from the following regression equation, estimated on data from individual tax filings:

$$y_{i,\tau} = \sum_{\tau=2005}^{2019} \delta_{\tau \times Young}\Big(I_\tau \times I_{20\ to\ 39}\Big) + \sum_{\tau=2005}^{2019} \delta_{\tau \times Mid}\Big(I_\tau \times I_{40\ to\ 59}\Big) + \sum_{\tau=2005}^{2019} \delta_{\tau \times Retiree}\Big(I_\tau \times I_{60+}\Big) + \alpha I_{20\ to\ 39} + \beta I_{40\ to\ 59} + \mathcal{B}X_i + \eta_l + e_{i,\tau}$$

where $y_{i,\tau}$ is either a dummy equal to one if the individual is a landlord (left figure) or the log of one plus rental income (right figure), I_τ is a fiscal year dummy, $I_{20\ to\ 39}$, $I_{41\ to\ 60}$ and I_{60+} denote dummies equal to one if the individual is 20 to 39 years old, 40 to 59 years old or 60 years old or older, X_i is a vector of controls, including gender, partner status and occupation category, and η_l is a location fixed effect, based on the area of residence (see Section 2) of individual i. Standard errors are double-clustered by area of residence and fiscal year.

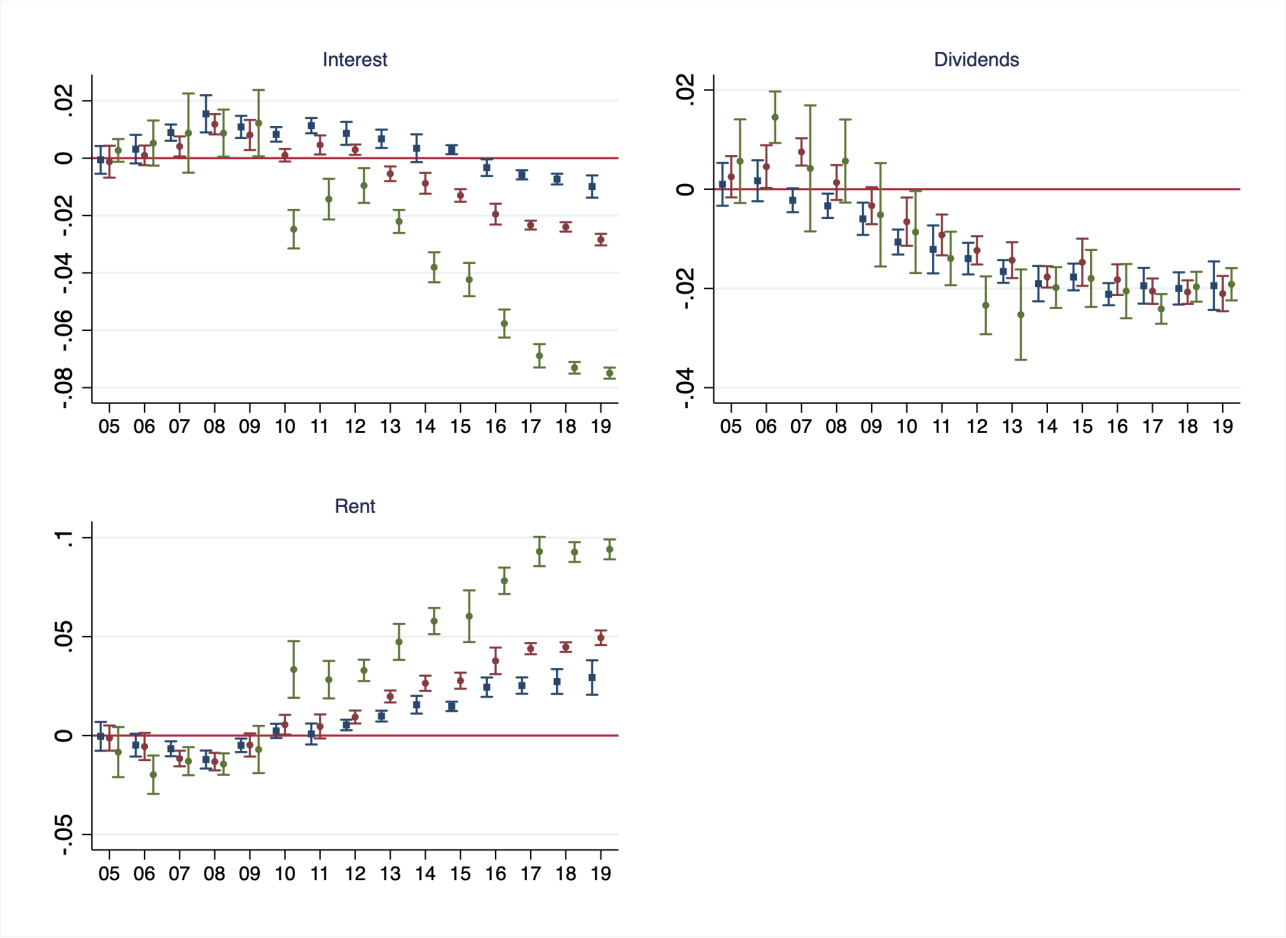


Figure A.5: The figure displays estimates of the parameters $\delta_{\tau \times Young}$ (blue), $\delta_{\tau \times Mid}$ (red) and $\delta_{\tau \times Retiree}$ (green) from the following regression equation, estimated on data from individual tax filings data for landlords only:

$$y_{i,\tau} = \sum_{\tau=2005}^{2019} \delta_{\tau \times Young}\Big(I_\tau \times I_{20\ to\ 39}\Big) + \sum_{\tau=2005}^{2019} \delta_{\tau \times Mid}\Big(I_\tau \times I_{40\ to\ 60}\Big) + \sum_{\tau=2005}^{2019} \delta_{\tau \times Retiree}\Big(I_\tau \times I_{60+}\Big) + \\ + \alpha I_{20\ to\ 39} + \beta I_{40\ to\ 60} + \mathcal{B}X_i + \eta_l + e_{i,\tau}$$

where $y_{i,\tau}$ is either the interest (top left), dividend (top right) or rental (bottom left) fraction of gross investment income (defined as the sum of interst, dividend, and rental income) of individual i, I_τ is a fiscal year dummy, $I_{20\ to\ 39}$, $I_{40\ to\ 59}$ and I_{60+} denote dummies equal to one if the individual is between 20 and 39 years old, 40 to 59 years old or 60 years old or older, X_i is a vector of controls, including gender, partner status and occupation category, and η_l is a location fixed effect, based on the area of residence (see Section 2) of individual i. Standard errors are double-clustered by postcode and year.

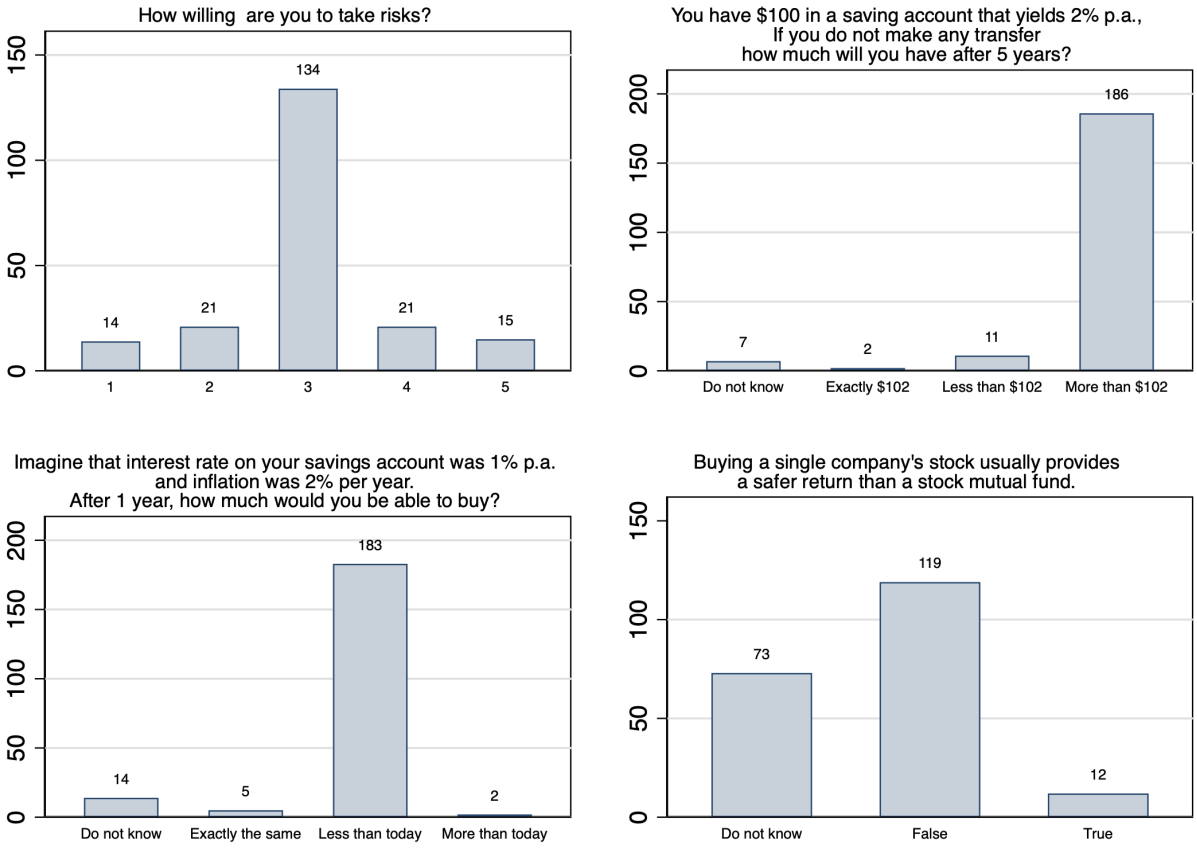


Figure A.6: The figure shows answers to risk preferences and financial literacy questions from the ALA Survey (Q1 to Q4 in section 2 of the survey, see Appendix B), for respondents who bought their rental properties between 2006 and 2019.

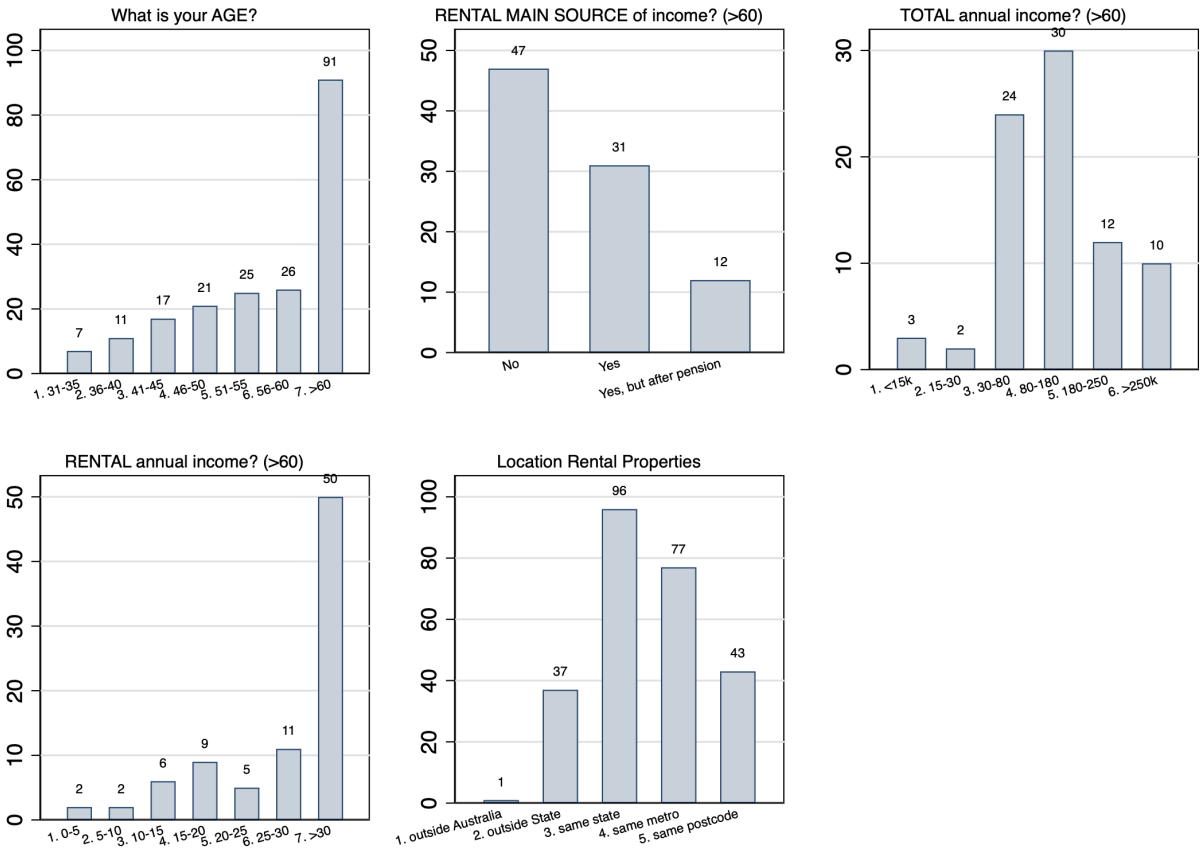


Figure A.7: The figure shows answers to questions on landlord characteristics from the ALA Survey (Q1 to Q6 in section 3 of the survey, see Appendix B), for respondents who bought their rental properties between 2006 and 2019.

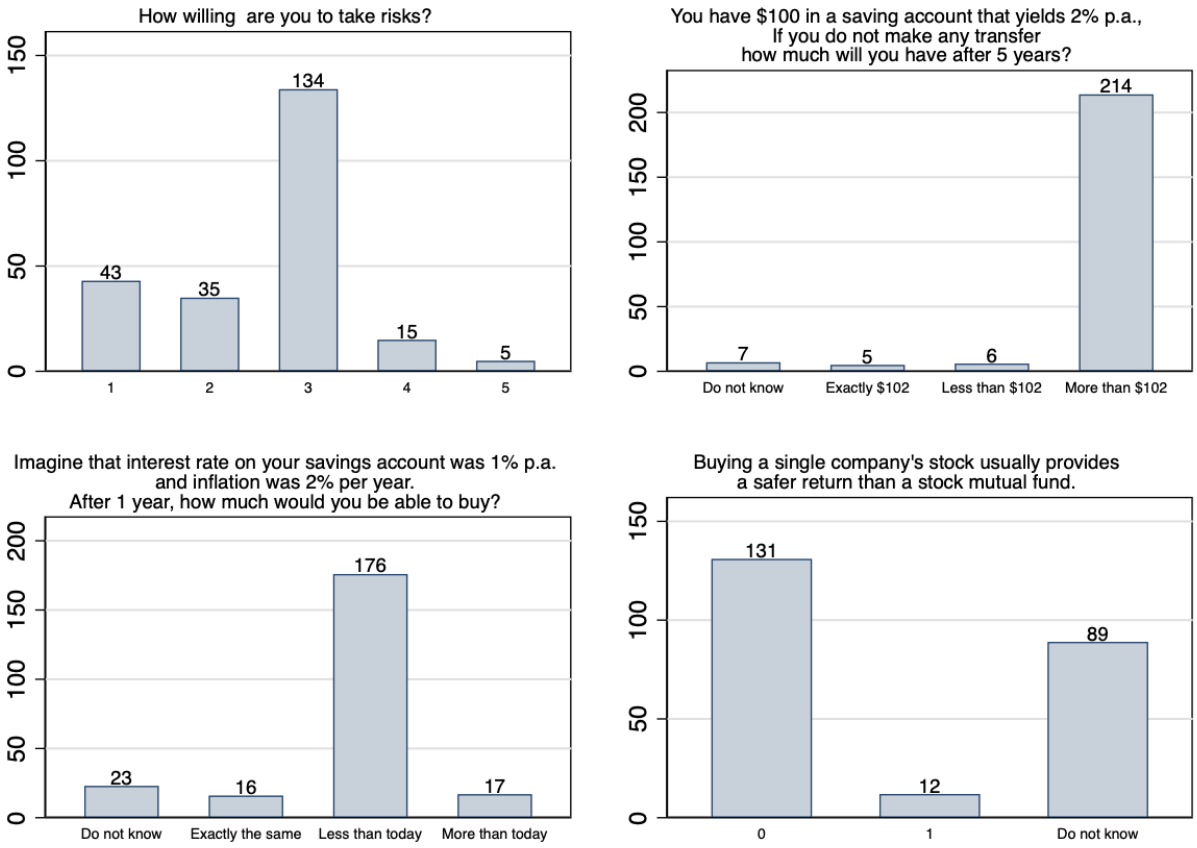


Figure A.8: The figure shows answers to risk preferences and financial literacy questions from the Qualtrics Survey (Q1 to Q4 in section 2 of the survey, see Appendix B).

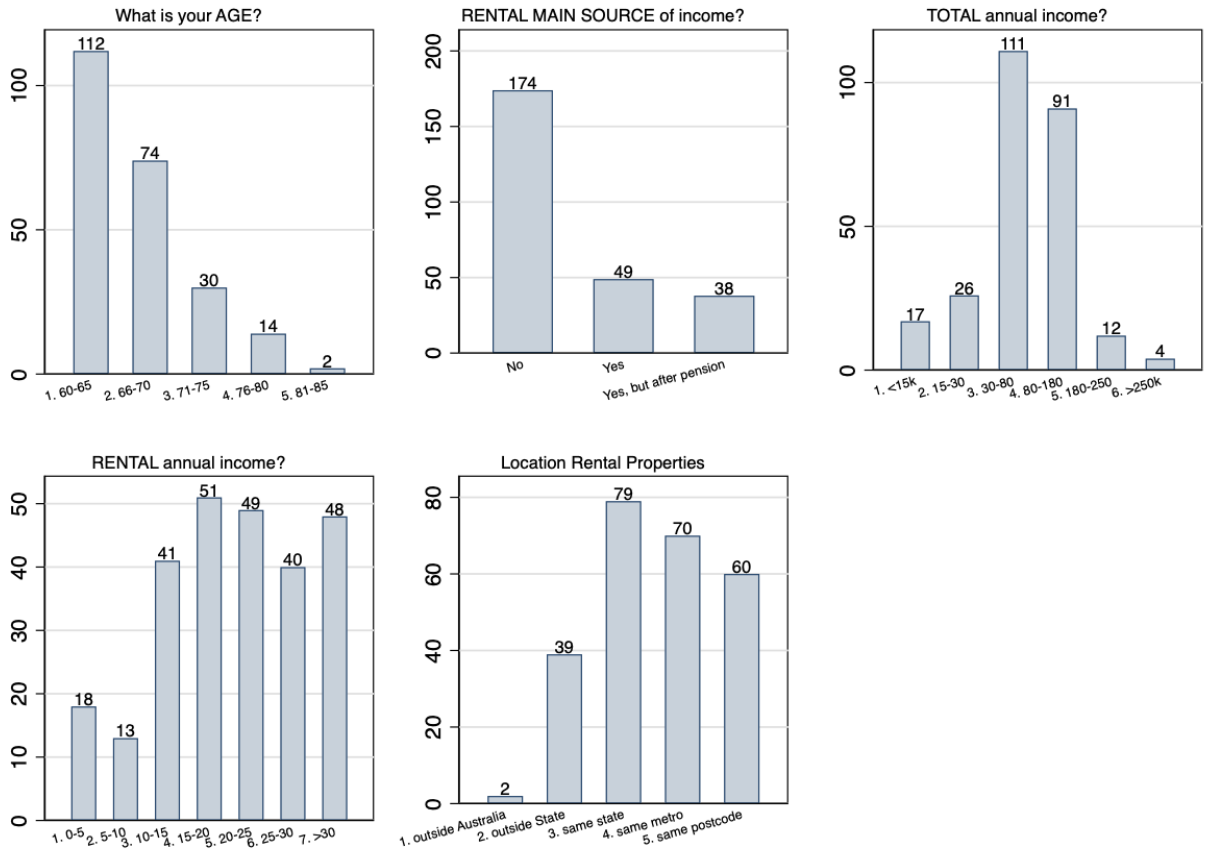


Figure A.9: The figure shows answers to questions on landlord characteristics from the Qualtrics Survey (Q1 to Q6 in section 3 of the survey, see Appendix B).

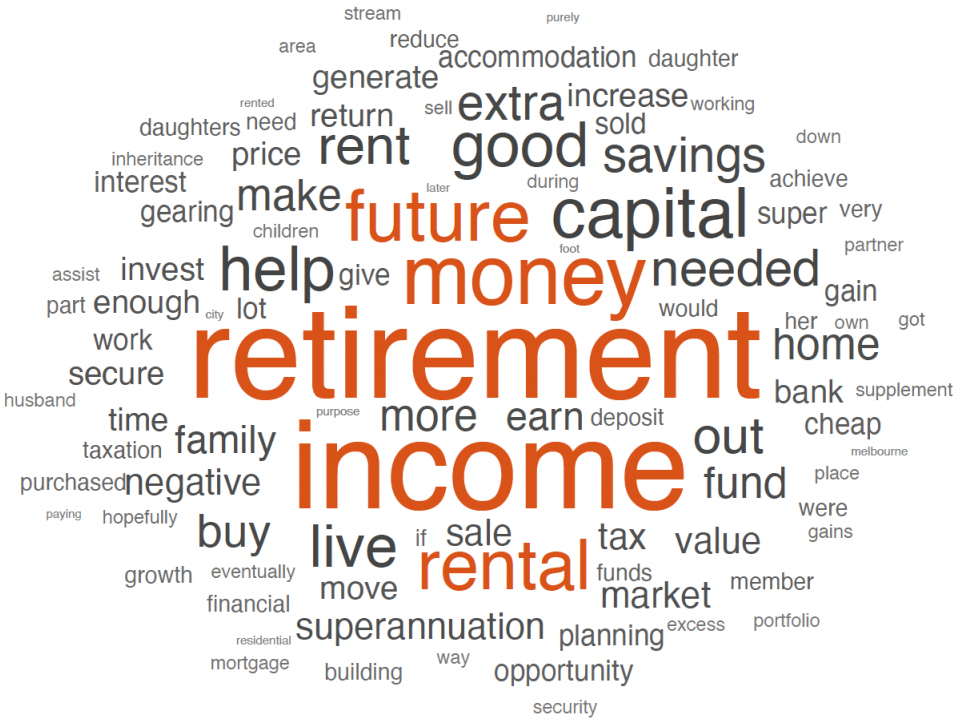


Figure A.10: The figure shows a word cloud summarizing keywords in the answers to the open question on the reason for buying rental properties, in the Qualtrics Survey (Q2 in section 1 of the survey, see Appendix B).

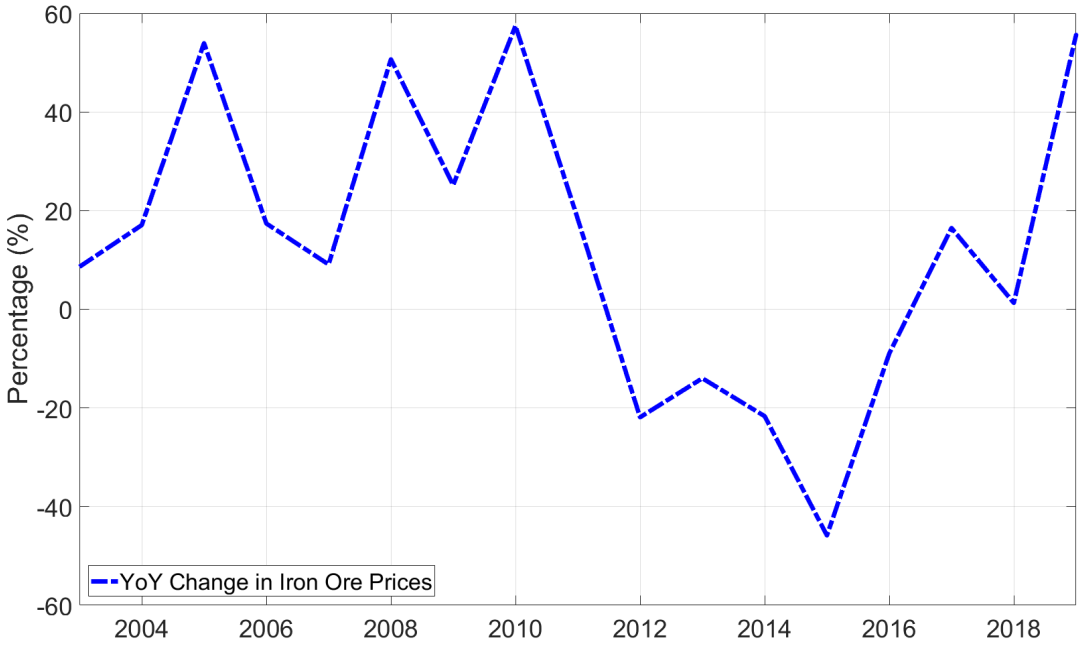


Figure A.11: The figure reports year-over-year percentage changes in iron ore prices (in year t, this is the change between year $t-1$ and t). Years are aligned with Australian fiscal years, and so begin in July and end in June. Iron ore prices are spot prices for shipments with 62% Fe content to Chinese ports (specifically, the CFR Tianjin port), and are quoted in terms of US Dollars per metric ton.

Table A.1: **Summary Statistics**

Panel A: New South Wales

	Avg	Std	1st	10th	25th	50th	75th	90th	99th
Price	612.26	798.11	0.00	185.00	300.00	460.00	710.00	1,120.00	3,000.00
Rent	2.07	1.16	0.65	1.08	1.43	1.82	2.38	3.20	6.49
Bedrooms	2.82	1.08	1.00	2.00	2.00	3.00	3.00	4.00	6.00
Bathrooms	1.51	0.70	1.00	1.00	1.00	1.00	2.00	2.00	4.00
Car spaces	1.58	1.01	1.00	1.00	1.00	1.00	2.00	2.00	5.00

Panel B: Victoria

	Avg	Std	1st	10th	25th	50th	75th	90th	99th
Price	448.65	586.64	0.00	0.00	200.00	355.00	559.80	850.00	2,260.00
Rent	1.67	0.84	0.63	0.97	1.21	1.52	1.91	2.47	4.76
Bedrooms	2.80	0.98	1.00	2.00	2.00	3.00	3.00	4.00	5.00
Bathrooms	1.49	0.62	1.00	1.00	1.00	1.00	2.00	2.00	3.00
Car spaces	1.69	1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00

Panel C: Western Australia

	Avg	Std	1st	10th	25th	50th	75th	90th	99th
Price	459.68	444.25	55.00	173.00	260.00	385.00	540.00	775.00	1,850.00
Rent	1.79	0.91	0.69	1.08	1.30	1.60	1.95	2.60	5.61
Bedrooms	2.79	1.33	0.00	0.00	2.00	3.00	4.00	4.00	5.00
Bathrooms	1.61	0.61	1.00	1.00	1.00	2.00	2.00	2.00	3.00
Car spaces	1.70	0.94	1.00	1.00	1.00	2.00	2.00	2.00	4.00

This table reports summary statistics for the characteristics of properties in the sales and rental listings data provided by Corelogic. For each characteristic, we report the mean, standard deviation, and the $1st$, $10th$, $25th$, $50th$, $75th$, $90th$ and $99th$ percentiles. *Price* is the sale price (in AUD thousands); *Rent* is the monthly asked rent (in AUD thousands); *Bedrooms*, *Bathrooms* and *Car spaces* are the number of bedrooms, the number of bathrooms and car spaces.

Table A.2: **Interest Rates and Fraction of Landlords: Urban Areas**

	(1)	(2)	(3)
CD_{6m}	-0.581***		
	(-10.52)		
$Bond_{2yr}$		-0.668***	
		(-10.62)	
$Bond_{10yr}$			-0.854***
			(-7.16)
Postcode HP	-0.010**	-0.010**	-0.011***
	(-2.84)	(-2.85)	(-3.01)
Mtg Credit Spread	0.375***	0.119	-0.198
	(3.35)	(0.91)	(-0.87)
Stock Div Yld	-1.567***	-1.659***	-1.482***
	(-5.66)	(-6.06)	(-3.96)
Stock Mkt Ret	-0.013*	-0.010	-0.015
	(-1.93)	(-1.42)	(-1.62)
Bus Cond Index	-0.001	-0.005	-0.010
	(-0.12)	(-0.42)	(-0.55)
Postcode Pop	-0.032***	-0.034***	-0.040***
	(-4.45)	(-4.85)	(-4.87)
Postcode FE	YES	YES	YES
R^2_{adj}	0.927	0.927	0.911
N	20,052	20,052	20,052

This table reports estimates of the coefficients from the following regression equation, estimated on the sample of postcodes belonging to urban areas:

$$FracLL_{i,t} = \gamma y_t + \mathcal{B}X_{i,t} + \alpha_i + e_{i,t}$$

where $FracLL_{i,t}$ is the share of landlords (out of all tax-filing residents) in postcode i and fiscal year t; y_t is either the rate on 6-month CDs issued by Australian banks, or the yield on 2-year or 10-year Australian government bonds; α_i is a postcode fixed effect and $X_{i,t}$ is a vector of controls, including Stock Div Yld , the stock market dividend yield in year t; Stock Mkt Ret, the stock market return over year t; Bus Cond Index, the average value in year t of the Business Conditions Index published by the Australian Bureau of Statistics; Mtg Credit Spread, the mortgage credit spread in year t; Postcode Population, the growth in the number of residents in postcode i, between year $t-1$ and t and Postcode HP, the log house price growth in postcode i between year $t-1$ and t. Standard errors are double clustered by fiscal year and postcode.

Table A.3: **Interest Rates and Investment Activity: Urban Areas**

	(1)	(2)	(3)
	Panel A: Buy to Lease		
CD_{6m}	-1.759***		
	(-6.22)		
$Bond_{2yr}$		-1.984***	
		(-5.98)	
$Bond_{10yr}$			-2.427***
			(-4.50)
Controls	YES	YES	YES
Postcode FE	YES	YES	YES
R^2_{adj}	0.612	0.612	0.582
N	12,024	12,024	12,024
	Panel B: Buy to Resell (Flipping)		
CD_{6m}	0.283**		
	(2.88)		
$Bond_{2yr}$		0.346***	
		(3.13)	
$Bond_{10yr}$			0.491***
			(3.40)
Controls	YES	YES	YES
Postcode FE	YES	YES	YES
R^2_{adj}	0.172	0.173	0.176
N	12,024	12,024	12,024

This table reports estimates of the coefficients from the following regression equation, estimated on the sample of postcodes belonging to urban areas:

$$FracInv_{i,t} = \gamma y_t + \mathcal{B}X_{i,t} + \alpha_i + e_{i,t}$$

where $FracInv_{i,t}$ is the fraction of buy-to-let (Panel A) or buy-to-resell (Panel B) purchases out of all transactions in postcode i in fiscal year t. We identify a transaction as *buy-to-let* if the property is listed for rent within 9 months from the sale, while we identify it as *buy-to-resell* if the property is either listed for sale or sold within 9 months from the sale. y_t is either the rate on 6-month CDs issued by Australian banks, or the yield on 2-year or 10-year Australian government bonds; α_i is a postcode fixed effect and $X_{i,t}$ is a vector of controls, including Stock Div Yld , the stock market dividend yield in year t; Stock Mkt Ret, the stock market return over year t; Bus Cond Index, the average value in year t of the Business Conditions Index published by the Australian Bureau of Statistics; Mtg Credit Spread, the mortgage credit spread in year t; Postcode Population, the growth in the number of residents in postcode i, between year $t-1$ and t and Postcode HP, the log house price growth in postcode i between year $t-1$ and t. Standard errors are double clustered by year and postcode.

B Survey Questions

We report below the questionnaires for the surveys discussed in Section 5. We first report the full questionnaire for the survey administered to a sample of members of the Australian Landlords Association (ALA) between October 9 and October 30, 2023. Then, we report questions from Section 1 of the survey administered to a sample of Australian landlords selected by Qualtrics, between February 25 and March 5, 2024. Sections 2 and 3 of the Qualtrics survey are identical to the corresponding sections of the survey administered to ALA members.

ALA Survey Section 1 of 3: Motives for Purchasing a Rental Property

[Q1] Have you purchased at least one rental property between July 2006 and July 2019?

- ○ Yes
- ○ No

IF YES in Q1 is selected, show [Q2] and [Q3] below and then move to Section 2

[Q2] Why did you purchase a rental property? Describe the motives in plain words.
[Open text]

[Q3] Why did you purchase a rental property? Assess the relevance of these motives:

	Very Irrelevant	Irrelevant	Neutral	Important	Very Important
Future Capital Gains	○	○	○	○	○
Higher Equity from Primary Residence	○	○	○	○	○
Low Mortgage Rates	○	○	○	○	○
Low return on saving account	○	○	○	○	○
Additional income stream (positive gearing)	○	○	○	○	○
Negative gearing	○	○	○	○	○
Safety of Real Estate	○	○	○	○	○
Other	○	○	○	○	○

IF NO in [Q1] is selected, show [Q4] below

[Q4] Have you purchased at least one rental property

- ○ Only Before July 2006
- ○ Only After July 2019
- ○ Before July 2006 and After July 2019
- ○ I have never purchased a rental property

IF one of the first three choices in [Q4] is selected, show [Q5] and [Q6] below and then move to Section 2, otherwise, move directly to Section 2.

[Q5] Why did you purchase a rental property? Describe the motives in plain words.
[Open text]

[Q6] Why did you purchase a rental property? Assess the relevance of these motives:

	Very Irrelevant	Irrelevant	Neutral	Important	Very Important
Future Capital Gains	○	○	○	○	○
Higher Equity from Primary Residence	○	○	○	○	○
Low Mortgage Rates	○	○	○	○	○
Low return on saving account	○	○	○	○	○
Additional income stream (positive gearing)	○	○	○	○	○
Negative gearing	○	○	○	○	○
Safety of Real Estate	○	○	○	○	○

Other	○	○	○	○	○

Section 2 of 3: Preferences and Risk Aversion

[Q1] Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

- ○ More than $102
- ○ Exactly $102
- ○ Less than $102
- ○ Do not know

[Q2] Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

- ○ More than today
- ○ Exactly the same
- ○ Less than today
- ○ Do not know

[Q3] Please tell me whether this statement is true or false. *"Buying a single company's stock usually provides a safer return than a stock mutual fund."*

- ○ True
- ○ False
- ○ Do not know

[Q4] Thinking about how you allocate your investable assets, do you lean more towards risk or reward on a scale of 1 (minimum) to 5 (maximum)?

- ○ 1, I want to avoid risk at all costs, even if it means my assets won't grow as fast as I would like
- ○ 2
- ○ 3, I try to find an even balance between risk and reward
- ○ 4
- ○ 5, I want to grow my assets as fast as possible, even if it means taking on extra financial risk

Section 3 of 3: Demographics

[Q1] Are you retired?

- ○ Yes
- ○ No
- ○ Partially

[Q2] What is your AGE?

- ○ Younger than 30
- ○ Between 31 and 35
- ○ Between 36 and 40
- ○ Between 41 and 45
- ○ Between 46 and 50
- ○ Between 51 and 55
- ○ Between 56 and 60
- ○ Older than 60

[Q3] Is rental income your main source of income?

- ○ Yes
- ○ Yes, but after pension
- ○ No

[Q4] What is your total annual income?

- ○ Between $0 and $15,000
- ○ Between $15,0001 and $30,000
- ○ Between $30,0001 and $80,000
- ○ Between $80,0001 and $180,000
- ○ Between $180,001 and $250,000
- ○ More then $250,000

[Q5] What is your rental annual income?

- ○ Between $0 and $5,000
- ○ Between $5,001 and $10,000
- ○ Between $10,001 and $15,000
- ○ Between $15,001 and $20,000
- ○ Between $20,001 and $25,000
- ○ Between $25,001 and $30,000
- ○ More than $30,000

[Q6] The rental property/ies you purchased is (are) located

- ☐ In Australia, in the same postcode where you reside
- ☐ In Australia, in the same metropolitan area where you reside
- ☐ In Australia, in the same state where you reside
- ☐ In Australia, outside the state where you reside
- ☐ Outside Australia

[Q7] Did you purchase:

- ☐ From an owner-occupied
- ☐ From a previous landlord
- ☐ A new construction
- ☐ Other
- ☐ Do not know

Qualtrics Survey Filtering Questions

[Q1] Have you purchased at least one rental property between July 2006 and July 2019?

○ Yes

○ No

[Q2] What is your Age?

IF YES in Q1 is selected and Age is 60 or older, show the survey, otherwise exit.

Qualtrics Survey Section 1 of 3

[Q1] Why did you purchase this rental property? Describe the motives in plain words.

[Q2] How important was for you to earn investment income, in the form of rent payments?

- ○ Very Irrelevant
- ○ Irrelevant
- ○ Neutral
- ○ Important
- ○ Very Important

[Q3] Did you think that rental income would be a convenient way to pay for consumption in retirement?

- ○ Definitely not
- ○ Probably not
- ○ Maybe
- ○ Probably yes
- ○ Definitely yes

[Q4] What were your main source(s) of investment income before purchasing this property? Select up to two

- ☐ Dividends from stocks
- ☐ Interest from saving accounts
- ☐ Interest from government or corporate bonds
- ☐ Interest from money market instruments
- ☐ Rental Income
- ☐ Other (please specify)
- ☐ I did not have any investment income

[Q5] What did you find most appealing about rental income? Select up to two

- ☐ Monthly frequency of payments
- ☐ Safety and reliability of payments
- ☐ Larger payments than other investments
- ☐ Other (please specify) _____
- ☐ Rental income was not an important factor in my decision

[Q6] How did you fund your downpayment? Select up to two

- ☐ Liquidating some financial investments (stocks or bonds)
- ☐ Cash from saving accounts
- ☐ Sale of other properties
- ☐ Inheritance
- ☐ Other windfalls or job termination payments
- ☐ Superannuition
- ☐ Other (please specify) _____

C Quantitative Portfolio Model

C.1 Framework

We consider a finitely lived individual, with maximum age $T(d)$ and retirement age $T(r)$. We assume the individual has constant relative risk aversion preferences (CRRA), and we model her decisions starting from period $t0$. The utility function is:

$$U_t = \frac{c_t^{1-\gamma}}{1-\gamma} + \beta E_t[U_{t+1}] \qquad if \quad t0 \leq t < T(d)$$
$$U_t = B\frac{W_t^{1-\gamma}}{1-\gamma} \qquad if \quad t = T(d)$$

where γ is the coefficient of relative risk aversion, β accounts for time preferences, and c_t is consumption in period t. In the last period, the individual receives utility from her bequest wealth W_t, with bequest motive captured by the coefficient B. The individual is endowed with an exogenous income process. Before retirement ($t \leq T(r)$) income dynamics are:

$$Y_{t+1} = e^{(z_{t+1} + f_y^l \sigma_l e_{t+1}^l)},$$
$$z_{t+1} = \mu_z + \rho z_t + \sigma_z e_{t+1}^z,$$

where z_{t+1} is a persistent shock and e_{t+1}^l is a transitory shock. The transitory shock affects both income and, as discussed below, rents. It can be interpreted as a temporary shocks taking place in the area in which the individual resides, and affecting local economic conditions. After retirement ($t > T(r)$), $Y_t = Y_{retire} = \alpha Y_{T(r)}$, with $\alpha \in (0, 1)$. Thus, in retirement the income flow is risk-free, but lower than the realization of the income process in the period of retirement.

In each period t the individual can invest her savings in a money market account, with risk free return $R^{rf} = (1 + r^{rf})$, and in the stock market, with stochastic return R_{t+1}^E. Stock market return dynamics are:

$$R_{t+1}^E = e^{(\mu_E + \sigma_E e_{t+1}^E)},$$

If the individual is a landlord, she earns returns from her rental property, in the form of rental income and capital gains. Rental income is earned every period, and follows the dynamics:

$$Rent^h_{t+1} = P_{h,t0} RY_h e^{\left(\mu_h (t-t0) + f^l_h \sigma_l e^l_{t+1}\right)},$$

where $P_{h,t0}$ is the price at which the property is purchased, in period $t0$. RY_h is the rental yield at purchase, μ_h is the expected growth rate of rents and prices, and e^l_{t+1} is the local temporary shock, common to income and rents. The house cannot be sold, and the landlord is only affected by the realization of the price in the final period $T(d)$, because of bequest. In this final period the house price is equal to:

$$P_{h,T(d)} = P_{h,t0} e^{\left(\mu_h (T(d)-t0-1) + \sum_{\tau=1}^{T(d)-t0-1} \sigma_h e_{h,\tau} + \sigma_{h,idio} e_{h,idio}\right)},$$

where $e_{h,\tau}$ captures aggregate house price shocks, and $e_{h,idio}$ is idiosyncratic housing risk. Consistent with the findings in Giacoletti (2021), we model idiosyncratic risk as a single shock realized at the time of sale.

We assume that the persistent shock to labor income (e^z_{t+1}), the local shock (e^l_{t+1}), and shocks to stock returns (e^E_{t+1}), and rental housing ($e_{h,\tau}$ and $e_{h,idio}$) are *i.i.d.* and uncorrelated.

C.2 Optimization Problem

We present here the optimization problems faced but an individual who is not, and is a landlord. If the individual is not a landlord, the value function is:

$$V_{NL,t}(\theta_t, y_t) = \underset{c_t, we_t}{max} \frac{c_t^{1-\gamma}}{1-\gamma} + E_t\left[\beta V_{NL,t+1}(\theta_{t+1}, y_{t+1})\right], \qquad if \quad t0 \leq t < T(d)$$

$$V_{NL,t}(\theta_t) = B\frac{\theta_t^{1-\gamma}}{1-\gamma}, \qquad if \quad t = T(d)$$

$Subject\ to:$

$$c_t \geq 0, \;\; we_t \geq 0, \;\; \rho_{rf,t} \geq 0,$$

$$\theta_t^{'} = Y_t(1-\delta) + \theta_t,$$

$$c_t^{'} = \theta_t^{'}(1 - we_t) - \rho_{rf,t},$$

$$c_t = \begin{cases} c_t^{'} & if \quad c_t^{'} \leq Y_t(1-\delta) + \theta_t Yld_\theta, \\ c_t^{'} - \phi\left(c_t^{'} - Y_t(1-\delta) - \theta_t^{'} Yld_\theta\right) & if \quad c_t^{'} > Y_t(1-\delta) + \theta_t Yld_\theta \end{cases}$$

$$\theta_{t+1} = \theta_t^{'} we_t R_{t+1}^E + \rho_{rf,t} R^{rf}.$$

In the framework above, θ_t is financial (liquid) wealth, we_t is the share of liquid wealth invested in equity, and $\rho_{rf,t}$ is the amount invested in money market accounts paying the risk-free rate. Terminal wealth in period $T(d)$ is equal to liquid wealth. Y_t is labor (or pension) income, as explained in the previous section, and δ is the fraction of income that has to be allocated to recurring expenses (for example, owner-occupied housing). Yld_θ is the share of liquid wealth that consists of investment income payments from period $t-1$.

Finally, ϕ captures the costs, or dis-utility, attached to using financial wealth for consumption spending. This is one of the critical parameters in our setting, since it determines the individual's preference for income-paying assets.

The optimization problem can be summarized as follows. In each period, the individual is endowed with liquid wealth (θ_t) and income (Y_t). The individual chooses what part of

this combined endowment ($\theta_t^{'}$) she intends to consume, and what share she intends to invest in stocks. The remainder is allocated to the money market account ($\rho_{rf,t}$). Consumption is impacted by a preference for consuming from income. When consumption spending ($c_t^{'}$) is smaller than total income received in period t, consumption spending equals goods consumption ($c_t = c_t^{'}$). However, if consumption spending exceeds total income, then goods consumption is smaller than spending ($c_t < c_t^{'}$). This gap is due to frictions experienced when consuming invested wealth, and is captured by the parameter ϕ. Total income has two components. Labor or pension income net of expenses $Y_t(1-\delta)$ and investment income from liquid wealth ($\theta_t Yld_\theta$).

When the individual is a landlord, the value function becomes:

$$V_{L,t}(\theta_t, y_t) = \underset{c_t, we_t}{max} \frac{c_t^{1-\gamma}}{1-\gamma} + E_t\left[\beta V_{L,t+1}(\theta_{t+1}, y_{t+1})\right], \qquad if \quad t0 \leq t < T(d)$$

$$V_{L,t}(\theta_t) = B\frac{(\theta_t + P_{h,t})^{1-\gamma}}{1-\gamma}, \qquad if \quad t = T(d)$$

Subject to :

$$c_t \geq 0, \;\; we_t \geq 0, \;\; \rho_{rf,t} \geq 0,$$

$$\theta_t^{'} = Y_t(1-\delta) + \theta_t + Rent_t^h,$$

$$c_t^{'} = \theta_t^{'}(1 - we_t) - \rho_{rf,t},$$

$$c_t = \begin{cases} c_t^{'} & if \quad c_t^{'} \leq Y_t(1-\delta) + \theta_t Yld_\theta + Rent_t^h, \\ c_t^{'} - \phi\left(c_t^{'} - Y_t(1-\delta) - \theta_t Yld_\theta - Rent_t^h\right) & if \quad c_t^{'} > Y_t(1-\delta) + \theta_t Yld_\theta + Rent_t^h, \end{cases}$$

$$\theta_{t+1} = \theta_t^{'} we_t R_{t+1}^E + \rho_{rf,t} R^{rf}.$$

The optimization problem is similar to the one for the non-landlord, but with some key differences. First, terminal wealth consists of both the terminal value of liquid wealth and the resales price of the house. Second, the landlord earns rental income $Rent_t^h$, which follows the dynamics described in the previous section. Then, total income received in period t consists of labor or pension income, plus investment income from liquid wealth, plus rental income.

C.3 Calibration and Solution

This section discusses the calibration of the stochastic processes and parameters in the framework presented in the previous two sections. All key parameter values are summarized below in Table C.1. We choose $t0$ to correspond to age 65 of the individual, while $T(r)$ is set to age 68 (typically the upper bound of retirement age for Austalians), and $T(d)$ is equal to 83.[1]

The persistent component of the income process is calibrated to have annual baseline growth (μ_z) of 3% and mean reversion of 0.95 (ρ_z). The baseline growth matches long-term output growth. We set the volatility of the shock (σ_z) to be equal to 10%. The values of ρ_z and σ_z are consistent with calibrations previously used in the literature (Meghir and Pistaferri, 2011). Finally, we calibrate the local shock to have standard deviation (σ_l) of 3.3%. Income exposure to this shock (f_y) is 0.05, consistent with our estimates of the effects of local shocks on labor income, reported in Table 8. After retirement, labor income drops to 50% of income from the retirement period ($\alpha = 0.5$). The parameter δ, which measures living expenses (such as own-housing costs), fees, and taxes, is set to 35%.

We calibrate the risk free rate to be equal to 2%, which matches 6-month CDs rates and short-term bond yields in 2017-2019. We set the expected rate of return on the stock market equal to 8%, and return volatility equal to 12%, which are standard values used in the literature.

For rental housing, we set the expected growth rate of prices and rents equal to 3%, roughly consistent with what observed in the data in the latter part of our sample. We set rental yields net of expenses equal to 4.5%.[2] Thus, the total return for the rental property is 7.5%, which is roughly consistent with what observed in the data in the latter part of the sample period of our analysis. The annual volatility of house prices is 10% (σ_h), while the volatility of the idiosyncratic shock is also 10% ($\sigma_{h,idio}$). This last parameter is calibrated using the standard

[1] Age 83 is life expectancy in Australia as of 2020-2022, based on data from the Australian Bureau of Statistics available at https://www.abs.gov.au/statistics/people/population/life-expectancy/latest-release.

[2] Figure 1 in the paper shows that the average gross yield across Australian postcodes is 5%. However, results in the paper show that landlords are more likely to purchase in areas with above average yields. The net yield of 4.5% would likely translate to a gross yield of roughly 6.5% once management expense, recurring maintenance, and taxes are accounted for.

deviation of residuals from hedonic regressions.

For what concerns preference parameters, we set the time preference coefficient (β) equal to 0.98, and the coefficient of relative risk aversion (γ) equal to 5. This is in line with Piazzesi, Schneider, and Tuzel (2007) and Piazzesi, Schneider, and Landvoigt (2015), who choose this value based on estimates from Hall (1988). The bequest coefficient (B) is set to 1.5, after eye-balling consumption and asset allocation patterns, to ensure that retirees consumption is not unrealistically high.

Some key coefficients of interest are the share of investment income out of total liquid wealth (Yld_θ), and the cost experienced when consumption spending exceeds total income (ϕ). We set the former equal to 2%. This implies that liquid assets (both stocks and the money market fund) pay a yield of approximately 2%. We solve the model for four values of the cost ϕ: 0 (no frictions), 0.10, 0.25, and 0.33. Section 6 in the paper discusses how different values of this parameter affect the comparison between landlords and non-landlords discounted utility.

The model is solved numerically, optimizing over the space of decision variables using grid search, and then implementing backward induction. We refer to the Appendices in Cocco (2005) and Campanale, Fugazza, and Gomes (2015) for further details, and to Judd, Maliar, and Maliar (2011) for the quadrature method used to discretize and integrate stochastic variables.

Table C.1: **Model Calibration**

Stochastic Variables		Preferences and Other Parameters	
μ_z	0.03	γ	5
ρ_z	0.95	β	0.98
σ_z	0.10	B	1.5
f_y^l	0.05	r_{rf}	0.02
σ_l	0.033	RY_h	0.045
μ_e	0.08	ϕ	{0,0.1,0.25,0.33}
σ_e	0.12	Yld_θ	0.02
μ_h	0.03	δ	0.35
σ_h	0.10	α	0.5
$\sigma_{h,idio}$	0.10	$\{T(r), T(d)\}$	{68,83}
f_h^l	0.25	$t0$	65

This table reports the calibrated values of the key parameters in the quantitative portfolio model (see Sections C.1 and C.2). The values of the parameters governing stochastic process and periodic payments are at annual frequency.