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Authors:
Ella Getz Wold
Knut Are Aastveit
Eirik Eylands Brandsaas
Ragnar Enger Juelsrud
Gisle James Natvik

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The housing channel of intergenerational wealth persistence*

Ella Getz Wold[†] Knut Are Aastveit[‡] Eirik Eylands Brandsaas[§]
Ragnar Enger Juelsrud[¶] Gisle James Natvik[‖]

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Abstract

We use Norwegian tax data and a life-cycle model with housing to study how wealth transmits across generations through the housing market. After controlling for a rich set of attributes, households with richer parents are nearly 15% more likely to be homeowners at age 30. Moreover, when entering, they have higher leverage and buy homes worth 15% more. Estimates using international stock market returns as a shift-share instrument support a causal interpretation. We further document that housing outcomes when young are important determinants of midlife wealth. This holds also when using plausibly exogenous variation in homeownership caused by the timing of intra-family deaths. As a result, housing gaps caused purely by parental wealth explain 12% of intergenerational wealth persistence, making housing equally important as the combined impact of a wide range of household characteristics including income and education. We explore new mechanisms for parental support, such as intra-family housing transactions below market value. Through the lens of our model, house price *expectations* stand out as a key driver of the magnitude of the housing channel of intergenerational wealth persistence.

Keywords: Housing market, intergenerational wealth, wealth inequality
JEL Codes: D31, E24, G51, R21

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[†]BI Norwegian Business School. Email: ella.g.wold@bi.no
[‡]Norges Bank and BI Norwegian Business School. Email: knut-are-aastveit@norges-bank.no
[§]Board of Governors of the Federal Reserve System. Email: eirik.e.brandsaas@frb.gov
[¶]Norges Bank. Email: ragnar.juelsrud@norges-bank.no
[‖]Norges Bank and BI Norwegian Business School. Email: gisle.j.natvik@bi.no

1 Introduction

Many parents continue to financially support their children as they enter adulthood – either indirectly or directly. The housing market stands out as especially attractive for parental support as i) barriers to entry make parental support key to early homeownership, and ii) high leverage in housing investments amplifies returns to equity. More than 40% of homeowners in the United States report receiving financial support from parents in order to buy a home. The same holds in Norway, the setting of our study.[1] In this paper we first study how parental wealth affects child housing outcomes, and second, to what extent these housing outcomes increase later-in-life wealth. Together, these two effects pin down the *housing channel* of intergenerational wealth persistence.

To illustrate how important housing can be for wealth accumulation, consider a numerical example using the actual evolution of asset prices. Imagine investing \$100 in stocks or the Norwegian housing market in the early 1990s. Crucially, and in line with the data, the housing investment is initially levered at 0.9, whereas the stock purchase is not. Twenty-five years later, the \$100 has grown to \$6,000 in the housing market, compared to \$4,600 in the stock market (with the equivalent of mortgage payments re-invested each year).[2] In this simple example, the owner stays in the home throughout and pays down the mortgage uniformly, yielding an average leverage of only 0.26 over the 25 years of our thought experiment. If the household instead re-invests in more expensive housing over time, as young people typically do, the housing return will be *substantially* higher.

The high return on equity in the housing market applies to everyone – irrespective of parent wealth. Still, substantial barriers to entry means that housing can be important for intergenerational wealth persistence. First, housing is generally indivisible. Second, buying or selling a home entails sizable transaction costs. Third, and perhaps most importantly, lenders apply borrowing constraints, such as loan-to-value and debt-to-income caps. Frictions thus prevent many young households from accessing the relatively high returns that the housing market provides. This creates a natural role for affluent parents to support their offspring in the housing market, by accelerating entry and facilitating higher home investments relative to income. As our numerical example illustrates, the consequences for later-in-life wealth can be large.

In this paper, we use Norwegian tax data merged with housing transactions data from

[1] These numbers are based on an online survey we performed on homeowners below the age of 50 using the platform Survey Monkey, see Appendix Figure A.1. The share is similar to that in other surveys.

[2] Specifically, we assume an additional amount equal to the debt servicing costs of the mortgage is re-invested each year when calculating the return on the stock investment. For detailed calculations, see Appendix B.

the Land Registry to study the importance of parental wealth for housing market outcomes and thereby midlife wealth. To complement the administrative data we also perform surveys in Norway and the US on financial support from parents to child. To better understand why parental wealth matters, we document several mechanism and assess their quantitative importance. Thereafter, we build a life-cycle model with housing that fits the empirical patterns and use it to assess the importance of house price growth and mortgage regulation for the magnitude of the housing channel of intergenerational wealth persistence.

We first document large gaps in housing outcomes by parental wealth. Our baseline wealth measure is simply an indicator for whether within-cohort parental wealth is in the upper half of the wealth distribution, although we also consider percentile wealth ranks for robustness. We show that households with richer parents are 15 percentage points (≈30%) more likely to be homeowners at age 30. Conditional on entering the housing market, they buy homes that are worth \$60 000 (≈30%) more and are eight percentage points (≈10%) more leveraged. We refer to these differences as "housing gaps". The documented housing gaps serve as our starting point for making four distinct contributions to the existing literature.

Our first contribution is to document the impact of parent wealth on housing outcomes, using a structural mediation analysis (a statistical decomposition) and a shift-share instrument for parental wealth. We decompose the housing gaps into three components or mediators: *pure parental wealth*, *other parental attributes* and *household attributes*. This is useful, as it allows us to determine not only the relative importance of different attributes and how it has evolved over time, but also determine why certain attributes are important. Specifically, an attribute can be important if there is a large gap in this attribute or because it has a large impact on housing outcomes.

Our mediation analysis attributes nearly half of the observed gaps in homeownership and purchase price to parental wealth, and the other half to household attributes. For leverage however, parental wealth alone explains the entire gap. Other parental attributes have modest importance. This means that even after accounting for a wide set of parental and household characteristics, we still find that households with richer parents are nearly 15% more likely to be homeowners at age 30. Moreover, conditional on entering, they buy homes that are worth 15% more and are nearly 10% more levered.

If unobservable variables correlated with parental wealth have direct impacts on housing outcomes, this could bias our results. We therefore exploit plausibly exogenous variation in parent wealth resulting from international stock market returns interacted with lagged stock market exposure in a shift-share analysis. The estimated impact of parental wealth on entry probabilities aligns quantitatively with the pure parental wealth component identified in the mediation analysis, supporting a causal interpretation of our findings.

Our second contribution is to document the impact of housing outcomes on intergenerational wealth persistence, again using a structural mediation analysis and an instrumental variable approach based on the timing of intra-family deaths. We decompose the wealth persistence into a *pure parental wealth* channel, an *other parental attributes* channel, a *household attributes* channel, and a *housing* channel.

For the housing channel to be important, two conditions must be satisfied. First, housing outcomes must be highly correlated with parental wealth (our first contribution). Second, housing outcomes must have a substantial impact on wealth accumulation. We find that households with richer parents are 15 percentage points (=35%) more likely to themselves be wealthy at midlife. More than 1/4 of this intergenerational wealth persistence is accounted for by earlier homeownership for households with richer parents. Of the homeownership effect, roughly half is due solely to the impact of parental wealth on housing. This impact is large, equal in size to the combined effect of parental wealth on household income, education, location and number of household members.

If unobservable variables correlated with housing outcomes have direct impacts on midlife wealth, this could bias our results. We therefore exploit plausibly exogenous variation in the *timing* of housing market entry caused by the *timing* of intra-family deaths. The estimated impact of entry age aligns quantitatively with the mediation analysis, supporting a causal interpretation of our findings.

Our third contribution is to uncover through which mechanisms parental wealth affects housing outcomes. We consider a novel channel referred to as intra-family sales. Richer parents are 60% more likely to co-purchase a house with a child, and nearly 10% more likely to sell a house directly to a child. Homes sold by parents to their offspring have an estimated price discount of 25%. Moreover, as previously established for other countries, e.g. Guiso and Jappelli (2002), we find evidence supportive of direct wealth transfers. Finally, following Benetton et al. (2022), we show that parental equity extraction is positively correlated with entry in the housing market. We extend their results and document that the importance of this channel varies with parental wealth – also when conditioning on homeownership. To quantify the importance of the mechanisms considered, we perform back-of-the-envelope calculations based on i) the share of parents who engage in each mechanism, and ii) the impact on children's entry probabilities. We find that the mechanisms discussed can explain more than half of the impact of parental wealth on offsprings' housing outcomes.

Our fourth contribution is to use a standard life-cycle model with housing and exogenous parental wealth to i) show that our empirical findings can be recovered under a standard calibration and ii) assess counterfactual scenarios. We model parental support as a financial transfer in early adulthood, and pick the transfer size in the model to match the empirical magnitude of the housing channel of intergenerational wealth persistence (contribution 2), which results in plausible transfer magnitudes. Having shown that a standard model augmented to include exogenous parental wealth can replicate the empirical estimates, we move on to a counterfactual analysis in which we change (expected) house prices and mortgage market regulation. This is interesting for at least two reasons. First, policy makers have a number of tools they can use to influence these factors. Second, these factors vary substantially across both time and space, making them important for thinking about external validity and what we can expect of the housing channel of intergenerational wealth persistence moving forward.

Our model findings suggest that while *realized* house price growth has a modest impact on the housing channel, *expected* house price growth has a substantial impact. Lowering house price expectations and allowing households to adjust their portfolios and leverage in response to these expectations substantially reduces the housing channel of intergenerational wealth persistence. This is driven by a large reduction in the impact of parent support on homeownership, as homeownership – especially at early ages – becomes less attractive. As a second counterfactual scenario, we use the model to evaluate how the housing channel of intergenerational wealth persistence depends on mortgage regulation. Tighter mortgage regulation, especially stricter loan-to-value limits, increases the importance of parental support, thereby strengthening the housing channel of intergenerational wealth persistence.

Related literature

Our paper lies at the intersection of three distinct literatures, which study i) the persistence of wealth across generations, ii) the importance of parents for child housing market outcomes, and iii) the relevance of housing outcomes for later-in-life wealth. In this paper, we lean on the combined insights of these three literatures, and offer the first decomposition and quantification of the housing channel of intergenerational wealth persistence.

First, several studies have documented that wealthy parents tend to have wealthy children. See for instance Chiteji and Stafford (1999), Charles and Hurst (2003), Boserup et al. (2016), Black et al. (2017), Adermon et al. (2018) and Fagereng et al. (2021). We contribute by focusing on the *housing* market as a key driver of wealth persistence across generations. Because the housing market is heavily regulated, policy makers have ample room to affect intergenerational wealth persistence working though housing.

Second, a number of papers have shown that parents matter for children's housing market outcomes. Most of these studies – including Engelhardt and Mayer (1998), Guiso and Jappelli (2002), Luea (2008), Kolodziejczyk and Leth-Petersen (2013), Blickle and Brown

(2019), Brandsaas (2021) and Boileau and Sturrock (2023) – focus on the impact of parental *transfers* on housing market entry. Relatedly, Benetton et al. (2022) study the importance of parental home equity extraction. Halvorsen and Lindquist (2017), Lee et al. (2020) and Bond and Eriksen (2021) document a positive correlation between parental wealth and entry into the housing market, while Daysal et al. (2023) show that increases to parental housing wealth passes through to child housing wealth. We contribute by taking a broader approach, focusing not only on parental transfers or one single mechanism, but on the causal influence of parental wealth in general. This is crucial, as it allows us to quantify how important housing is for intergenerational wealth persistence. We also document novel mechanisms, and assess the quantitative importance of each mechanism.

Finally, there exists a somewhat smaller literature establishing the importance of housing and mortgage decisions for wealth accumulation over the life cycle. Using Norwegian data, Eggum and Larsen (2023) show that capital gains on housing are important for wealth inequality. Di et al. (2007) and Turner and Luea (2009) show that homeownership status is important for wealth accumulation using PSID data, while Bach et al. (2020) use Swedish tax data and find that housing and mortgage choices taken while young are key determinants of households' position in the wealth distribution at retirement. Relatedly, Bernstein and Koudijs (2020) document the "critical importance" of mortgage decisions for household wealth building. We contribute by using plausibly exogenous variation in age of entry caused by the timing of intra-family deaths to quantify the impact of entry age on midlife wealth, and by isolating the impact which is working through *parent* wealth.

2 Data

In this section we present the register data which is the basis of our empirical analysis and two online surveys we conducted to complement the register data.

2.1 Register data

We use Norwegian administrative data from Statistics Norway, merged with housing transaction data from the Land Registry. The former provides household balance sheet information and allows us to link parents and children. The latter gives us accurate information on housing transactions and allows us to follow the ownership of specific houses over time. In this section we discuss sample selection and the measurement of key variables, and provide some summary statistics of special interest.

Sample construction We start out with a sample of 3.4 million individuals aged 18 or older, for whom we know the identity of their parents. We then keep only the individuals for whom we observe parental wealth when the child household is 19-21 years old, meaning that both parents are alive and file taxes in Norway. Because our tax data start in 1992, the oldest (child) individual included in our sample will be born in 1972. This reduces the number of individuals in our sample quite substantially.

We proceed by collapsing the data to the household level, using the household identifiers available since 2004. Household age and household education are defined as the average value across all (adult) household members. Most other variables – such as income and wealth – are defined as the sum across all households members. For parental variables, we define parental wealth and income as the sum across the mother and father. For households with two adult members, we take the average of parental wealth and income across the two sets of parents when collapsing to the household level. The individual house purchase value is defined as the purchase price times the ownership share. The house purchase value of the household is found by summing over the individual house purchase values. We define parents as living in a big city if at least one household member has parents living in a big city. Collapsing the data to the household level leaves us with 1.5 million households in the period 2004-2017.

Measurement of main variables Our main dependent variables are different housing market outcomes and other forms of wealth. Prior to 2010, we do not observe housing wealth directly. We therefore define households as homeowners if they have real wealth above a minimum level, set to capture the value of the cheapest available housing. From 2010 and onward we observe housing wealth directly, and we define a household as a homeowner if it has above-zero primary housing wealth. We classify a household as entering the housing market in year t if i) the household purchases a home in year t, and ii) the household was not a homeowner in year $t-1$. House purchases, as well as purchase prices, are precisely measured in the housing transactions data. Loan-to-value ratios are not directly observed, but computed by dividing the house purchase price by total debt.

We use two main measures of parental wealth, both of which capture gross financial wealth, but at different times. First, we construct a time-invariant parental wealth indicator p_i^{w20}, based on the three-year average of parental wealth around the time when the (child) household is 20 years old. $p_i^{w20} = 1$ if parental wealth for household i is in the upper half of the wealth distribution within child-cohort, and zero otherwise. Second, we construct a time-varying indicator of parental wealth $p_{i,t}^{w}$, which is equal to one if parental wealth in year t is above the year-specific median.

We also use an indicator of "midlife" net household wealth, based on the sum of financial wealth and real wealth net of debt. As discussed above, the oldest (child) individual in our sample is born in 1972, making him or her 45 years old in 2017 – the last year of our sample. To ensure that we observe midlife wealth for a non-trivial share of our sample, we measure it at age 40-42. Hence, midlife wealth $\bar{w}_i = 1$ if net household wealth in the household's early 40s is above the year-specific median, and zero otherwise. For robustness purposes, we also measure household and parental wealth by calculating their percentile rank in the wealth distribution, within years and controlling for age effects.

In Section 3.2 we rely on the interaction of stock wealth shares and international stock market returns as an instrument for parent wealth. Specifically, we instrument for $p^w_{i,t}$ using stock-share$_{i,t-1} \times r_t$, in which stock-share$_{i,t-1}$ is measured as the share of non-deposit financial wealth relative to total financial wealth and r_t captures the return on the S&P500 stock market index.[3] For our event study on grandparent death in Section 4.2, we consider the death of any of the grandparents for any adult member of the household, based on year-of-death data. We constrict the sample to households with exactly one observed grandparent death.

Several control variables are included in the analysis. In terms of household characteristics, we always control for income, education, location[4] and number of adult household members, i.e. co-habitation. When collapsing to the household level, we use the average of individual education measures. When not superfluous, we also control for household age. In some specifications we control for household financial wealth, although the partly mechanical relationship between housing wealth and financial wealth could be an issue (Chetty et al., 2017). However, whether financial wealth is included as a control or not has virtually no impact on our results. We also report results where we control for the household risky asset share and two-year future income growth. In terms of parental characteristics, we control for total income, average maximum education obtained, current location, number of children (i.e. number of siblings for the (child) household) and – as a robustness – the risky asset share.

Summary statistics Summary statistics for the last year in our sample are provided by parental wealth status in Table 1. When the (child) household is 20 years old, richer parents on average have financial wealth of $60,000 per person, compared to $6,000 for

[3]We measure stock market exposure by gross financial wealth less deposits. As shown in Fagereng et al. (2020), almost all of non-deposit financial assets for Norwegian households is stocks and mutual funds.

[4]For indicator variables such as education and location, we use dummy variables such as "big city" and "higher education". The reason is that in the upcoming mediation analysis, these variables will also enter on the left hand side in the regressions. The results are robust to controlling for more fine-grained measures of location and educational outcomes.

poorer parents. In terms of household characteristics, those with richer parents have about twice as much financial wealth as those with poorer parents. They are also eleven percentage points more likely to be homeowners and earn \$5,000 more. The number of siblings does not differ by parental wealth. Households with richer parents have somewhat more adult household members, reflecting a higher probability of co-habitating.

	Full sample	Low parental wealth	High parental wealth
p^{w20}	0.5	0	1
Parent financial wealth^{20} (USD)	32,000	6,000	60,000
Financial wealth$_t$ (USD)	21,000	14,000	27,000
Homeowner$_t$ (%)	47	41	52
Total income$_t$ (USD)	45,000	42,000	47,000
Max education	4.6	4.3	4.9
Age	30	30	29
Household members	1.3	1.2	1.4
Siblings	1.7	1.7	1.7
N	837,260	474,564	481,399

Table 1: Summary statistics 2017. Average (per capita) values.

Notes: Low (high) parental wealth means parental financial wealth at household age 19-21 is below (above) the year-specific median. The homeownership indicator takes a value of one if at least one household member owns housing wealth and zero otherwise. The max education indicator variable takes values from 0 to 8 (https://www.ssb.no/en/klass/klassifikasjoner/36/koder) and is measured as the average across all adult household members. Household members include the number of adult household members, siblings is the average number of siblings across all adult household members found by taking the average number of children per parent and subtracting one. All prices are in 2015-values, with USDNOK=8.5.

2.2 Survey data

Our main empirical analysis relies exclusively on the register data discussed above. However, we have also undertaken two small online surveys. Both surveys were conducted on the survey platform Survey Monkey.

The first survey is targeted towards homeowners under 50 in Norway and the US. The motivation is to i) shed further light on the extent of parental housing support as well as the most used support mechanisms, and ii) to assess how similar the Norwegian experience is to that in the US. The sample consists of 300 individuals in Norway, and 377 individuals in the US.

The second survey is targeted towards parents above 40 in Norway. The motivation is to i) shed further light on parents' preferences for supporting their children for housing purposes vs. other purposes, and ii) assess how these preferences vary with parental wealth. The sample consists of 240 individuals. The exact survey questions and response shares for both surveys are reported in Appendix C.

3 The importance of parental wealth for housing

Housing stands out as especially attractive for parental support due to the combination of high returns on equity – partly driven by high leverage – and substantial barriers to entry. Survey responses confirm the special role of housing. Around 80% of Norwegian parents prefer supporting their child in the housing market over other support purposes, see Appendix Figure A.2a. While the preference for supporting one's child in the housing market is independent of parental wealth, the ability to actually execute the support is higher for wealthier parents, see Appendix Figure A.2b. While less than 40% of low-wealth parents have supported a child in the housing market or would consider doing so in the future, the equivalent share for high-wealth parents is close to 90%.

We now evaluate the importance of parental wealth for housing outcomes. In Section 3.1, we use a mediation analysis to statistically decompose the difference in housing outcomes between those with richer and poorer parents. We explore both the extensive margin, captured by homeownership at age 30, and the intensive margins of purchase price and leverage conditional on entering. Then, in Section 3.2, we use plausibly exogenous variation in parental wealth due to international stock market returns to gauge the causal impact of parental wealth on housing.

3.1 Mediation analysis

Mediation analysis is a statistical decomposition of a correlation into different components, or mediators. In this section, our object of interest is the correlation between housing outcomes and parental wealth. We decompose this correlation into three distinct, observable components: *pure parental wealth*, *other parental attributes* and *household attributes*.

Framework Let a housing outcome $h_{i,t}$ depend on parental wealth at age 20 $p^{w20}_{i,t}$, other parental attributes $p^{o}_{i,t}$ and household attributes $x_{i,t}$, as in equation (1). Other factors which influence housing outcomes are grouped together in the error term $\eta_{i,t}$.

$$h_{i,t} = \beta_0 + \beta_1 p^{w20}_{i,t} + \beta_2 p^{o}_{i,t} + \beta_3 x_{i,t} + \eta_{i,t} \tag{1}$$

Taking the covariance between housing and parental wealth based on equation (1) and dividing by the variance of parental wealth, we arrive at the following expression

$$\frac{cov(h_{i,t}, p^{w20}_{i,t})}{var(p^{w20}_{i,t})} = \underbrace{\beta_1}_{\text{i)parental wealth}} + \underbrace{\beta_2 \frac{cov(p^{o}_{i,t}, p^{w20}_{i,t})}{var(p^{w20}_{i,t})}}_{\text{ii)parental attributes}} + \underbrace{\beta_3 \frac{cov(x_{i,t}, p^{w20}_{i,t})}{var(p^{w20}_{i,t})}}_{\text{iii)hh attributes}} + \underbrace{\frac{cov(\eta_{i,t}, p^{w20}_{i,t})}{var(p^{w20}_{i,t})}}_{\text{iv)unobservables}} \quad (2)$$

The left-hand side of equation (2) is the regression coefficient from regressing housing $h_{i,t}$ on parental wealth $p^{w20}_{i,t}$ without further controls. This term captures the difference in a housing outcome based on parental wealth – a housing "gap". Equation (2) shows that housing gaps can be decomposed into three observable components. The pure parental wealth component is simply given by the β_1-coefficient from equation (1). An unbiased estimate of β_1 captures the causal impact of parental wealth on a housing outcome. The other parental attributes component consists of two terms. β_2 captures the impact of other parental attributes on housing, and the covariance-variance term captures the correlation between these other parental attributes and parental wealth. Hence, other parental attributes are important for explaining housing gaps under two conditions: other parental attributes have large impacts on housing, and other parental attributes are highly correlated with parental wealth.

The third component in equation (2) is the household attributes component. This too consists of two terms: the impact of household attributes on housing (β_3) and the correlation between these household attributes and parental wealth. Again, two conditions must be met for household attributes to be important: household attributes must have a large impact on housing, and they must be highly correlated with parental wealth. The final term in equation (2) is unobservable to us as econometricians. By construction, this term will drop out in our estimation. It is important to keep in mind, however, that if $cov(\eta_{i,t}, p^{w20}_{i,t}) \neq 0$, our β-estimates will be biased, which is why we complement this analysis by exploiting plausibly exogenous variation in parental wealth in Section 3.2.

In order to decompose the impact of parental wealth on housing market outcomes, we compute the components in equation (2) separately. First, we estimate equation (1) to obtain $\hat{\beta}_1$, $\hat{\beta}_2$ and $\hat{\beta}_3$. Second, we regress p^o_i on p^{w20}_i to obtain $cov(p^o_i, p^{w20}_i)/var(p^{w20}_i)$ and regress x_i on p^{w20}_i to obtain $cov(x_i, p^{w20}_i)/var(p^{w20}_i)$. In the presentation of equations (1) and (2) we assumed the variables were scalars. In practice, parental and household attributes are vectors. The extension to vectors is straightforward, in the sense that all attributes are added separately to equation (1).[5] Both the parental and household attributes components then consist of the sum of the products between the regression coefficients from equation (1)

[5] Specifically, equation (1) becomes $h_{i,t} = \beta_0 + \beta_1 p^{w20}_{i,t} + \beta_{2a} p^{oa}_{i,t} + ... + \beta_{2n} p^{on}_{i,t} + \beta_{3a} x^{a}_{i,t} + ... + \beta_{3n} x^{n}_{i,t} + \eta_{i,t}$

and the respective covariance-variance terms.[6]

Measurement We consider multiple housing outcomes as our left-hand-side variable, starting with homeownership at age 30 as our main indicator. This is an easily interpreted measure of the extensive margin of housing choice and includes all households observed at age 30. We also report results for the probability of entering the housing market in a given year in Appendix Figure A.3. The interpretation of this outcome is more complicated, as it will be affected by composition effects with respect to the potential entrants. Further, we consider intensive margin effects, i.e. housing outcomes conditional on entering the housing market. That is, we decompose the impact of parental wealth on the purchase price upon entry and on leverage upon entry. These two housing outcomes are only observed for households who we observe entering the housing market. For all housing outcomes except entry probabilities, the time subscript is redundant, so the housing outcome is simply h_i.

Our baseline measure of parental wealth is p_i^{w20}, which measures whether average parental financial wealth in the year when the household is aged 19-21 is above or below the year-specific median. This measure captures parental wealth at the start of adulthood and contains no time variation. However, we consider contemporaneous parental wealth in an robustness exercise.

Splitting parental wealth at the median facilitates a transparent graphical presentation, but is admittedly a coarse measure of parental wealth. However, as seen from Appendix Figure A.4a, the relation between parental wealth rank and homeownership at age 30 is approximately linear, with the exception of those with parental wealth in the bottom five percent. This suggests that by focusing on movements from below to above the median, we are not missing different effects elsewhere in the distribution. Still, we also consider other categorizations of parental wealth for robustness purposes, such as wealth ranks or levels.

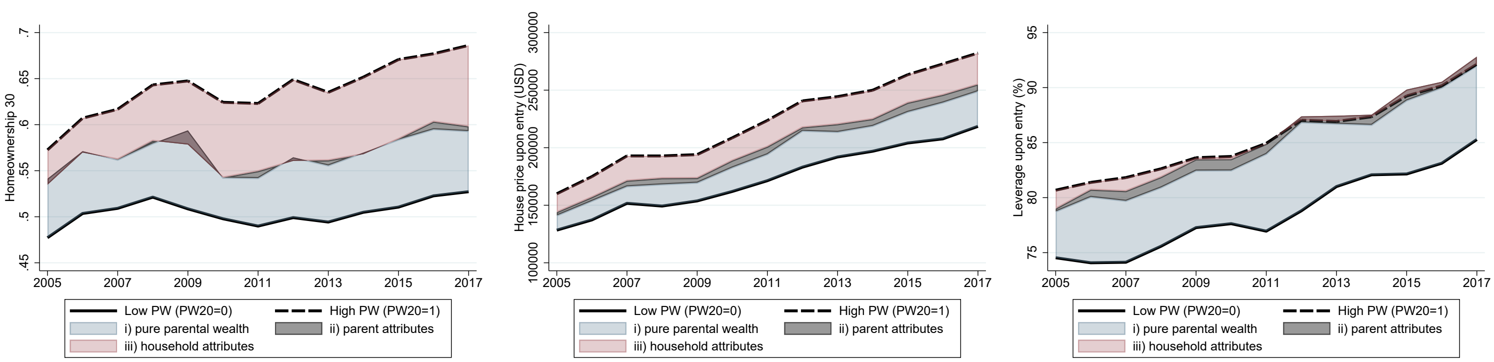
Housing outcome I: Homeownership rate at age 30 Figure 1a depicts homeownership rates at age 30 over time, for households with parents in the upper and lower half of the wealth distribution.[7] By the end of our sample, nearly 70% of households with richer parents are homeowners at age 30, compared to just above 50% of households with poorer parents. In other words, the homeownership gap is roughly fifteen percentage points, or 30%. Note that this gap has increased both in absolute and relative size over time.

[6]Specifically, the other parental attributes component is given by $\beta_{2a}\frac{cov(p^{oa}_{i,t},p^{w20}_{i,t})}{var(p^{w20}_{i,t})} + ... + \beta_{2n}\frac{cov(p^{on}_{i,t},p^{w20}_{i,t})}{var(p^{w20}_{i,t})}$ and the household attributes component is given by $\beta_{3a}\frac{cov(x^{a}_{i,t},p^{w20}_{i,t})}{var(p^{w20}_{i,t})} + ... + \beta_{3n}\frac{cov(x^{n}_{i,t},p^{w20}_{i,t})}{var(p^{w20}_{i,t})}$.

[7]The same exercise can of course be done for homeownership at any other age. Homeownership rate gaps tend to peak in the household's early 30s.

The homeownership gap at age 30 is decomposed according to equation (2). The household attribute component is marked in red in Figure 1a, and accounts for roughly half of the homeownership gap on average. That is, the fact that households with richer parents have other observable characteristics than those with poorer parents can account for half of their extra ownership rates. Among these attributes, household income is by far the most important characteristic, followed by the number of household members and education, as shown in Appendix Figure A.5. The total importance of household attributes has increased over time.

Other parental attributes – education, income, location and number of children – are less important in explaining ownership gaps, as captured by the gray area. The share of this component has remained small and stable throughout the sample period. Finally, the pure parental wealth component is captured by the blue area in Figure 1a and accounts for roughly half the ownership gap on average. This implies that, even after controlling for a large set of household and parent characteristics, households with richer parents are nearly 15% more likely to be homeowners at age 30. The size of the pure parental wealth component has remained quite stable over time.



(a) Homeownership at age 30 (b) Purchase price upon entry ($) (c) Leverage upon entry (%)

Figure 1: Housing outcomes by parental wealth

Notes: The housing outcome gaps are decomposed into three observable components, pure parental wealth, parental attributes and households attributes, in accordance with equation (2). h_i is (a) homeownership rate at 30, (b) the purchase price upon entry, or (c) the computed leverage upon entry. $p_i^{w20} = 1$ if average parental financial wealth when the household is aged 19-21 is above the year-specific median, p_i^o is parent income, education, location and number of children, x_i is hh income, financial wealth, education, location and number of adult household members.

As a robustness exercise, we add two-year future income growth and the risky asset share for parents and offspring as additional control variables in Appendix Figure A.6a. This shortens the sample by two years and increases the importance of other parental attributes slightly. Otherwise the results are largely unchanged. We also report results when parent wealth is captured by *contemporaneous* parent wealth in Appendix Figure A.7a. Both the total homeownership gap and the pure parental wealth component become slightly larger, but the main impression remains unchanged.

Housing outcome II: House purchase price We next consider the association between parental wealth and the house purchase price upon entry, which is observed only for those households who enter the housing market. Figure 1b depicts the purchase price upon entry in real USD by parental wealth.[8] By the end of our sample period, households with richer parents buy homes worth approximately \$60,000 (≈30%) more when entering the housing market. The purchase price gap has roughly doubled in absolute terms over the time period, and has increased also in percentage terms. By the end of our sample, the household attributes component can explain about 40% of the purchase price gap. The most important household characteristic is the number of household members, which is higher for those with parents in the upper half of the wealth distribution. As before, also income and education are important household attributes.

Other parental attributes are somewhat more important in explaining differences in purchase prices than differences in homeownership rates. Still, the other parental attributes component is modest in size. This leaves a substantial role for the pure parental wealth component, which accounts for 50% of the observed difference in purchase prices between households with above versus below median wealthy parents. That is, even after controlling for a rich set of observables, households with richer parents buy homes worth an additional 15% when entering the housing market. Note that the pure parental wealth component has increased over the sample period. Appendix Figures A.6b and A.7b confirm that, once again, the results are robust to also controlling for future income growth and risky asset shares, as well as using contemporaneous parental wealth.

Housing outcome III: Leverage upon entry Leverage is another margin of adjustment that is likely to vary with parental wealth, and which again conditions on entry. Indeed, Figure 1c shows that households with richer parents are roughly eight percentage points (≈10%) more levered. The leverage gap has increased over time, and households with richer parents have leverage rates above 90% towards the end of the sample. This is high considering the LTV-cap of 85%, and can be explained by i) banks being allowed to deviate from the cap for 10% of new mortgages, ii) measurement error in our LTV-measure and iii) additional

[8]Prices in NOK are first deflated to obtain constant 2015-prices, and are then converted to USD using a constant exchange rate of USDNOK=8.5.

unobserved collateral or mortgage guarantees.

Interestingly, and in contrast to the other housing outcomes, household attributes are *not* important in explaining the leverage gap. In fact, the leverage gap is entirely attributed to the pure parental wealth channel for most of the sample. We interpret this to reflect that most first time buyers are constrained by the regulatory LTV-cap at 85%, and that especially households with richer parents are likely to receive additional collateral or guarantees from their parents that enable them to exceed this limit.[9] Appendix Figures A.6c and A.7c confirm that, also for leverage, the results are robust to controlling for future income growth and risky asset shares, as well as using contemporaneous parental wealth.

3.2 The causal impact of parental wealth

The previous section showed that, even after controlling for a rich set of parental and household characteristics, parental wealth is an important mediator for housing outcomes. However, there could be omitted variables which influence this relationship, challenging a causal interpretation. For instance, preferences are likely to influence housing outcomes directly, but are unobserved to us as econometricians.[10] If these preferences are correlated with wealth and transmitted from one generation to the next, they will impact our β-estimates in equation (1). In this section we use plausibly exogenous variation in parental wealth caused by a shift-share (Bartik) type instrument, in order to gauge the extent to which our above estimates imply a causal impact of parental wealth on housing outcomes.

Our instrument is based on international stock market returns and initial stock market exposure. We measure international stock market returns by the return on the S&P 500 index, r_t.[11] The annual return varies from -24% to 18% during our sample period, creating non-trivial variation in financial wealth. Parents have different exposure to stock market returns based on their balance sheets, and we use this to obtain cross-sectional variation. Our instrument is the interaction between stock shares and international stock market returns. The first-stage equation is

$$p^w_{i,t} = \alpha + \beta_1 \text{stock-share}_{i,t-1} \times r_t + \beta_2 p^o_{i,t} + \beta_3 x_{i,t} + \epsilon_{i,t} \tag{3}$$

[9] This is also consistent with findings in Aastveit et al. (2022) who study the household balance sheet effects of introducing LTV-caps in Norway.

[10] As discussed in the previous section however, including the risky asset shares of parents and offspring as a proxy for risk aversion has very limited impact on our results.

[11] In principle, we could also use Norwegian stock market returns. However, the exogeneity threats might be larger in this case. Also, the financial asset holdings of Norwegian households contain a substantial share of international stock market exposure, ensuring a strong first stage. According to Statistics Norway, 55% of stock ownership is through mutual funds, in which 80% of investments are international – implying an international exposure of at least 40%.

We measure parental wealth contemporaneously in order to obtain a strong instrument. The exclusion restriction is that stock-market wealth changes for parents only affect households' entry probabilities through their effect on parental wealth. To address the concern that there might be direct effects on the households own stock market wealth, we can control for the (child) household's stock market wealth changes. The second-stage is

$$h_{i,t} = \alpha^{IV} + \beta_1^{IV} \hat{p_{i,t}}^{w} + \beta_2^{IV} p_{i,t}^{o} + \beta_3^{IV} x_{i,t} + \epsilon_{i,t}^{IV} \tag{4}$$

	(1)	(2)	(3)	(4)	(5)
	P(entry)	P(entry)	$p_{i,t}^{w}$	P(entry)	P(entry)
$p_{i,t}^{w}$	0.0131***			0.0189***	0.0204***
	(0.00156)			(0.00180)	(0.00167)
stock-share$_{i,t-1} \times r_t$		0.0166***	0.875***		
		(0.00187)	(0.0838)		
Model	OLS	OLS	OLS	IV	IV
N	3,955,433	3,955,433	3,955,433	3,955,433	3,955,433
Clusters	1,043,389	1,043,389	1,043,389	1,043,389	1,043,389
Mean	0.0438	0.0438	0.457	0.0438	0.0438
Standard controls	Yes	Yes	Yes	Yes	Yes
HH stock share interaction	No	No	No	No	Yes

Table 2: IV-analysis: stock market return.

Notes: $entry_{i,t} = 1$ if household i purchases a house in year t and did not own housing in year $t-1$, $entry_{i,t} = 0$ if household i did not purchase a house in year t and did not own housing in year $t-1$. $p_{i,t}^{w} = 1$ if average parental financial wealth is above the year-specific threshold, and zero otherwise. Stock-share is the share of non-deposit financial wealth, r_t is the annual return on the S&P 500.

The regression results are reported in Table 2. Column 1 reports the OLS results. The point estimate indicates that having parents in the upper half of the wealth distribution increases the entry probability by 1.3 percentage points in a given period. The reduced form results are reported in the second column, while the first-stage results are reported in the third column. The F-statistic on the first stage is well above 100, suggesting a strong instrument. Scaling the reduced form results by the first stage results gives the same estimate as the IV-estimate reported in Column 4. It says that having parents in the upper half of the wealth distribution increases entry probabilities by 1.9 percentage points. The IV-estimate exceeds the OLS-estimate, but the 95% confidence intervals overlap – consistent with a causal interpretation of the OLS-estimates.

In Column 5 we explicitly control for the interaction of (child) household stock market shares and international stock market returns. This increases the estimated impact of parental wealth slightly, but the take-away remains unchanged. In sum, our evidence indicates a causal effect of parental wealth on offspring's entry rates into the housing market.[12]

4 The housing channel of intergenerational wealth persistence

So far we have documented large housing gaps caused by parental wealth. This is important in itself, as homeownership is generally thought to provide both private and social benefits (Coulson and Li (2013), Sodini et al. (2023)). In this section we quantify the role of the housing market in driving intergenerational wealth persistence. As in Section 3, we proceed in two steps. First, we use a mediation analysis to statistically decompose intergenerational wealth persistence into different components and isolate the housing market channel. Second, we use plausibly exogenous variation in housing outcomes caused by the timing of intra-family deaths to estimate the causal impact of housing outcomes on midlife wealth.

4.1 Mediation analysis

In this section we consider the correlation between household wealth and parental wealth and decompose this correlation into four observable channels: *pure parental wealth*, *other parental attributes*, *household attributes*, and *housing*.

Framework Let midlife wealth $\bar{w}_i$ depend on parental wealth when the household is aged 19-21 (denoted p_i^{w20}), other parental attributes at midlife ($\bar{p}_i^o$), household attributes at midlife ($\bar{x}_i$) and housing outcomes (h_i) – as in equation (5). Any other variables which affect household wealth are grouped together in the error term ϵ_i. We first lay out the structural framework, and thereafter we describe the measurement of variables.

$$\bar{w}_i = \alpha_0 + \alpha_1 p_i^{w20} + \alpha_2 \bar{p}_i^o + \alpha_3 \bar{x}_i + \alpha_4 h_i + \epsilon_i \tag{5}$$

[12]With some assumptions, the impact on entry rates can be translated into an estimated impact on homeownership rates at age 30. Assume that adults enter the economy at age 18, and that the baseline entry rate equals the sample mean of 4.4%. If the entry rate increases by 1.9 percentage points each year (column 4), the homeownership rate at 30 increases by 13 percentage points. If the entry rate increases by 1.3 percentage points each year (column 1), the homeownership rate at 30 increases by 9 percentage points. The latter is roughly equal to the size of the pure parental wealth channel in Figure 1a.

Using equation (5) to express the covariance between $\bar{w}_i$ and p_i^{w20}, and dividing by the variance of p_i^{w20}, we arrive at

$$\frac{cov(\bar{w}_i, p_i^{w20})}{var(p_i^{w20})} = \overbrace{\alpha_1}^{\text{i)parental wealth}} + \alpha_2 \overbrace{\frac{cov(\bar{p}_i^o, p_i^{w20})}{var(p_i^{w20})}}^{\text{ii)parental attributes}} + \alpha_3 \overbrace{\frac{cov(\bar{x}_i, p_i^{w20})}{var(p_i^{w20})}}^{\text{iii)hh attributes}} + \\ + \underbrace{\alpha_4 \frac{cov(h_i, p_i^{w20})}{var(p_i^{w20})}}_{\text{iv)gross housing}} + \underbrace{\frac{cov(\epsilon_i, p_i^{w20})}{var(p_i^{w20})}}_{\text{v)unobservables}} \tag{6}$$

The left-hand side in equation (6) is the correlation between parental wealth and household wealth, and captures our measure of intergenerational wealth persistence. As before, this term is simply the regression coefficient from regressing household wealth on parental wealth without controls.

The decomposition in (6) features four distinct observable channels. First, there is a pure parental wealth channel, captured by the α_1 coefficient from equation (5). The remaining channels are the products of two terms. The other parental attributes channel is the impact of other parental attributes on household wealth, α_2, times the correlation between these other parental attributes and parental wealth. The household attributes channel is the impact of household attributes on household wealth, α_3, times the correlation between these household attributes and parental wealth. Finally, the gross housing channel is the impact of housing outcomes on midlife wealth, α_4, times the correlation between housing outcomes and parental wealth, $cov(h_i, p_i^{w20})/var(p_i^{w20})$. Note that the latter ratio is the left-hand side of equation (2) in the previous section, i.e. it is the regression coefficient from regressing housing outcomes on parental wealth. Substituting this term from equation (2), we can rewrite equation (6) as

$$\frac{cov(\bar{w}_i, p_i^{w20})}{var(p_i^{w20})} = \overbrace{\alpha_1}^{\text{i)parental wealth}} + \overbrace{\alpha_4\beta_1}^{\text{ii) (net) housing}} + \overbrace{(\alpha_2 + \alpha_4\beta_2)\frac{cov(\bar{p}_i^o, p_i^{w20})}{var(p_i^{w20})}}^{\text{iii)parental attributes'}} \\ + \underbrace{(\alpha_3 + \alpha_4\beta_3)\frac{cov(\bar{x}_i, p_i^{w20})}{var(p_i^{w20})}}_{\text{iv)hh attributes'}} + \underbrace{\frac{cov(\epsilon_i, p_i^{w20})}{var(p_i^{w20})} + \alpha_4 \frac{cov(\eta_i, p_i^{w20})}{var(p_i^{w20})}}_{\text{v)unobservables'}} \tag{7}$$

Here, the gross housing channel has been replaced by the (net) housing channel, which is what we refer to as the housing channel of intergenerational wealth persistence. This channel is given by $\alpha_4 \times \beta_1$, and captures the impact of parent wealth on child midlife wealth *through* housing. Specifically, β_1 is the impact of parent wealth on housing outcomes from equation (1), and α_4 is the impact of housing outcomes on child midlife wealth from equation (5). The difference between the gross and the net housing channel is attributed to other parental attributes or household attributes.

In the upcoming analysis we first estimate the α-coefficients from equation (5) and the covariance-variance terms. We use these coefficients to compute the components of intergenerational wealth persistence as specified in equation (6). Using $\hat{\alpha_4}$ and $\hat{\beta}_1$ we also separately report the (net) housing channel from equation (7).

Measurement Net household wealth at midlife is measured when the household is in its early 40s. Parental wealth is, as before, measured based on average financial wealth when the household is aged 19-21. However, again, we also consider contemporaneous measures.

In our baseline analysis, both household wealth and parental wealth are dummy variables which capture whether wealth holdings are above or below the year-specific median. Findings from the recent literature on intergenerational wealth persistence suggest that the correlation between parent and child wealth ranks (from 1 to 100) is quite well approximated by a linear relationship, see for instance Adermon et al. (2018) and Fagereng et al. (2021). This is also the case in our sample, as shown in Appendix Figure A.8. This suggests that the simple division of above/below the median captures the main features of the data. Still, we also report results using wealth ranks for robustness.

Crucially, we include housing outcomes h_i as mediators. As our baseline, we focus on the extensive margin, i.e. homeownership. To allow for some dynamic effects, we include homeownership indicators at different ages, specifically ages 27, 30, 33 and 36. We do not include ages below 27, as the number of households we observe both in their early 20s and in their early 40s is limited. These housing outcomes capture only the extensive margin, that is, the decision to become a homeowner or not at different points over the life cycle. As an extension, we also use outcomes conditional on entry to capture the intensive margin. These estimates are necessarily based solely on the roughly 70% of households who become homeowners by middle age.

Estimation We estimate all the components of intergenerational wealth dependence separately, reporting detailed regression results in the appendix, and summarizing the main results here. We first estimate equation (5) to obtain $\hat{\alpha}_1$, $\hat{\alpha}_2$, $\hat{\alpha}_3$ and $\hat{\alpha}_4$. The results are reported in the first column of Appendix Table A.1. After obtaining the α-estimates, we regress p_i^o, x_i and h_i on p_i^{w20}, one-by-one, to get the covariance-terms in equation (6). The results are reported in Columns 2-11 of Appendix Table A.1. Given the β_1-estimate from the previous section, we then have what we need to calculate the distinct components of intergenerational wealth persistence as specified in equations (6)-(7).

The components are summarized in Table 3. First, total intergenerational wealth persistence is 15 percentage points. This means that households with parents in the upper half of the wealth distribution are 15 percentage points (=35%) more likely to themselves be in the upper half of the wealth distribution at midlife. This number is simply the estimated coefficient from regressing midlife household wealth on parental wealth, i.e. the left-hand side of equations (6) and (7).

Intergenerational wealth persistence	**0.15 (100%)**
Parental wealth channel	0.08 (55%)
Parental attributes channel	0.01 (5%)
Household attributes channel	0.02 (13%)
Gross housing channel	0.04 (27%)
Net housing channel	0.02 (12%)

Table 3: Decomposing intergenerational wealth persistence

Notes: The table shows results from decomposing intergenerational wealth persistence in accordance with equation (6). The gross housing channel is further decomposed into a net housing channel as in equation (7). Parental wealth is p^{w20}. Parental attributes are education, income, location and number of children. Household attributes are education, income, location and number of adult household members. Housing market measures are homeownership indicators at ages 27, 30, 33 and 36.

As seen from the second row of Table 3, the pure parental wealth component accounts for 55% of intergenerational wealth persistence. Other parental attributes – such as parental income, education, location and number of children – do *not* account for a large share of the observed intergenerational persistence. Household attributes, on the other hand, are more important, explaining 13% of the correlation between parental wealth and child wealth. Strikingly, housing outcomes are substantially more important than both parental attributes and other household attributes in explaining intergenerational wealth persistence – see the fourth row of Table 3. In fact, more than 1/4 of the correlation between parental wealth and household wealth is explained by households with richer parents having better housing outcomes, i.e. the gross housing channel.

Finally, the net housing channel accounts for 12% of intergenerational wealth persistence and implies that households with richer parents are two percentage points more likely to be in the upper half of the wealth distribution at midlife *due* to the impact of parental wealth on housing. This key number will serve as an important moment to match in the theoretical model in Section 6. Note that the net housing channel is about the same size as the household attributes channel. A useful interpretation of the magnitude is thus that the direct impact of parental wealth on homeownership is equally important for intergenerational wealth persistence as the direct impact of parental wealth on household income, education, location and number of household members.

The results so far have been based on whether wealth is above or below the median. In Appendix Table A.2 we instead use the rank from 1 to 100 to capture household wealth and parental wealth. In total, increasing the parental wealth rank by one increases the household wealth rank at midlife by 0.3, which is similar in magnitude to previous findings.[13] Compared to the results in Table 3, the net housing channel becomes slightly smaller, and drops from just above 10% to just below 10%. Qualitatively, the results are unchanged.

The intensive margin of homeownership A benefit of using homeownership indicators at different ages is that no household is excluded from the sample, as long as it is in the data for that particular age. However, we do not capture the impact working though variables such as purchase price and leverage, which are defined only for households who enter the housing market. To evaluate the importance of the intensive margin, we redo our analysis on a sample of (eventual) homeowners. The results are reported in Appendix Table A.3. Measuring housing outcomes by only purchase price and leverage upon entry yields a net housing channel of 11%. If we also include age of entry, the net housing channel increases to 16%. These results suggest that the extensive margin result discussed above should be viewed as a lower bound for the total effect.

4.2 The causal impact of housing on wealth accumulation

Precisely estimating the housing channel of intergenerational wealth persistence requires an unbiased estimate of the impact of housing on midlife wealth, i.e. coefficient α_4 from equation (5). In this section we use plausibly exogenous variation in housing resulting from variation in the timing of grandparent death to estimate the causal impact of age of entry in the housing market on midlife wealth. We restrict our sample to households for whom we observe exactly one grandparent death in our sample period.[14] This means that we rely on variation in *timing* only for identification.

[13]For instance Fagereng et al. (2021) find a rank-rank coefficient of 0.24 (for non-adoptees) using Norwegian data, Adermon et al. (2018) find a rank-rank coefficient of 0.3-0.4 using Swedish data and Pfeffer and Killewald (2015) find a rank-rank coefficient of 0.39 (for ages 35-44) using US PSID data

[14]Note that a grandparent is defined as an individual, not a household. In the analysis, we consider the death of any one grandparent. The results are similar if we only consider the death of a "final" grandparent on one side, i.e if we condition on the deceased grandparent not having a surviving spouse.

The strength of the instrument relies on grandparent death having a non-trivial impact on housing outcomes. To document that this is the case, we estimate en event study around grandparent death, based on the following equation

$$y_{i,t} = \alpha + \delta_t + \sum_{k=-2}^{k=3} \beta_k I_{i,t}^k + \epsilon_{i,t} \tag{8}$$

The outcome variable $y_{i,t}$ is the probability of entering the housing market, defined for households who are not in the housing market ($y_{i,t} = 0$) or are entering the housing market in year t ($y_{i,t} = 1$). We define a vector of time dummies for the years prior to and following the death of a grandparent, $I_{i,t}^k$, with k denoting the number of years since the grandparent death took place. All β_k-coefficients are relative to $k = -3$, which we set as our baseline. δ_t captures time fixed effects.

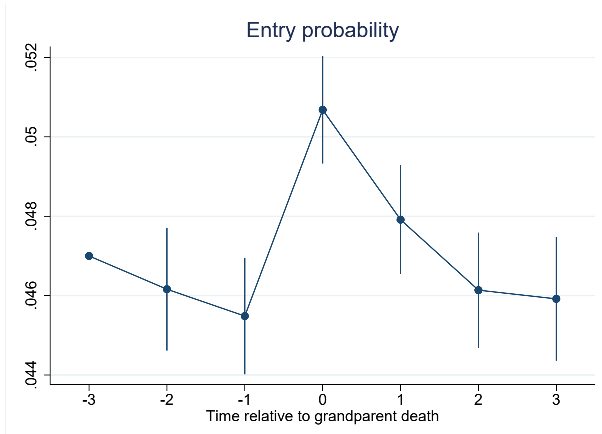


Figure 2: Event study around grandparent death

Notes: Regression results from estimating equation (8) with $y_{i,t}$ = entry probability$_{i,t}$. Sample: households who experience exactly one grandparent death in the sample period.

Figure 2 reveals a substantial spike in the probability of entering the housing market exactly in the year of grandparent death. The entry probability increases by more than ten percent, from around 4.6% to 5.1%. This response confirms that the timing of grandparent death causes variation in age of entry in the housing market. Note that there is a small decline in entry probabilities in the year prior to grandparent death. This could mean that some households anticipate the upcoming death of a grandparent, and choose to delay entry. This anticipation effect might be especially relevant for households who expect to inherit their grandparents' house. If we exclude such households from the sample, there are no significant anticipation effects - see Appendix Figure A.9.[15] All our results are robust to

[15]Specifically, we exclude households who enter the housing market in the same municipality in which

excluding these households, as shown in Appendix Table A.4.

This impact of grandparent death on the age of entry in the housing market is further captured by the first stage in equation (9), where h_i is the age of entry for household i

$$h_i = \alpha + \beta_1 \text{age-gpd}_i + \beta_2 p_i^o + \beta_3 x_i + \epsilon_i \tag{9}$$

The regression results from the first stage are reported in Appendix Table A.5, and an F-statistic exceeding 300 confirms the strength of the instrument.[16] Once we have the instrumented age of entry in the housing market from equation (9), we estimate the impact on midlife wealth according to the second stage in equation (10):

$$\bar{w}_i = \alpha^{IV} + \beta_1^{IV} \hat{h}_i + \beta_2^{IV} p_i^o + \beta_3^{IV} x_i + \epsilon_i^{IV} \tag{10}$$

The exclusion restriction says that the timing of grandparent death should only affect midlife wealth through the age of entry in the housing market. The main threat to identification is that the timing of grandparent death could cause variation in other types of investments as well. Specifically, the death of a grandparent could cause an increase in financial wealth due to inheritance. We discuss this potential concern at length below, and perform several robustness exercises to ensure that the impact of grandparent death on financial assets – and therefore midlife wealth – is not driving our results.

Our baseline estimates are reported in the first row of Table 4. We consider three different measures of household net wealth: above/below the median in Columns 1-2, the rank from 1-100 in Columns 3-4 and the USD value in Columns 5-6. Using first the above/below median characterization of household wealth, the instrumented impact of entry age is negative at -0.01, and significant only at the ten percent level, as seen from Column 1. This estimate implies that entering the housing market one year later reduces your probability of being rich at midlife by one percentage point. If we instead use the wealth rank in Column 3, the negative impact increases and becomes statistically significant even at the one percent level. Quantitatively, the point estimate says that entering the housing market one year later implies a 1.4 lower wealth rank. Using midlife wealth in USD provides a similar picture, as seen from Column 5. Entering the housing market one year later reduces midlife wealth by

their deceased grandparent resided. This ensures that the remaining households are not inheriting their grandparents house.

[16]What is the driving mechanism behind the instrument? It is not simply direct inheritance of grandparents' home, as results are robust to excluding these heirs. One likely mechanism is that the death of a grandparent increases parental wealth, which in turn benefits the child household in the housing market. Appendix Figure A.10 shows that average parental financial wealth increases by $2,000 or 12% in the year of grandparent death, and then slowly decreases thereafter.

roughly \$15,000.[17] The IV estimates are not statistically different from the OLS-estimates for any of the three wealth measures. The second row of Table 4 reports the same coefficients, using gross real wealth, measured as the value of real estate and vehicles in the data, rather than net wealth. All in all, the results are similar.

	$\bar{w} = \{0, 1\}$		$\bar{w}$-rank		$\bar{w}$ in USD	
Net wealth	IV	OLS	IV	OLS	IV	OLS
Age of entry	-0.011*	-0.012***	-1.42***	-1.44***	-15,507**	-6,557***
	(0.0064)	(0.0013)	(0.489)	(0.100)	(6,111)	(1,246)
Real wealth	IV	OLS	IV	OLS	IV	OLS
Age of entry	-0.017***	-0.019***	-1.23***	-1.40***	-10,687***	-8,267***
	(0.0062)	(0.0012)	(0.380)	(0.0778)	(2,530)	(517)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	7,609	7,609	7,069	7,069	7,069	7,069

Table 4: The impact of age of entry on midlife wealth.

Notes: Results from estimating equation (10). The dependent variable is household net wealth or gross real wealth at midlife measured as: above/below median, rank from 1-100 or value in USD. Control variables include parental income, location, education, number of children, household income, location, education and number of (adult) household members. Net wealth is the value of all assets minus liabilities, real wealth is the value of real estate and vehicles. Sample: households who experience exactly one grandparent death in sample period.

Could the impact of grandparent death on financial wealth be biasing our results? First, we note that if the death of a grandparent causes an (earlier) investment in financial assets, we expect this to have a larger impact on net wealth than on real wealth. Yet, as seen from Table 4, the results are similar. Second, doing an event study based on equation (8) using household financial wealth as the dependent variable, shows that there is no significant increase in financial wealth in the year of a grandparent death. Still, we do two additional exercises to ensure that we are correctly isolating the impact of age of entry in the housing market on midlife wealth. First, we control for financial wealth holdings at different ages to capture the dynamic profile of financial wealth. Second, we exclude households with increases in financial wealth at the time of grandparent death from the sample. The results are reported in Appendix Tables A.6 and A.7 respectively, and are quite similar to the baseline. All in all, the results support a causal impact of housing on midlife wealth.

[17] While this estimate might seem large, a simple back-of-the-envelope calculation suggests that it is not unreasonable. The average house price is around \$200,000 and the annual real house price increase exceeds 5%. This suggests an average yearly return of more than \$10,000.

5 How does parental support in the housing market take place?

So far, we have documented the importance of parental wealth for housing outcomes, and how this channel contributes to intergenerational wealth persistence. We next explore the mechanisms behind *why* parental wealth matters. Survey evidence suggests that the most important support form is financial transfers, especially in the US – see Appendix Figure A.11. The second largest support form is parental guarantees for mortgages, followed by parental co-ownership of the house and/or co-signing of the mortgage. While not all support forms are easily observed in tax data, we proceed to quantify some of the main mechanisms.

5.1 Home equity extraction and liquidity support

In the year before a house purchase liquid assets increase substantially – see Appendix Figure A.12. The increase in liquid assets could result from reduced consumption, increased income, or portfolio rebalancing. We are not able to fully account for the increase in liquid assets based on balance sheet data from tax records. A likely explanation is that we fail to fully observe inter-vivos transfers.[18] Below we therefore take a more indirect approach and consider i) instances where parents extract equity from their homes, and ii) instances where parental financial assets decrease simultaneously as offspring's financial assets increase.

Parental equity extraction Benetton et al. (2022) show that households are more likely to enter the housing market in years when parents extract home equity. This is consistent with parents (partially) transferring equity to their child. We find evidence of a similar effect in the Norwegian data. Moreover, we show that the importance of this channel differs between those with richer vs. poorer parents - also when conditioning on homeownership.

We define a parental equity extraction as an increase in debt which exceeds 10% *and* \$2,000[19], and proceed by regressing entry on parental equity extraction.[20] In the year of a parental equity extraction, the probability of entering the housing market is 1.2 percentage points (=27%) higher – see Columns 1-3 of Table 5. Interestingly, the correlation between

[18]In contrast to other items, transfer income is self-reported. Moreover, reporting is only formally required if the transfer exceeds NOK 100,000 (≈ \$12,000) and is not used for tax purposes.

[19]This is slightly higher than in Benetton et al. (2022), which require increases in excess of 5% and \$1,000, reflecting higher house prices in Norway, and the fact that we observe total debt rather than mortgage debt.

[20]Following Benetton et al. (2022), we regress contemporaneous entry in the housing market on contemporaneous equity extraction. We could alternatively regress contemporaneous entry on lagged equity extraction, motivated by the pattern in Figure A.12. The results in this case remain positive and statistically significant, but decrease in magnitude.

parental equity extraction and entry into the housing market is larger for households with richer parents. This pattern is observed in Columns 4-6, where we interact equity extraction with having richer parents at age 20. When including control variables and household fixed effects, we find that entry probabilities are 0.8 percentage points higher when poorer parents extract equity, compared to 0.8+0.5=1.3 percentage points higher when richer parents extract equity. This could reflect differences in the size of parental equity extractions or in the use of these funds.

	(1) $\text{Entry}_{i,t}$	(2) $\text{Entry}_{i,t}$	(3) $\text{Entry}_{i,t}$	(4) $\text{Entry}_{i,t}$	(5) $\text{Entry}_{i,t}$	(6) $\text{Entry}_{i,t}$
$\text{Equity}_{i,t}$	0.0153***	0.0175***	0.0117***	0.00999***	0.0127***	0.00936***
	(0.000246)	(0.000245)	(0.000266)	(0.000352)	(0.000350)	(0.000375)
$\text{Equity}_{i,t} \times p_i^w$				0.00842***	0.00947***	0.00461***
				(0.000492)	(0.000489)	(0.000530)
N	4,112,920	4,092,485	3,842,848	4,112,920	4,092,485	3,842,848
Mean	0.0438	0.0438	0.0438	0.0438	0.0438	0.0438
Controls	No	Yes	Yes	No	Yes	Yes
HH FE	No	No	Yes	No	No	Yes

Table 5: Parental equity extraction.

Notes: $entry_{i,t} = 1$ if household i purchases a house in year t and did not own housing in year $t-1$, $entry_{i,t} = 0$ if household i household i did not purchase a house in year t and did not own housing in year $t-1$. $\text{Equity}_{i,t} = 1$ if parents increase debt by at least 10% *and* \$2,000, and zero otherwise. Parental wealth: $p_i^w = 1$ if average parental financial wealth when household is aged 19-21 is above the year-specific threshold, and zero otherwise.

Financial transfers We define a parental transfer as an incident where parental financial wealth decreases by at least NOK 30,000 (=\$3,750), and (child) household bank deposits increases by at least NOK 30,000 (=\$3,750) in the same year. Albeit somewhat arbitrary, the transfer size is set to roughly match the average transfer size considered in Brandsaas (2021) based on US PSID data. Transfers that are not financed by financial wealth, such as the parental equity extractions discussed above, are thus by construction not included.

Once we have the transfer dummy, we can regress entry on parental transfers, as we did with parental equity extraction. To match the pattern observed in Figure A.12, we regress entry in year t on parental transfers in $t-1$.[21] The results are reported in Table 6. Receiving

[21] Using instead contemporaneous transfers is not straightforward, as we are then conditioning on an increase in liquid assets at the time of entry into the housing market. This is the opposite of what we typically observe in the data, as households use their liquid savings to fulfill the downpayment requirement.

a parental transfer in year $t-1$ increases average entry probabilities by 1.6 percentage points (=37%). The differential impact on households with richer parents is small in magnitude, and not statistically significant when the full set of controls are added.

	(1)	(2)	(3)	(4)	(5)	(6)
	$\text{Entry}_{i,t}$	$\text{Entry}_{i,t}$	$\text{Entry}_{i,t}$	$\text{Entry}_{i,t}$	$\text{Entry}_{i,t}$	$\text{Entry}_{i,t}$
$\text{Transfer}_{i,t-1}$	0.0402***	0.0273***	0.0160***	0.0408***	0.0302***	0.0155***
	(0.000496)	(0.000498)	(0.000546)	(0.000839)	(0.000837)	(0.000918)
$\text{Transfer}_{i,t-1} \times p_i^w$				-0.00577***	-0.00448***	0.00081
				(0.00104)	(0.000455)	(0.00114)
N	3,209,946	3,192,924	2,974,061	3,209,946	3,192,924	2,974,061
Mean	0.0438	0.0438	0.0438	0.0438	0.0438	0.0438
Controls	No	Yes	Yes	No	Yes	Yes
HH FE	No	No	Yes	No	No	Yes

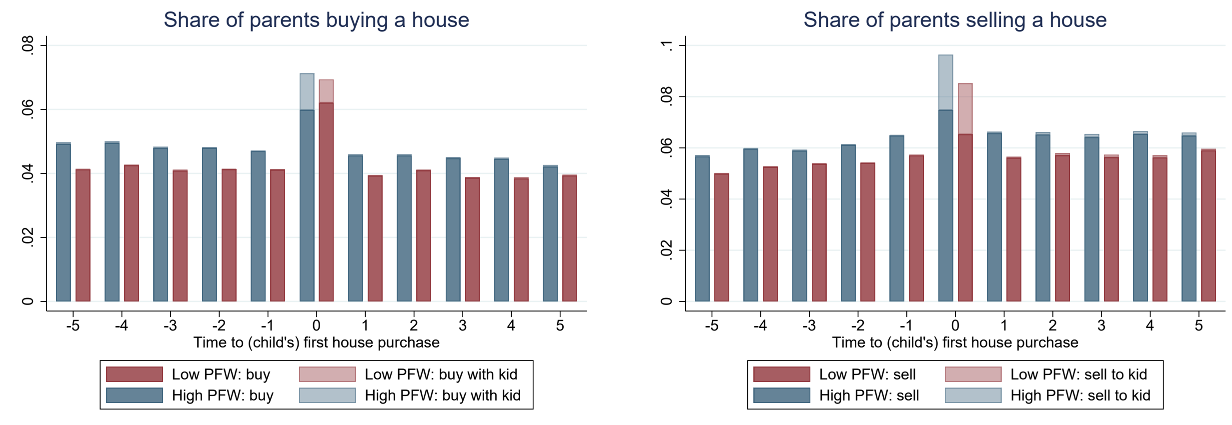
Table 6: Parental transfers

Notes: $entry_{i,t} = 1$ if household i purchases a house in year t and did not own housing in year $t-1$, $entry_{i,t} = 0$ if household i household i did not purchase a house in year t and did not own housing in year $t-1$. $\text{Transfer}_{i,t-1} = 1$ if parent financial wealth decreased by at least NOK 30,000 *and* child bank deposits increased by at least NOK 30,000 in period $t-1$. Parental wealth: $p_i^w = 1$ if average parental financial wealth when the household is aged 19-21 is above the year-specific threshold, and zero otherwise.

5.2 Intra-family housing transactions

Figure 3a depicts the share of parents who buy a house around the time when a child enters the housing market, by parental wealth. In the year when a child enters the housing market, the share of parents buying jumps from four to seven percent. Using unique housing IDs, we can further infer whether parents are buying a house *with* their child. This is captured by the lighter shaded part of the bars in Figure 3a. For richer parents, about half of the excess purchase propensity at the year of entry is explained by co-purchasing, which compares to roughly 1/3 for parents with below median wealth. This implies that richer parents are almost 60% more likely to co-purchase a house with their child at the time of entry than poorer parents.

Figure 3b depicts the share of parents *selling* a house around the year when a child enters the housing market. In non-entry years, roughly six percent of parents sell a house. This compares to almost ten percent in the year of entry for those with above median wealth, and just above eight percent for those with below median wealth. Around 2/3 of the excess sale propensity in the year of child entry into the housing market is explained by parents selling a house directly to their child, as captured by the lighter shaded parts of the bars in Figure 3b. Richer parents are nearly 10% more likely to sell a house directly to their child in the year of entry. Appendix Figure A.13 shows a significant decline in secondary housing wealth for richer parents only, consistent with richer parents selling secondary housing to their offspring.



(a) Parents buying

(b) Parents selling

Figure 3: Intra-family sales and purchases by parental wealth.

Notes: Share of first-time buyer parents who buy (panel a) or sell (panel b) a house around the child household's entry into the housing market (year $t = 0$). Red and blue bars show results for households with parental wealth below and above the median, respectively. Light areas indicate transaction with the child.

Sales prices Co-purchasing a house with parents can be economically beneficial by relaxing borrowing constraints. In contrast, buying a house from parents is only economically beneficial if the transaction takes place at a price below the market value of the house.[22] If there is such a rebate, the transaction should be marked as a full or partly gift-sale in the tax records. As it turns out, 97% of all transactions are reported as taking place at market value, and this share does not vary by parental wealth. However, anecdotal evidence suggests that there is room to influence the reported market value, which is decided upon by a realtor. We therefore restrict the sample to the 97% of transactions which reportedly take place at market value, and investigate whether intra-family sales are discounted even here.

[22]If the household expects to inherit its parental wealth anyway, one could argue that this simply implies a reshuffling of dynasty wealth. However, given that i) the household is likely to be constrained by the downpayment requirement, and ii) the return on wealth is amplified by high leverage for the young, such an early-in-life transfer is probably preferable. Moreover, a lower sales price implies lower capital gain taxes, which represents an economic gain to the parents/dynasty.

To evaluate whether parents sell homes to their children at discounted prices, we predict house purchase prices based on square meters, number of rooms, number of bathrooms, municipality and year of purchase – as in equation (11). Data for these variables are often missing, leaving a sample of nearly 99,000 entries to the housing market for which we have all the housing characteristics. Of these transactions, 3,300 are sales from parent to child and are excluded in the estimation. Regression results are reported in Table A.8 in the appendix.

$$hprice_{i,t} = \alpha + \beta_1 sqm_{i,t} + \beta_2 rooms + \beta_3 bathrooms + \delta_k municipality_k + \delta_t year_t + \epsilon_{i,t}. \quad (11)$$

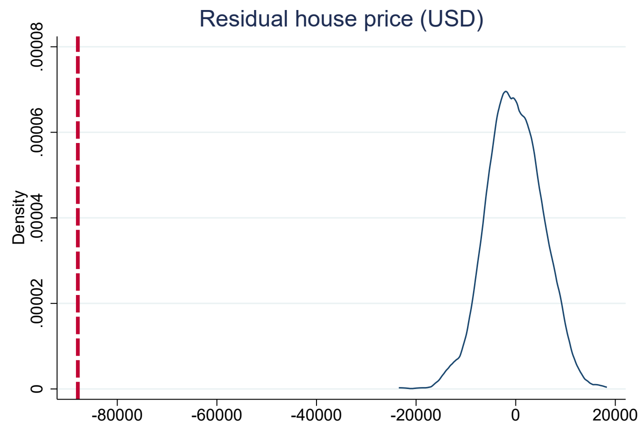


Figure 4: Estimated house sale discounts (USD).

Notes: The residual house price is the difference between the listed purchase price and the estimated market value (11). The dashed line represents the average residual house price when parents sell to their children. The distribution represents the average residual house price from 1,000 randomly drawn samples.

Using the estimated coefficients from equation (11), we calculate the difference between actual purchase prices and predicted purchase prices for all transactions in our sample. For the intra-family sales, the average purchase price is $87,000 *less* than predicted, which implies a discount in excess of 25%. To make sure that the large estimated discount for parental sales is not a statistical fluke, we do a simple exercise in which we redo the calculations for randomly drawn samples of actual transactions, unconditional on whether they are within family or not. Specifically, from our transactions data we draw 1,000 random samples of 3,300 transactions, which is the size of our intra-family sales sample. Leaving out each sample one-by-one, we re-estimate equation (11) and use the results to predict purchase prices for all transactions. We then calculate the average residual house price for each sample, resulting in the smooth distribution in Figure 4. On average, residual house prices are close to zero, and virtually all mass lies between -\$20,000 and \$20,000. This is in stark contrast to the average residual for intra-family sales, which is captured by the dashed, red line to the left in Figure 4. We thus conclude that parents are indeed selling houses to their children at sizable discounts.

5.3 How important are the mechanisms considered?

We end this section by performing back-of-the-envelope calculations to assess how important the different mechanisms are in explaining the entry gap between households with richer and poorer parents. Note that the mechanisms considered seek to explain only the part of the entry gap which is accounted for by parental wealth. To assess each mechanism's magnitude, we first multiply the *share of parents* who engage in mechanism $i = \{$equity withdrawal, transfer, co-purchase, direct sale$\}$ by the *impact* of mechanism i on the entry probability. Both terms are allowed to differ by parental wealth. This gives us the implied entry rate explained by each mechanism for households with richer and poorer parents. Then, we take the difference in implied entry rates between households with richer and poorer parents, and divide by the total entry gap accounted for by parental wealth. This gives us the share of the entry gap which is attributed to each mechanism.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Share of parents		Impact on entry		Entry accounted for		Share of gap
	pw20=1	pw20=0	pw20=1	pw20=0	pw20=1	pw20=0	accounted for
Equity extraction	24%	19%	1.40 pp	0.94 pp	0.34 pp	0.18 pp	**29%**
Transfer	8.5%	3.9%	1.55 pp	1.55 pp	0.13 pp	0.06 pp	**13%**
Co-purchase	0.012×0.052 =0.062%	0.007×0.037 =0.026%	100 pp	100 pp	0.062 pp	0.026 pp	**7%**
Direct sale	0.022×0.052 =0.114%	0.020×0.037 =0.074%	100 pp	100 pp	0.114 pp	0.074 pp	**7%**
Sum	33%	23%			0.65 pp	0.34 pp	**56%**

Table 7: Mechanisms: assessing the magnitudes

Notes: The numbers in columns 5-6 are found by multiplying the numbers in columns 1-2 and columns 3-4 based on parental wealth. The numbers in column 7 are found by taking the difference between the numbers in columns 5 and 6, and dividing by the total entry gap explained by parental wealth of 0.55 pp.

Parental equity extraction The results of the back-of-the-envelope calculation for parental equity extraction are reported in the first row of Table 7. Considering only (potential) first time buyers, 24% of high-wealth parents and 19% of low-wealth parents extract equity in a given period. For households with richer parents, parental equity extraction increases the entry probability by 1.40 percentage points (see Column 6 of Table 5, row 1 + row 3). For households with poorer parents, parental equity extraction increases the entry probability by 0.94 percentage points (see Column 6 of Table 5, row 1). Combining these two sets of numbers, we have that – for households with richer parents – parental equity extraction increases their entry probability by 0.24×1.40 = 0.34 percentage points. For households with poorer parents, parental equity extraction increases their entry probability by 0.19×0.94 = 0.18 percentage points. The entry probability gap between households with richer and poorer parents accounted for by parental equity extraction is thus (0.34-0.18)/0.55=29%.[23]

Parental transfers The results of the back of the envelope calculation for parental transfers are reported in the second row of Table 7. Considering only (potential) first time buyers as before, 8.5% of richer parents and 3.9% of poorer parents provide transfers in a given period. Receiving a transfer increases the entry probability by 1.55 percentage points, with no significant difference across parental wealth groups (see Column 6 of Table 6). Combining these two sets of numbers, we have that – for households with richer parents – transfers increase their entry probability by 0.085×1.55 = 0.13 percentage points. For households with poorer parents, transfers increase their entry probability by 0.039×1.55 = 0.06 percentage points. The entry probability gap between households with richer and poorer parents accounted for by parental transfers is thus (0.13-0.06)/0.55 =13%.

Co-purchasing The results of the back of the envelope calculation for parental co-purchasing are reported in the third row of Table 7. 1.2% of households with richer parents entering the housing market co-purchase together with their parent, see Figure 3a. Given an entry rate of 5.2%, this implies that 0.062% of high-wealth parents of (potential) entrants co-purchase a home together with a child in a given period. For households with poorer parents, 0.7% of entrants co-purchase together with a parent. Given an entry rate of 3.7%, it follows that 0.026% of low-wealth parents of (potential) entrants co-purchase a home together with a child in a given period. Because co-purchasing only takes place conditional on the child household entering the housing market, the impact on entry is set to one. This implies that co-purchasing increases entry rates by 0.062 percentage points for households with richer parents, and 0.025 percentage points for households with poorer parents. As a result, co-purchasing can explain 7% of the total entry gap accounted for by parental wealth.

Direct sales The results of the back of the envelope calculation for direct housing sales from parent to child are reported in the fourth row of Table 7. 2.2% of households with

[23] On average over the sample period, the gap in entry rates is 1.5 pp, see Appendix Figure A.3. Roughly 1/3 or 0.55 pp is due to parental wealth.

richer parents entering the housing market buy directly from a parent, see Figure 3b. Given an entry rate of 5.2%, this implies that 0.114% of high-wealth parents of (potential) entrants sell a house to a child in a given period. For households with poorer parents, 2.0% of entrants buy directly from a parent. Given an entry rate of 3.7%, this implies that 0.074% of low-wealth parents of (potential) entrants sell a house to a child in a given period. Because a direct sale from parent to child only takes place conditional on the (child) household entering the housing market, the impact on entry is again set to one. This implies that direct sales increases entry rates by 0.114 percentage points for households with richer parents, and 0.074 percentage points for households with poorer parents. As a result, direct sales can also explain 7% of the total entry gap accounted for by parental wealth.

Total Adding up the mechanisms considered, we have explained 56% of the difference in entry probabilities caused by parental wealth.[24] Which mechanisms are we missing? One mechanism generally considered to be important based on surveys and anecdotal evidence – and consistent with the importance of parental wealth for LTVs in Figure 1c – is mortgage guarantees. That is, a parent agrees to be liable for the mortgage in case the child should fail to meet the payment obligations. In general, there are likely a number of different ways parents can assist their children financially in the housing market. Our back-of-envelope calculations suggest that parental equity extraction, other transfers and intra-family transactions can account for more than half of the impact of parental wealth on housing market entry rates.

Before moving on to the model, we briefly summarize our results. First, we have documented substantial housing gaps between those with richer vs. poorer parents, and decomposed these gaps into a pure parental wealth component, an other parental attributes component and a household attributes component. Instrumenting parental wealth with a shift-share IV based on international stock market returns support a causal impact of parental wealth on housing market outcomes. Second, we have seen that the gross housing channel can account for roughly one quarter of total intergenerational wealth persistence, and that half of this is driven purely by parental wealth. An instrumental variable approach based on the timing of intra-family deaths supports a causal interpretation of the impact of housing on midlife wealth. Finally, in terms of how parental wealth is transmitted, we find evidence of parental housing equity withdrawal, financial transfers, co-purchasing, and

[24] An implicit assumption when adding up the importance of each mechanism is that there is limited overlap. This might not be the case. For instance, parents who extract equity might also give financial transfers. However, only four percent of parents extracting equity or giving transfers engage in both support forms simultaneously. We thus consider the assumption of no overlap to be acceptable for our back-of-the-envelope calculation.

direct sales from parent to child at substantially discounted prices.

6 Model and counterfactual exercises

In this section, we build a life-cycle model with housing and exogenous parental support to i) explore if a calibrated staple model, augmented with financial support from parents, can reproduce our empirical estimates of the housing channel of intergenerational wealth persistence and ii) conduct counterfactual analyses to understand the roles of house price growth and mortgage market regulation. These counterfactuals are chosen to address external validity and the most immediate policy question stemming from our empirical analysis.

6.1 Model set-up

Parental support is fixed in accordance with a "warm glow" bequest motive and takes the form of an initial cash transfer or an annual cash transfer. Modeling parental support as a transfer is in line with the survey evidence presented in Appendix Figure A.11, as well as the results from Section 5. We first describe the baseline model without parental support in Sections 6.1.1-6.1.2. In Section 6.1.3, we add parental support to the model. We discuss the implications of endogenizing parental support given alternative bequest motives in Appendix D.1. Computational details are reported in Appendix D.5.

6.1.1 Environment

We extend a workhorse life-cycle model with housing, modified to match our Norwegian setting, to isolate the effect of parental support. For a thorough discussion of these models we refer to Yang (2009); Attanasio et al. (2012); Davis and Van Nieuwerburgh (2015).

Demographics A household is born at age T^s, retires at age T^r, and dies at age T^d. Each period is one year, and we do not consider mortality risk or bequest motives for the (child) household.

Preferences The expected lifetime utility of a household is given by

$$\mathbb{E}\left[\sum_{a=T^s}^{T^d} \mathcal{B}^a u\left(c_a, h_a, s_a\right)\right] \tag{12}$$

where $\mathcal{B} > 0$ is the discount factor, $c > 0$ is non-housing consumption, $h \in \mathcal{H}(s) \subset \mathbb{R}^2$ is housing consumption, and $s \in \{0, 1\}$ is the ownership status which equals 0 for renters and 1 for owners. The feasible set of housing depends on whether the house is renter- or owner-occupied. The expectation $\mathbb{E}$ is taken over sequences of idiosyncratic shocks that we specify below. In what follows, we omit the dependence of variables on age a, except where it is misleading. Households have CRRA preferences with a Cobb-Douglas aggregator over housing and consumption

$$u(c, h, s) = \frac{\left(c^{1-\eta} h^{\eta} \chi(s)\right)^{1-\gamma}}{1-\gamma}, \tag{13}$$

where $0 < \eta < 1$ is the weight on housing, γ measures risk aversion, and $\chi(s)$ is the homeownership premium. The ownership premium is 1 for renters and $1 + \chi$ for owners.

Endowments Households are endowed with an uncertain labor income stream during working age

$$\log y_{i,a} = f(a) + \nu_{i,a} + \varepsilon_{i,a},\ a = T^s, \ldots, T^r. \tag{14}$$

We let $f(a)$ denote the deterministic component, ν is a persistent income shock, and $\varepsilon \sim \mathcal{N}(0, \sigma_\varepsilon^2)$ is a transitory shock. The persistent shock follows an AR(1) process

$$\nu_{i,a} = \rho \nu_{i,a-1} + u_{i,a}, \tag{15}$$

where ρ is the persistence parameter and $u \sim \mathcal{N}(0, \sigma_\nu^2)$. In retirement, income is constant and equal to a fixed proportion (ϕ_{ret}) of the household's income in the last period of working life ($a = T^r$)

$$\log(y_{i,a}) = \log(\phi_{ret}) + f(a = T^r) + \nu_{i,T^r},\ a = T^r + 1, \ldots, T^d \tag{16}$$

Social welfare systems provide a consumption floor $\underline{c}$ after rent of the cheapest unit. Households are endowed with an initial level of net worth x_{T^s}.

Housing market The market value of a house is linear in house size h. The house price follows a stochastic process with drift μ_h and volatility σ^h

$$\log(p_{a+1}) = \log(p_a) + \epsilon_{a+1}^h, \epsilon \sim \mathcal{N}(\mu_h, \sigma_h^2). \tag{17}$$

The rental price is assumed to be a constant fraction κ of the market value ph. Households have the option to rent, denoted $s = 0$, or own, $s = 1$, in order to consume housing services. Houses are characterized by their sizes, which belong to discrete finite sets $\mathcal{H}(s)$ that depend on ownership status. Buying and selling owner-occupied housing entails adjustment and transaction costs that are proportional to the market value of the house and we denote these proportional costs by m_b and m_s, respectively. We let $tc(p, s, h, s', h')$ denote the total transaction cost for a household who switches housing tenure from s to s' and house size from h to h'. For example, a current renter ($s = 0$) living in a rental unit of size h who buys ($s' = 1$) a house of size h' when the price is p, pays a transaction cost of $tc(p, 0, h, 1, h') = (1+m_b)ph'$. Moreover, homeowners experience depreciation δ, which includes maintenance and taxes.

Financial market Households can save in a one-period risk-free bond with return r^f. Borrowing against collateral (owner-occupied housing) is allowed, but households must satisfy a loan-to-value (LTV) and a loan-to-income (LTI) constraint. We model borrowing as a one-period mortgage that is rolled over each period. The mortgage has an interest rate of $r^f + r^m$, where $r^m \geq 0$ is the mortgage premium. Households will never simultaneously hold both a mortgage and save in the risk-free bond since the mortgage premium is positive. We let b denote the net position in bonds. The effective interest rate is r^f for net savers and $r^f + r^m$ for borrowers

6.1.2 Household optimization

We now outline the decision problem for households with non-wealthy parents. For readability, we denote all one-period-ahead variables with primes ($'$).

Budget equation All households choose consumption c and a net bond position b. Renters pay rent while homeowners have the value of their house on their balance sheet. Changing housing status involves transaction costs. For a household with wealth x and income y, the budget equation is

$$x + y = c + b + tc(p, s, h, s', h') + (1 - s')\kappa ph' + s'ph' \tag{18}$$

Evolution of wealth Next-period wealth is given by the net position in bonds and the stochastic market value of owner-occupied housing net of depreciation

$$x' = b(1 + r(b)) + s'p'h'(1 - \delta) \tag{19}$$

Decision problems There are five discrete choices. Current renters choose to rent or own and current owners choose to sell and rent, sell and buy, or remain in the current house.

A household solves

$$V(x,h,s,\nu,p,a) = \max_{c,h',b',s'} \{u(c,h') + \mathcal{B}\mathbb{E}\left[V(x',h',s',\nu;,p',a+1)\right]\} \tag{20}$$

subject to

$$c > 0 \tag{21}$$
$$h' \in \mathcal{H}(s') \tag{22}$$
$$s' \in \{0,1\} \tag{23}$$
$$b' \geq -LTVph's' \tag{24}$$
$$\frac{b'}{y} \geq -LTIs' \tag{25}$$

and the budget constraint and the law of motion (equations (18) and (19)). If the household chooses to rent ($s' = 0$), the last two constraints collapse to a single no-borrowing constraint.

6.1.3 Modelling parental support

To be consistent with the empirical strategy, exactly half of the households in our model are assumed to have wealthy parents. Parental support is exogenous and takes the form of a financial transfer, in line with our empirical findings. We model two different forms of transfers, an initial transfer or an annual transfer, to allow for different transfer timing.

Initial transfer We first consider an initial one-time transfer, modelled as an additional cash endowment that households hold at the beginning of adulthood, $\tau_{T^s}^{PW}$. For households with non-wealthy parents, $\tau_{T^s}^{PW} = 0$. Modelling intergenerational transfers as a once-and-done transfer occurring when households enter working life is a standard way to model intergenerational persistence, see e.g., Lee and Seshadri (2019).

Annual transfer The second form of parental support we consider is instead an annual transfer, τ^{PW}, every year from $t = T^s$ for twenty years. For households with non-wealthy parents, $\tau^{PW} = 0$. Frequent transfers is normally a prediction of models with altruistic parents and children (e.g., Altonji et al. (1997); Barczyk et al. (2022)), and is consistent with empirical transfer patterns (McGarry, 2016).

6.2 Parameterization

Our parameterization strategy consists of three steps. First, we fix the external parameters, i.e., parameters we can set without relying on model dynamics and that are common across all types of households. Second, we internally calibrate two preference parameters, the discount factor $\mathcal{B}$ and the ownership utility premium χ, to match homeownership and financial wealth at different ages. Here we match moments for households with below-median wealthy parents. Third, we pick the parental support parameters to match the net housing channel of intergenerational wealth persistence as specified in equation (7) in Section 4.1. Model parameters are reported in Appendix Table D.1, and we relegate the discussion of the standard first step to Appendix D.2.

6.2.1 Internal calibration

In the second step we choose the remaining preference parameters to match life-cycle moments of wealth and homeownership for households with non-wealthy parents. Specifically, we set the discount factor $\mathcal{B}$ and the utility shifter for homeownership χ by targeting the homeownership rate and financial wealth at *each* age between 25 and 45. The moments are calculated as the average across our sample of households with non-wealthy parents. Appendix Figure D.1 shows the empirical moments along with the corresponding model-implied moments for wealth and homeownership. The calibrated model matches the empirical moments quite well, but it somewhat over-predicts both financial wealth and homeownership rates as households become middle-aged.

6.2.2 Calibrating parental parameters

We choose our parental transfer parameters, $\tau_{T^s}^{PW}$ and τ^{PW} to match the estimated housing channel of intergenerational wealth persistence as defined in equation (7) in Section 4. Specifically we target a net housing channel of $\beta_1\alpha_4 = 0.02$, which means that households with richer parents are two percentage points more likely to be rich themselves at midlife, due to better housing outcomes as a *result* of higher parental wealth. We here perform the same regressions on model data as we did on the actual data, details in Appendix D.3. The transfer parameters are well identified since higher transfers increase the effect of parental wealth on housing β_1, while leaving the positive relationship between housing outcomes and midlife wealth α_4 almost unchanged. The results are reported in Table 8.

	Data	Model	
		Initial Transfer	Annual Transfer
Net housing channel	**0.02**	**0.02**	**0.02**
sum(α)	0.45	0.75	0.74
sum(β)	0.20	0.12	0.11

Table 8: Mediation analysis in the data and in the model

Notes: The net housing channel is $\sum_{j=27,30,33,36} \alpha_{4,j}\beta_{1,j}$, where $\alpha_{4,j}$ is the effect of homeownership on wealth and $\beta_{1,j}$ is the impact of parental wealth on homeownership, at age j.

We set the initial transfer $\tau_{T^s}^{PW} = 39.3$ and the annual transfers $\tau^{PW} = 1.14$ to replicate a net housing channel of intergenerational wealth persistence of two percentage points, as seen from the first row of Table 8. These transfer parameters imply life-time values of roughly \$40,000 and \$17,000 respectively, using the discount factor $\mathcal{B}$ over 20 years for the annual transfers. The life-time value of the initial transfer is larger because young households to a greater extent are constrained from smoothing consumption intertemporally. Hence, when households receive their entire transfer at a very young age, they spend less on housing and more on consumption than if part of the transfer is paid out later. Also note that housing is more important for wealth accumulation in the model than in the data (larger α's), while parental wealth is somewhat less important for housing. The latter reflects that in these models, all households become owners when they are sufficiently wealthy, which diminishes the link between parental wealth and housing outcomes.

Are the implied transfer sizes reasonable? Brandsaas (2021) finds the mean transfer size for housing purposes in PSID data to be roughly \$4,000. However, there are two reasons why our calibrated transfers should be larger. First, house prices are considerably higher in Norway than in the US – about three times higher per square foot.[25] Second, we target the *total* impact of parental support, while direct transfers in practice are only one of many support forms.

6.3 Counterfactual exercises

In this section we run two experiments to better understand how the housing channel of intergenerational wealth persistence depends on features of the housing market. First, we

[25]For example, in 2017 the median listing price per square feet in the US was \$132 while the average sale price per square feet in Norway was about \$400. Sources: National Association of Realtors (FRED mnemonic `medlispripersqufeeus`) and Statistics Norway (Table `06035`)

explore the role of house price growth and show that lower house price *expectations* – and subsequent adjustments of financial portfolios and leverage – substantially reduce the housing channel. Second, we explore how mortgage regulation affects the housing channel.

6.3.1 The effect of house price growth

Understanding how house price growth affects intergenerational wealth persistence is important for two reasons. First, house price growth in Norway has been relatively high in recent decades. Considering the impact of lower house price growth is therefore interesting for external validity and for contemplating what the housing channel of intergenerational wealth persistence might look like in the future. Second, policy makers have several tools that influence house price growth, such as building restrictions, mortgage regulation and tax incentives (Duca et al., 2021). A better understanding of how house price growth affects wealth persistence is therefore key to an informed policy debate.

As a counterfactual scenario, we change average house price growth to $\mu = 0.015$, which is the estimate in Cocco (2005) for the United States, almost halving price growth from its value of 0.0288 in our sample. We consider two experiments. First, we keep policy functions unchanged, and only alter realized house price growth. This isolates the impact of lower house price growth, without letting households adjust their behavior in anticipation of it. That is, expected house price growth is kept unchanged. Second, we re-solve the model to obtain new policy functions when both realized *and* expected house price growth are reduced.

The results are illustrated in Figure 5, while Appendix Figure D.3 plots the α and β coefficients separately. As price growth falls – with expectations remaining unchanged – the housing channel of intergenerational wealth persistence slightly declines for both types of parental support. The reduction is driven mostly by a lower impact of housing on wealth (α_4), and less by the impact of parental wealth on housing (β_1) - see Appendix Figure D.3. Intuitively, with lower realized price growth, the relationship between housing and midlife wealth is weakened, while there is little change in the relationship between parental wealth and housing outcomes as household behavior is kept unchanged.

Next, when house price *expectations* change as well, the housing channel of intergenerational wealth persistence declines further to 0.5-1.5 percentage points. The decline is larger for the case of the initial transfer than the annual transfer, reflecting the importance of parental support early in life. The large drop in the housing channel when house price expectations fall highlights the crucial importance of endogenous responses to house price growth. In anticipation of high price growth (the benchmark), everyone would like to invest in housing early in life, but they are limited by borrowing constraints. Transfers from parents allow young households to invest earlier, which then yields higher wealth later in life due to the high realized price growth. With lower expected house price growth, this channel is weakened as households adjust their portfolios and leverage by buying less housing and borrowing less. The intuition is confirmed in Appendix Figure D.3, where we see that the decrease in the housing channel is driven mainly by a weakened relation between parental wealth and housing outcomes at young ages.

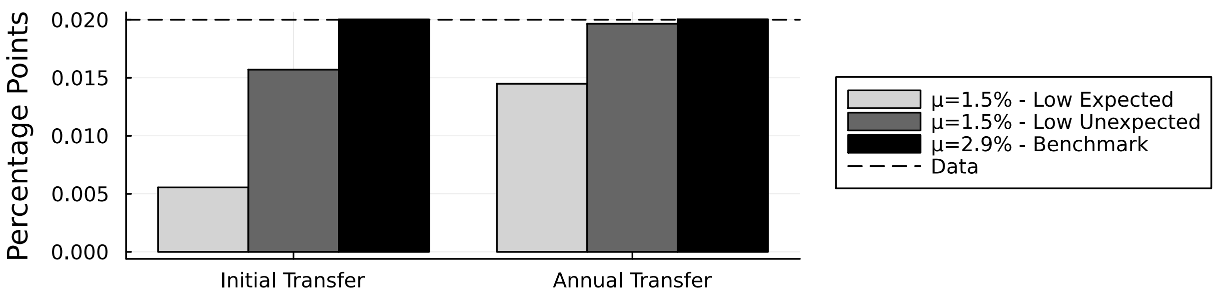


Figure 5: The housing channel of intergenerational wealth persistence and house price growth

Notes: This figure plots the net housing channel of intergenerational wealth persistence as we lower actual and expected house prices.

6.3.2 The effect of mortgage regulation

Finally, we use the model to quantify the impact of downpayment requirements on the effect of parental wealth on children's housing outcomes and wealth. There are two offsetting effects at play. First, stricter requirements increase the need for parental housing support, e.g., Blickle and Brown (2019). Second, stricter requirements mechanically reduce household leverage, thereby decreasing the potential for levered capital gains on received transfers. We find that tighter regulation *increases* the housing channel of intergenerational wealth persistence, suggesting that the former effect dominates. Our results further indicate that relaxing loan-to-value (LTV) constraints is more efficient than relaxing loan-to-income (LTI) constraints in reducing the housing channel of intergenerational wealth persistence.[26] The reason is that the housing channel is driven by young, high-income households, who use parental support mainly to circumvent the LTV-cap.

We first consider a scenario where the maximum LTV ratio is tightened from 90% to 70-85%. As seen from the left panel of Figure 6, this tightening increases the housing channel, especially when parental support comes as an initial transfer. In this case, tightening the minimum downpayment from 10% to 30% doubles the housing channel of intergenerational wealth persistence from two to four percentage points. Next, we tighten the LTI constraint,

[26] Our analysis is "an all else equal" analysis. For a detailed discussion on how mortgage regulation affects house prices we refer to Kaplan et al. (2020); Greenwald and Guren (2021).

see the right panel of Figure 6. In this case the impacts are considerably smaller. In fact, for the annual transfer, tightening the maximum LTI ratio from five to four has virtually no effect on the housing channel. For the initial transfer, the impact is slightly higher, and qualitatively consistent with the impact of a tighter LTV-constraint.

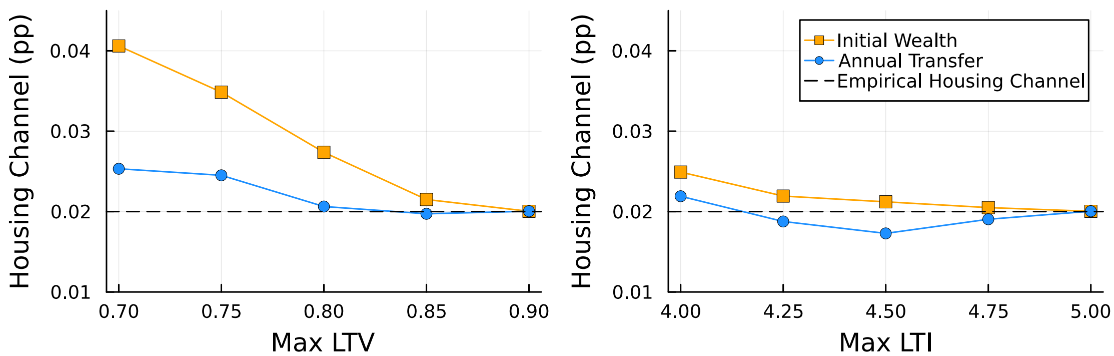


Figure 6: The housing channel of intergenerational wealth persistence and mortgage market regulation

Notes: This figures plots the net housing channel of intergenerational wealth persistence as we vary the maximum loan-to-value and debt-to-income.

Why are the effects larger when parental support takes the form of an initial transfer? As seen from Appendix Figure D.4, the impact of homeownership on wealth (i.e. the α's) does not depend on which type of parental support households receive and is only modestly affected by tightening the mortgage regulation. Thus, the change in the housing channel is mainly driven by changes in the relationship between parental wealth and housing (i.e. the β's). With an initial transfer, parental support becomes much more important as the LTV or LTI tightens, especially for the youngest age groups. The reason is that only households receiving a large initial transfer are able to purchase a home at a young age when regulation becomes stricter. For older age groups, or when support comes in the form of small annual transfers, parental support does not lead to a similarly large increase in homeownership rates.

7 Summary

We have documented large gaps in housing outcomes by parental wealth. Roughly half of these gaps can be explained by household attributes, while other observable parental attributes than wealth play a modest role. Even after controlling for a rich set of variables, we find that households with richer parents are nearly 15% more likely to be homeowners at age 30. Moreover, when they enter the housing market, they buy homes worth 15% more with nearly 10% higher leverage. Plausibly exogenous variation in parental wealth due to international stock market returns support a causal impact of parental wealth on housing outcomes.

Using a structural mediation framework to explore wealth persistence across generations, we find that housing is an important driver. In fact, 1/4 of intergenerational wealth persistence is attributed to housing outcomes. Half of this effect is due purely to parental wealth. As a result, 12% of the persistence in wealth across generations is due to the direct impact of parent wealth on homeownership. This is the same magnitude as the impact of parent wealth on a wide range of household characteristics, including income and education. In terms of mechanisms, we find evidence of richer parents supporting their offspring through home equity withdrawals, liquidity provision, co-purchasing, and by selling housing directly to their offspring at substantial (unreported) price discounts.

We build a life-cycle model with housing and exogenous parental support which matches our main empirical findings. Through the lens of our model, we find that lower house price growth reduces the magnitude of the housing channel of intergenerational wealth persistence. *Expected* house price growth and consequent portfolio adjustments, are key drivers of this reduction. When house prices are expected to rise, parental transfers allow the young households to get around borrowing constraints and make leveraged housing investments. We further show that tighter mortgage regulation, especially stricter LTV-caps, feeds the housing channel of intergenerational wealth persistence. This is driven by parental support becoming more decisive for homeownership, especially for younger households with relatively high income. When constraints are tightened, it becomes even more important to receive parental transfers to benefit from expected house price growth.

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A Additional figures and tables

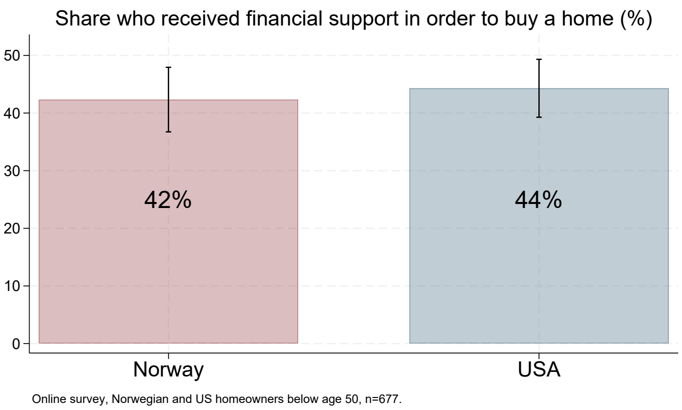
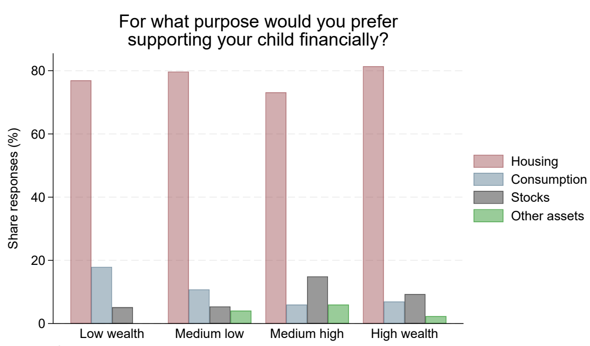
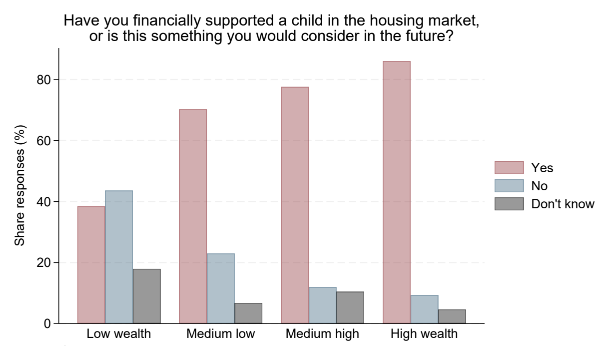


Figure A.1: Share of homeowners who report receiving financial support from parents or grandparents when buying a home (%). Online survey.

Notes: The figure shows results from an online survey conducted on the survey platform Survey Monkey. The sample consists of 300 respondents in Norway and 377 respondents in the US. All respondents are homeowners below age 50. The figure shows the share (%) of respondents receiving financial support from parents or grandparents when buying a home.



(a) Preferred financial support form



(b) Attitudes towards housing support

Figure A.2: Survey responses by (self-reported) wealth

Notes: The figure shows results from an online survey conducted on the survey platform Survey Monkey. The sample consists of 240 individuals residing in Norway, aged 40+, with children. Panel (a) shows results for the preferred way of providing financial support to a child. Panel (b) shows results for whether the parents have or plan to support their child in the housing market.

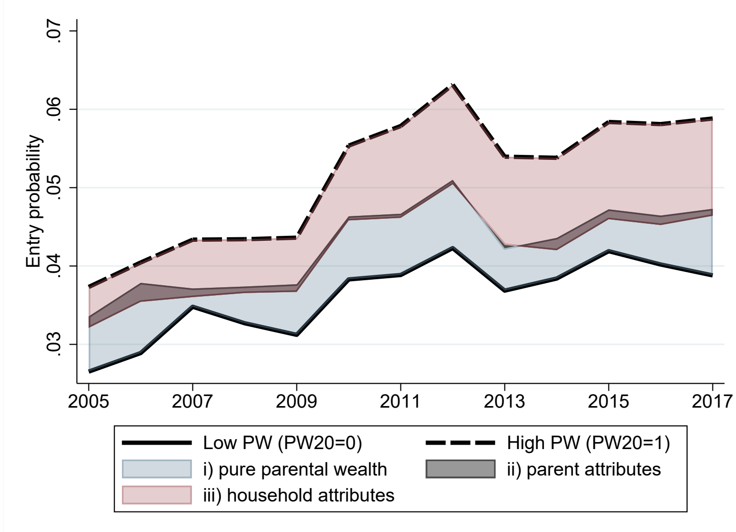
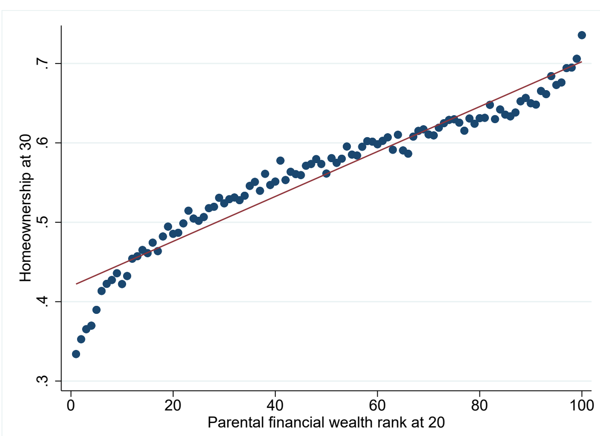
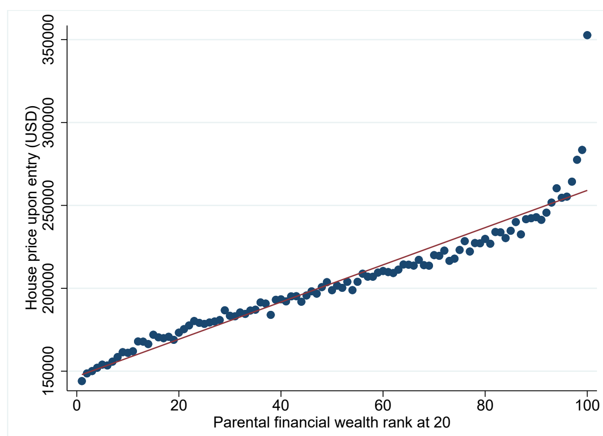


Figure A.3: Entry probability by parental wealth: decomposed into channels i)-iii) as in equation (2).

Notes: The figure shows the entry probability for households with parental wealth below and above the median. The entry probability gap is then decomposed into three observable components, pure parental wealth, parental attributes and households attributes, in accordance with equation (2). h_i is the probability of entering the housing market. $p_i^{w20} = 1$ if average parental financial wealth when household is aged 19-21 is above the year-specific threshold, p_i^o is parent income, education, location and number of children, x_i is hh income, financial wealth, education, location and number of hh members. Sample consists of households not in the housing market or entering the housing market.



(a) Homeownership at age 30



(b) Purchase price upon entry (USD)

Figure A.4: Housing outcomes by parental wealth rank (1-100)

Notes: Parental wealth rank from 1 to 100 is calculated based on the year-specific distribution of parental financial wealth when the child is aged 19-21.

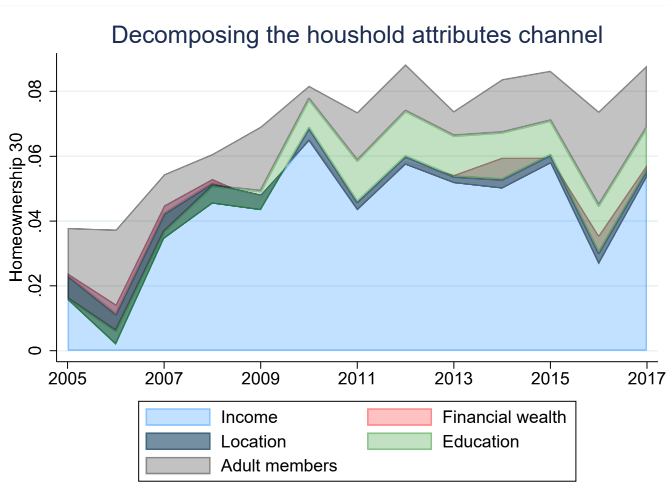
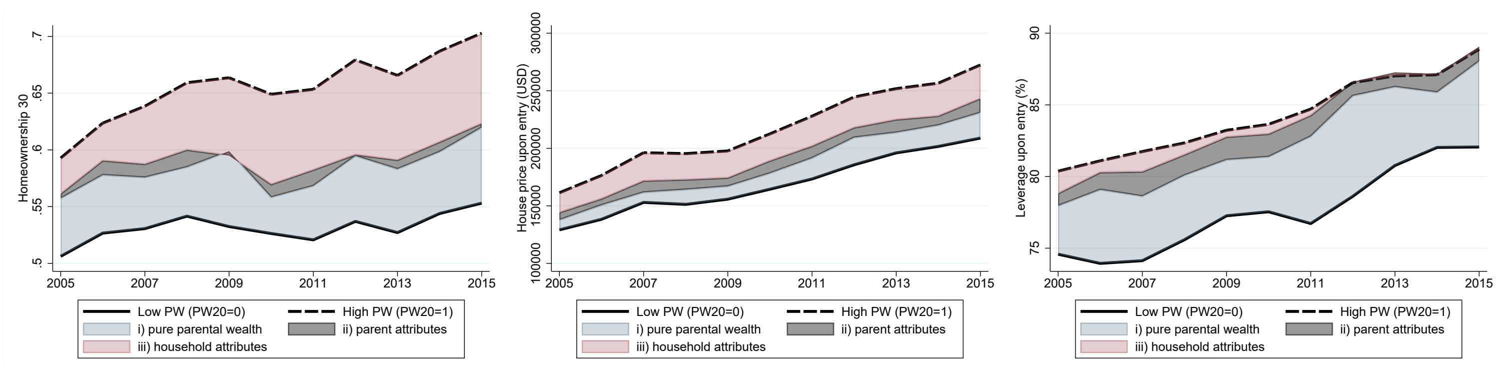


Figure A.5: Homeownership at 30 by parental wealth at 20: the household attributes component in equation (2)

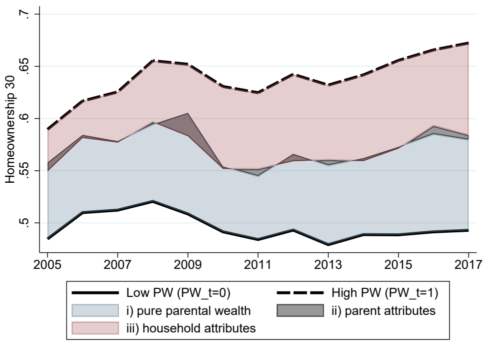
Notes: The figure decomposes the household attribute component in equation (2). Household attributes are decomposed into household income, location, member of adults in the household, the household education level and household financial wealth. h_i is a homeownership indicator at age 30. Sample consists of 30-year old's.



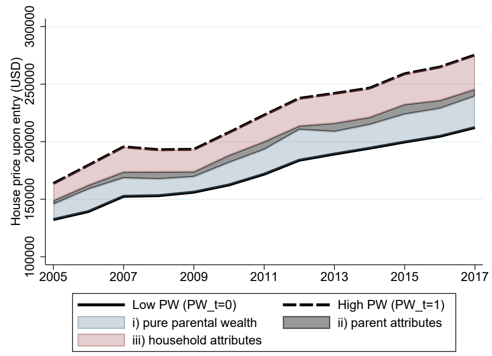
(a) Homeownership at age 30 (b) Purchase price upon entry ($) (c) Leverage upon entry (%)

Figure A.6: Housing outcomes by parental wealth at age 20: decomposed into channels i)-iii) as in equation (2). Future household income growth and risky asset shares for parents and offspring as additional control variables.

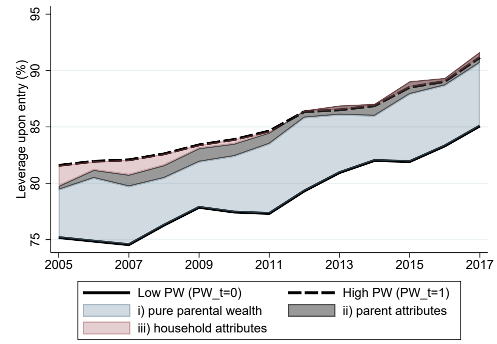
Notes: The figure shows housing outcome gaps, decomposed into three observable components, pure parental wealth, parental attributes and households attributes, in accordance with equation (2). $p_i^{w20} = 1$ if average parental financial wealth when the household is aged 19-21 is above the year-specific median, p_i^o is parent income, education, location, number of children and risky asset share, x_i is hh income, financial wealth, education, location, number of adult household members, risky asset share and two-year future income growth. The sample behind (a) consists of 30-year old households. The sample behind (b) and (c) consists of only households entering the housing market.



(a) Homeownership at age 30



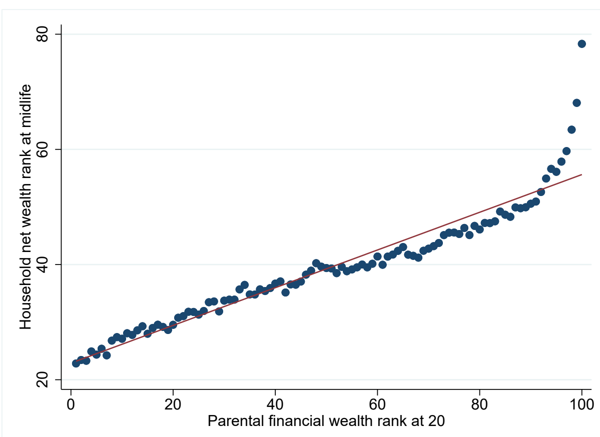
(b) Purchase price upon entry ($)



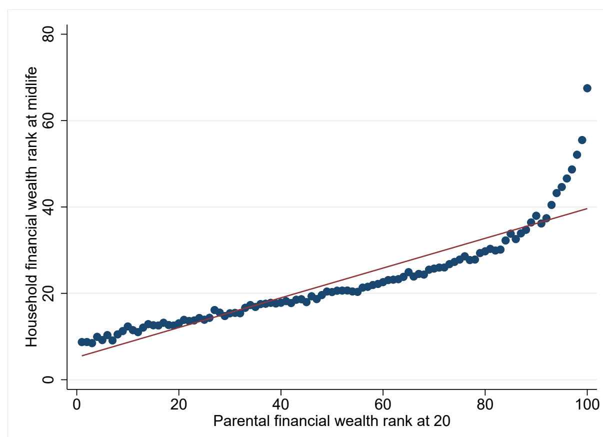
(c) Leverage upon entry (%)

Figure A.7: Housing outcomes by parental wealth at $t-1$: decomposed into channels i)-iii) as in equation (2)

Notes: The figure shows housing gaps decomposed into three observable components, pure parental wealth, parental attributes and households attributes, in accordance with equation (2). $p^w_{i,t-1} = 1$ if average parental financial wealth in year $t-1$ is above the year-specific median, p^o_i is parent income, education, location and number of children, x_i is hh income, financial wealth, education, location and number of adult household members. The sample behind (a) consists of 30-year old households. The sample behind (b) and (c) consists of only households entering the housing market.



(a) Household net wealth



(b) Household financial wealth

Figure A.8: Household wealth ranking (1-100) in early 40s by parental financial wealth ranking (1-100) when child is 19-21.

Notes: The figure shows household net wealth ranking (panel (a)) and household financial wealth ranking (panel (b)) by parental financial wealth ranking when child is 19-21. Household wealth in early 40s is ranked from 1-100 based on the year-specific distribution after removing age effects. Parental financial wealth when the (child) household is 20 years is ranked from 1-100 based on the year-specific distribution.

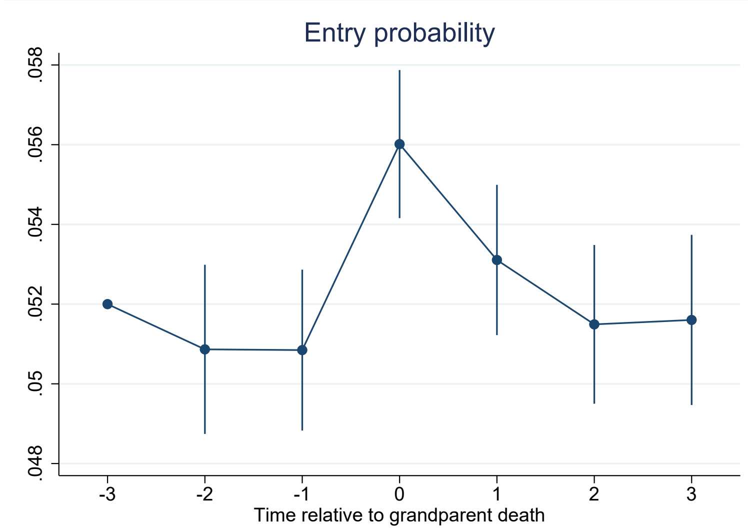


Figure A.9: Event study around grandparent death - only households not inheriting their grandparents house

Notes: Regression results from estimating equation (8) with $y_{i,t}$ = entry probability$_{i,t}$. Sample: households who experience exactly one grandparent death in the sample period - households entering the housing market in the same municipality as their deceased grandparent resided are excluded from the sample.

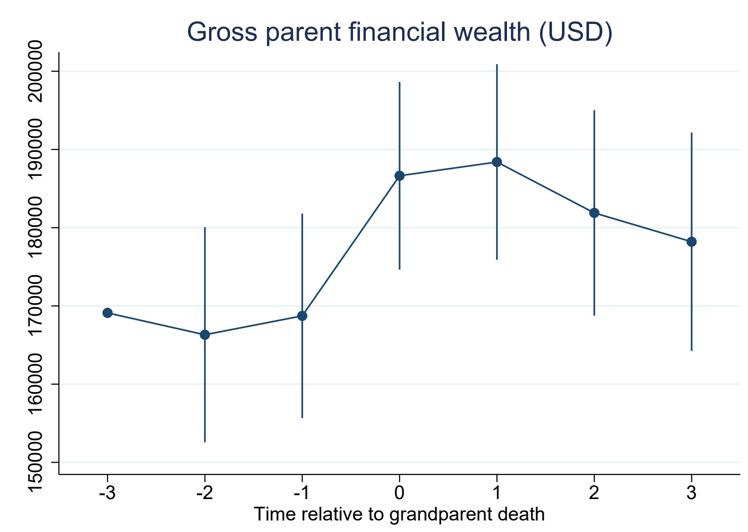


Figure A.10: Event study around grandparent death

Notes: Regression results from estimating equation (8) with $y_{i,t}$ equal to gross parent financial wealth. Sample: households who experience exactly one grandparent death in the sample period.

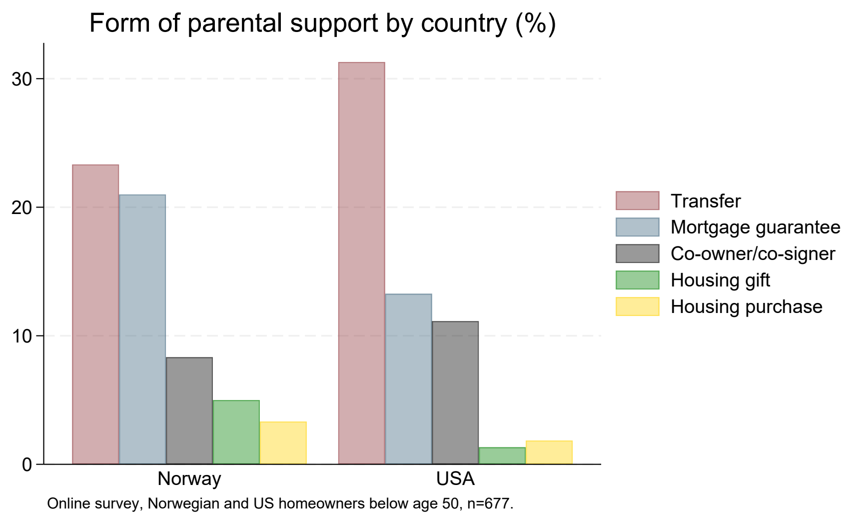


Figure A.11: The share of respondents receiving different forms of parental or grandparental housing support (%).

Notes: The figure shows results from an online survey conducted on the survey platform Survey Monkey. The sample consists of 300 respondents in Norway and 377 respondents in the US. All respondents are homeowners below age 50. The figure shows the share (%) of respondents receiving various form of parental or grandparental housing support.

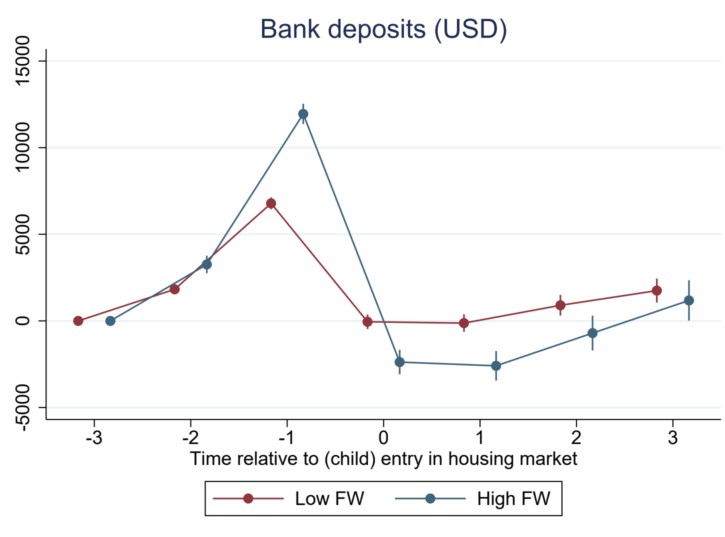


Figure A.12: Bank deposits (USD). Event study around housing market entry (t=0)

Notes: This figure shows the evolution of bank deposits around time of entry into the housing market. $entry_{i,t} = 1$ if household i purchases a house in year t and did not own housing in year $t-1$, while $entry_{i,t} = 0$ if household i did not purchase a house in year t and did not own housing in year $t-1$. "Low FW" ("High FW") means average parent financial wealth when the household is aged 19-21 is below (above) the year-specific median.

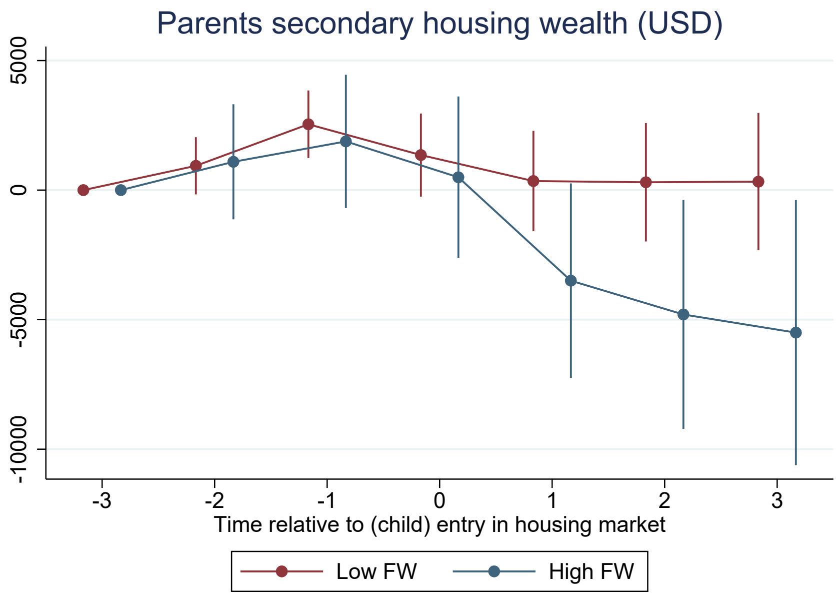


Figure A.13: Event study: parental secondary housing wealth (USD).

Notes: The figure shows an event study on parental secondary housing wealth around (child) housing market entry. Entry: $entry_{i,t} = 1$ if household i purchases a house in year t and did not own housing in year $t-1$, $entry_{i,t} = 0$ if household i household i did not purchase a house in year t and did not own housing in year $t-1$. "Low FW" ("High FW") means average parent financial wealth when the household is aged 19-21 is below (above) the year-specific median.

	(1) $\bar{w}$	(2) $city^p$	(3) $income^p$	(4) $educ^p$	(5) $children^p$	(6) entry-age	(7) hprice	(8) income	(9) educ	(10) city	(11) hh members
p^{w20}	0.0846***	0.0280***	43627.9***	0.115***	-0.0433***	-0.268***	93206.2***	20926.9***	0.150***	0.0714***	0.145***
	(0.0103)	(0.0044)	(1645.9)	(0.00696)	(0.0135)	(0.0590)	(3664.8)	(918.4)	(0.00724)	(0.00618)	(0.00490)
owner-27	0.0269**										
	(0.0115)										
owner-30	0.0400***										
	(0.0127)										
owner-33	0.1081***										
	(0.0157)										
owner-36	0.2780***										
	(0.0157)										
$city^p$	0.0680***										
	(0.0240)										
$income^p$	8.90e-08*										
	(4.91e-08)										
$educ^p$	0.0125										
	(0.0113)										
income	1.80e-08										
	(8.49e-08)										
educ	0.0644***										
	(0.0105)										
city	0.123***										
	(0.0127)										
hh members	0.0362**										
	(0.0158)										
$children^p$	-0.0203***										
	(0.0053)										
N	8,909	8,909	8,909	8,909	8,909	8,909	8,909	8,909	8,909	8,909	8,909

Table A.1: Regression results from estimating equation (5) (Col.1) and the covariance-terms in equation (6) (Col.2-11).

Intergenerational wealth persistence	0.33 (100%)
Parental wealth channel	0.20 (61%)
Parental attributes channel	0.02 (6%)
Household attributes channel	0.05 (15%)
Gross housing channel	0.06 (18%)
Net housing channel	0.03 (9%)

Table A.2: The importance of various channels of intergenerational wealth persistence. Rank-rank analysis.

Notes: The table shows results for decomposing intergenerational wealth persistence into a parental wealth channel, parental attribute channel, household attribute channel and gross housing channel as defined in equation (6). The gross housing channel can further be decomposed into a net housing channel as in equation (7). Parental wealth is the rank from 1-100 based on average financial wage when the household is 19-21. Household wealth is the rank from 1-100 based on midlife net wealth. Parental attributes are education, income, location and number of children. Household attributes are education, income, location and number of adult household members. Housing market measures are homeownership indicators at ages 27, 30, 33 and 36.

	h = Price & LTV	h = Price, LTV & Age
Intergenerational wealth persistence	0.19 (100%)	0.19 (100%)
Parental wealth channel	0.10 (53%)	0.10 (53%)
Parental attributes channel	0.01 (5%)	0.01 (5%)
Household attributes channel	0.06 (32%)	0.04 (21%)
Gross housing channel	0.02 (11%)	0.04 (21%)
Net housing channel	0.02 (11%)	0.03 (16%)

Table A.3: The importance of various channels of intergenerational wealth persistence. Intensive margin of homeownerhsip.

Notes: The table shows results for decomposing intergenerational wealth persistence into a parental wealth channel, parental attribute channel, household attribute channel and gross housing channel as defined in equation (6). The gross housing channel can further be decomposed into a net housing channel as in equation (7). Parental wealth is p^{w20}. Parental attributes are education, income, location and number of children. Household attributes are education, income, location and number of adult household members. Housing market outcomes are purchase price and leverage upon entry (Column 2) or purchase price upon entry, leverage upon entry and age of entry (Column 3).

	$\bar{w} = \{0, 1\}$		$\bar{w}$-rank		$\bar{w}$ in USD	
Net wealth	IV	OLS	IV	OLS	IV	OLS
Age of entry	-0.019***	-0.013***	-2.04***	-1.67***	-9,558***	-7,218***
	(0.0072)	(0.0017)	(0.5598)	(0.1210)	(3,664)	(792)
Real wealth	IV	OLS	IV	OLS	IV	OLS
Age of entry	-0.012**	-0.017***	-1.553***	-1.559***	-13,486***	-9,504***
	(0.0048)	(0.0010)	(0.4320)	(0.0934)	(2,847)	(613)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	5,057	5,057	5,057	5,057	5,057	5,057

Table A.4: The impact of age of entry on midlife wealth. Excluding households who inherit their deceased grandparents house at entry.

Notes: This table reproduces Table 4 except households who enter the housing market in the same municipality as their deceased grandparent resided are excluded from the sample.

	Age of entry
Age GP-death$_i$	0.198***
	(0.0113)
F-stat	308
Controls	Yes
N	7,069

Table A.5: First stage: impact of age of grandparent death (Age GP-death) on age of entry in the housing market.

Notes: Regression results from estimating equation (9). The F-statistic for the significance of age of grandparent death is 308. Control variables include parent income, education, location and number of children, as well as household income, financial wealth, education, location and number of household members. Control variables are measured in ones early 40s. Sample: households experiencing exactly one grandparent death in sample period.

	$\bar{w} = \{0,1\}$		$\bar{w}$-rank		$\bar{w}$ in USD	
Net wealth	IV	OLS	IV	OLS	IV	OLS
Age of entry	-0.048*	-0.010***	-4.46***	-1.37***	-26,895**	-6,593***
	(0.0248)	(0.0018)	(1.95)	(0.142)	(11,016)	(785)
Real wealth	IV	OLS	IV	OLS	IV	OLS
Age of entry	-0.010	-0.016***	-3.02**	-1.25***	-33,753***	-7,504***
	(0.0149)	(0.0011)	(1.42)	(0.106)	(10,514)	(697)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	4,113	4,113	4,113	4,113	4,113	4,113

Table A.6: The impact of age of entry on midlife wealth. Controlling for financial wealth at ages 30, 35 and 40.

Notes: This table reproduces Table 4 except three extra control variables are added: financial wealth at ages 30, 35 and 40.

	$\bar{w} = \{0,1\}$		$\bar{w}$-rank		$\bar{w}$ in USD	
Net wealth	IV	OLS	IV	OLS	IV	OLS
Age of entry	-0.015	-0.013***	-1.94***	-1.23***	-19,614**	-6,086***
	(0.0095)	(0.0022)	(0.702)	(0.164)	(8,471)	(1,964)
Real wealth	IV	OLS	IV	OLS	IV	OLS
Age of entry	-0.012*	-0.016***	-1.52***	-1.29***	-12,290***	-7,624***
	(0.0065)	(0.0015)	(0.551)	(0.129)	(3,440)	(800)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	2,580	2,580	2,580	2,580	2,580	2,580

Table A.7: The impact of age of entry on midlife wealth. Excluding those with increase in financial wealth at time of grandparent death.

Notes: This Table reproduces Table 4 except households which increase financial wealth from $t = -1$ to $t = 0$ are excluded from the sample.

	(1) House purchase price
Square meters	1,557***
	(15)
Number of rooms	12,417***
	(473)
Number of bathrooms	39,587***
	(1,549)
N	98,809
Municipality FE	Yes
Year FE	Yes
R^2	0.28

Table A.8: Predicting house prices (USD) based on equation (11).

Notes: Estimates from regressing the house purchase price on household attributes. Sample: only houses reportedly sold at market value and excluding sales from parent to child.

B Simple example: investing in housing vs. stocks

In this appendix we provide some simple calculations meant to illustrate and quantify the role of leverage in driving the high (ex-post) return on housing equity in the Norwegian market. The solid lines in Figure B.1 show that the international stock market (measured by the S&P500) has outperformed the Norwegian housing market in terms of price gains over the coverage period 1992-2017. However, onze we account for the stylized fact that housing investments are typically highly levered, the return on housing equity is found to exceed the return on stocks. Specifically, we compare the following two investments:

1. Invest $100 in 1992 as a downpayment on a house worth $1,000, implying an initial leverage of 0.9. Pay an annual interest rate on the mortgage, and pay down 1/25 of the mortgage each year over the next 25 years.

2. Invest $100 in stocks in 1992, at zero leverage. Each year, invest an additional amount equal to the interest rate cost in 1.

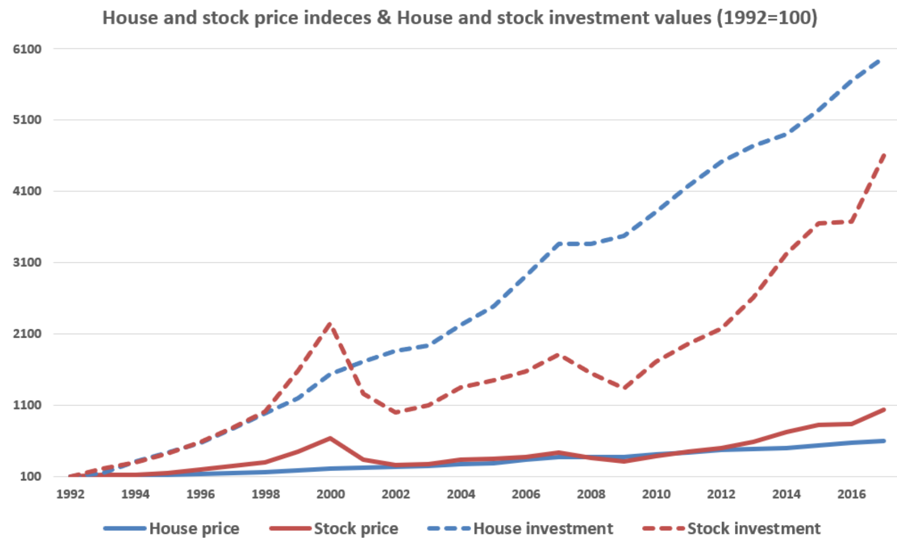


Figure B.1: Equity from investment strategies 1 and 2

The dashed lines in Figure B.1 depict the equity from investment strategies 1 and 2. Investing the \$100 in housing leaves you with \$6,000 twenty-five years later, compared to \$4,600 if you invest in stocks. The higher return in the housing market is conditional on a modest average leverage ratio of 0.26 – below that seen in the data.

The above calculations ignore the riskiness of the investment. While the stock market has the highest realized return, is also has a substantially higher volatility. Assuming a risk-free rate of return of 2%, we calculate a Sharpe-ratio of 1.3 for the Norwegian housing market, compared to 0.5 for the international stock market.

C Online survey

C.1 Survey on homeowners in Norway and the US

The survey was conducted through the survey platform Survey Monkey in November 2023, and consisted of 300 respondents in Norway and 377 respondents in the US. All respondents were homeowners below the age of 50.

1. Have you ever received financial support (such as help with a down payment requirement) in order to buy a home?

    - Yes, from parents or grandparents ($n_{USA} = 167$, $n_{NOR} = 127$)
    - Yes, from other sources ($n_{USA} = 58$, $n_{NOR} = 56$)
    - No, never ($n_{USA} = 152$, $n_{NOR} = 117$)

2. If you have received financial support from parents or grandparents in order to buy a home, what type of support was this?

    - Financial transfer, such as gift or inheritance ($n_{USA} = 118$, $n_{NOR} = 70$)
    - Having someone guarantee for the mortgage ($n_{USA} = 50$, $n_{NOR} = 63$)
    - Having someone co-own the house and/or co-sign the mortgage ($n_{USA} = 42$, $n_{NOR} = 25$)
    - Received house as gift/inheritance ($n_{USA} = 5$, $n_{NOR} = 15$)
    - Bought the house from your parents/grandparents (potentially at a discount) ($n_{USA} = 7$, $n_{NOR} = 10$)
    - Not applicable ($n_{USA} = 155$, $n_{NOR} = 113$)

C.2 Survey on parents in Norway

The survey was conducted through the survey platform Survey Monkey in October 2023, and consisted of 240 respondents. All respondents were parent above the age of 40, residing in Norway.

1. For what purpose would you prefer supporting your child financially?

    - Invest in housing (n=186)
    - Invest in stocks (n=21)
    - Invest in other assets (n=9)
    - Cover general expenses (n=24)

2. Have you financially supported a child in the housing market, or is this something you would consider in the future?

    - Yes (n=165)
    - No (n=50)
    - Don't know (n=25)

3. If you were to support your child financially in entering the housing market, how would you prefer to do it?

    - Transfer money as a gift or early inheritance (n=71)
    - Give housing directly to child (n=39)

- Sell housing directly to child (n=6)
- Become a co-owner and/or co-mortgagor (n=57)
- Guarantee for the mortgage (n=62)
- Other (n=5)

4. What is the combined net wealth of you and your co-parent? Net wealth refers to the value of all your assets less debt.

    - Less than NOK 500,000 (n=39)
    - NOK 500,000 - NOK 2 mill. (n=74)
    - NOK 2 mill. - NOK 5 mill. (n=67)
    - More than NOK 5 mill. (n=43)
    - Prefer not to answer (n=17)

D Model Appendix

Parameter		Value	Source
Externally Calibrated			
σ_{ν}^{2}	Var. pers. inc. shock	0.012	Fagereng et al. (2017)
σ_{ν}^{2}	Var. trans. inc. shock	0.023	Fagereng et al. (2017)
ρ	Shock persistence	0.95	Standard
ϕ_{ret}	Replacement Ratio	0.842	Fagereng et al. (2017)
$f(a)$	Life-cycle income	Fig. D.2d	Fagereng et al. (2017)
$\underline{c}$	Consumption Floor	NOK100,000	Welfare system
n/a	Initial Wealth	Fig. D.2c	Fagereng et al. (2017)
p_{ini}	Initial house price	89.78	Own calculation
T^{s}	Starting age	22	
T^{r}	Retirement age	67	Fagereng et al. (2017)
T^{d}	Final age	100	
m_{b}	Purchase cost	0.025	Yao et al. (2015)
m_{s}	Sales cost	0.025	Yao et al. (2015)
κ	Rent-to-price ratio	0.044	Own calculation
r^{f}	Risk-free rate	0.016	Yao et al. (2015)
r^{m}	Mortgage premium	0.039	Own calculation
LTV	Maximum loan-to-value	0.9	Regulation
LTI	Maximum loan-to-income	5.0	Regulation
δ	Depreciation	0.02	Yao et al. (2015)
μ_{h}	Price growth	0.0288	Own calculation
σ_{h}	Price std dev	0.0468	Own calculation
$\mathcal{H}(0)$	Rental sizes	$[1.0, 1.75]$	Own calculation
$\mathcal{H}(1)$	Owner-occupied sizes	$[1.75, 2.27, 3.25]$	Own calculation
η	Weight on housing	0.35	Standard
γ	Risk Aversion	2.0	Standard
Internally Calibrated			
$\mathcal{B}$	Discount factor	0.9689	Internal estimation (6.2.1)
χ	Ownership utility shift	0.0103	Internal estimation (6.2.1)
Parental Parameters			
$\tau_{T^{s}}^{PW}$	Initial transfer	39.3	Internal estimation (6.2.2)
τ^{PW}	Annual transfer	1.14	Internal estimation (6.2.2)

Table D.1: Calibrated Parameter Values

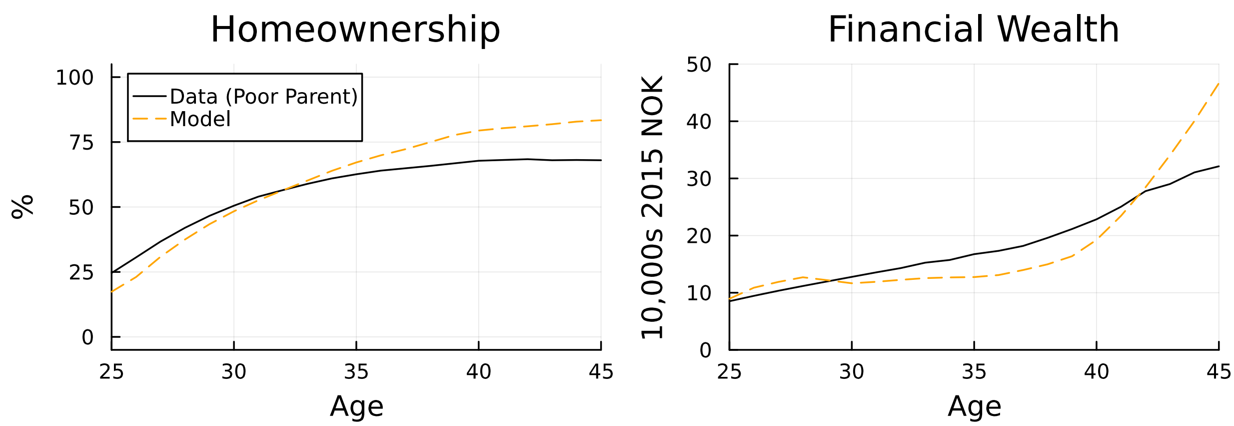


Figure D.1: Model Fit

Notes: The data plots homeownership rate and average financial wealth of households with non-wealthy parents in our sample. The model line is the equivalent for the model sample, where financial wealth is 0 for borrowers ($b < 0$) and the amount saved in bonds for savers ($b > 0$).

D.1 The implications of endogenizing parental support

In the model, parental support was treated as fixed. In this appendix we briefly discuss the implications of relaxing this assumption.

We assume that parents support their adult offspring in the housing market due to a bequest motive.[27] We consider a stylized example in which parents can choose to give ”housing bequests” b^h and ”other bequests” b^o, in which we can think of other bequests as stocks. Due to barriers of entry in the housing market, we assume that $\frac{dh}{db^h} > \frac{do}{db^o}$, i.e. that parental support is more important for becoming a homeowner than becoming a stock owner. Further, we assume that the return on housing exceeds that on stocks – in line with Appendix B – so that $\frac{d\bar{w}}{dh} > \frac{d\bar{w}}{do}$. We consider three alternative bequest motives:

1. ”Warm glow” motive: parents receive utility from giving bequests, i.e. $u(b^h + b^o)$
2. ”Altruism” motive: parents receive utility from child’s midlife wealth, i.e. $u(\bar{w})$
3. ”Homeownership” motive: parents receive utility from child’s homeownership, i.e. $u(h)$

[27] An alternative explanation is that parents support children to minimize dynasty tax payments. Specifically, due to tax valuation rules, parental ownership of secondary housing entails substantially larger wealth and property taxes than if a child owns the same house as a primary house. We find it unlikely that this is an important motivation for two reasons. First, this incentive only applies to parents who own secondary housing and chooses to transfer the home to a child which is not yet in the housing market. This group accounts for only 2% of entrants into the housing market. Second, from 2010 to 2017 (i.e. the years for which we separately observe secondary housing), the share of parents which own secondary housing while their adult child is *not* in the housing market has increased from less than seven percent to nearly eleven percent. This is the opposite of what the tax motive would predict, as the tax value of secondary housing in this period has increased from 40% to 90% (while the tax value of primary housing has remained unchanged).

We ask - what happens to parental support if the option to be a homeowner is completely removed? While this is not a policy relevant counterfactual, it nests more realistic exercises in which homeownership is made less attractive.

First, given the warm glow bequest motive, parents only care about giving, and so total bequests are the same. Second, given the altruism motive, total bequest will go down, as they are now less efficient in increasing child midlife wealth. This happens both because $\frac{dh}{db^h} > \frac{do}{db^o}$ and because $\frac{d\bar{w}}{dh} > \frac{d\bar{w}}{do}$. Third, given the homeownership motive, parents no longer have any reason for giving bequests, and so parental support falls to zero.

What are the implications for total intergenerational wealth persistence? First, keeping parental support fixed, removing homeownership from the table reduces intergenerational wealth persistence, as parental housing bequests had an especially large effect on child midlife wealth (i.e. larger than stocks). Second, if anything, parental support will *decline*, meaning that there might be an additional reduction in intergenerational wealth persistence. As such, the reductions in intergenerational wealth persistence identified in the model exercises should be viewed as lower bounds.

D.2 External Calibration

Transaction costs In Norway, home buyers pay a transaction tax ('document fee') of 2.5% of the purchase price. We therefore set $m_b = 0.025$. The main direct cost of selling is the real estate agent commission, which averages 2% (Yao et al., 2015). We set the cost to be slightly higher, $m_s = 0.025$, since sellers additionally usually pay for advertisement and other costs associated with home sales.

Income Process For the stochastic component we use the parameter values from Fagereng et al. (2017) on Norwegian data. They estimate $\sigma^2_\nu = 0.012$, $\sigma^2_\varepsilon = 0.023$, and $\phi_{ret} = 0.842$. We set $\rho = 0.95$, a standard value in the literature. We report their estimated income profile $f(a)$ in Figure D.2d. Their estimates do not account for any correlations between parental wealth and income, however. We therefore adjust the income profile $f(a)$ by the income gap between households with poor parents and the average income of all households in our data. Figure D.2d plots the results. For simplicity, we assume that income risk does not depend on parental wealth.[28]

Finally, we set the consumption floor $\underline{c} = NOK100,000$ (≈ $12,000), roughly matching what is left after subtracting rental payments from after-tax minimum disability payments.

[28] Fagereng et al. (2017) find that income risk is almost independent of education. Since education is strongly correlated with parental wealth, this suggests that any difference based on parental wealth is of limited size.

Housing Parameters To find the growth rate and volatility of house prices we use existing home price indices. We deflate the nominal index by median household income, after tax, since income is stationary in the model. We then use the observed mean growth and standard deviation to set $\mu_h = 0.0288$ and $\sigma_h = 0.0468$. Figure D.2b plots the time trends of nominal and real- and income-deflated house prices in Norway, as well as the mean growth rates and standard deviations.

We calibrate house sizes to match the 5th, 25th, 50th, and 75th percentiles of square meters of residential units, which correspond to 44, 77, 100, and 143 square meters, respectively. We normalize the smallest unit to have a size of 1. We assume that the two smallest units can be rented, so that $\mathcal{H}(0) = [1.0, 1.75]$. We then assume that only the 3 largest units can be owned, such that $\mathcal{H}(1) = [1.75, 2.27, 3.25]$.

We estimate rent-to-price ratios κ in Norway in two steps. First, we use statistics on yearly rent per square meter, by rooms in the unit and price per square meter, by type (single-family, small multifamily, and multifamily). We then divide the rent per square meter for units with 5 rooms by the single-family square meter price, the 4 room rental price by the small multi-family price, and the 3 and 2 rooms prices by the multifamily price. In the years we have data, 2012-2022, the ratios are relatively stable. We set κ equal to 0.044, the average rent-to-price ratios of these four units' series over all years, see Figure D.2e.[29]

Preference Parameters We set the preference weight on housing η to 0.35, roughly equal to the average for households aged 27-45 in Yao et al. (2015). We set the risk aversion parameter γ to 2.0, a standard value in life-cycle models.

Initial Conditions To find a household's initial financial wealth, we draw from the empirical distribution of households with non-wealthy parents, estimated non-parametrically (see Figure D.2c). We sort the net worth of households aged 20-23 with non-wealthy parents and divide them into 10 equally sized bins by gross financial wealth. Households are randomly allocated to bins and receive an initial endowment equal to the average of their bin.

We draw the households' initial productivity shock from the stationary distribution implied by equation (15). All households start as renters, but are allowed to choose to become homeowners in the first period.

Households draw the initial house price p_s from a uniform distribution. We calibrate the mean of the initial price in the following way. In the early 1990s, the average market value of a 'starter home', was about 3.5 times the average household income. Using our calibrated

[29]For similar models calibrated to the United States, a standard value is 0.05, based on Davis et al. (2008). Our somewhat lower estimate could be driven by difference in tax regulation – rental income in duplexes are tax exempt if the owner lives in one unit – and other institutional differences.

income process, the average income for households aged 20-80 is NOK 449,000 (≈ \$53,000) and so we set the average initial price equal to 89.78 for one unit of housing, so that the price of the smallest owner-occupied unit is 3.5 times the average income. The edges of the distribution are set at ±20%, so that $p_s \sim \mathcal{U}_{[0.8\times 89.78, 1,2\times 89.78]}$.

Remaining External Parameters The risk-free rate r^f is 0.016, the maximum leverage d is 0.9, the maximum debt-to-income level is 5.0, and housing depreciation δ is 0.02. We set the mortgage premium r^m to 0.039, the average spread since 1990, similar to what is found in Erard (2014).

D.3 Mimicking Empirical Regressions in the Model

To re-create the intermediation analysis in the simulated panel from the model, we perform the following analysis. We first simulate households without wealthy parents (the parental wealth dummy $p^w = 0$). We then simulate the same households, giving them the same shocks, but this time with wealthy parents ($p^w = 1$). We define $\bar{w}$ to be one if households have above median wealth at age 43. We then evaluate whether a given household owned a home at ages 27, 30, 33, and 36 to get the homeownership indicators.

To calculate the housing channel, we run two sets of regressions - exactly as in the empirical analysis. First, we regress homeownership indicators h at age j on a parental wealth dummy and household characteristics:

$$h_i^j = \beta_0^j + \beta_1^j p i^w + \beta_3^j x_i + \eta_i \text{ for } j = 27, 30, 33, 36$$

This mirrors equation (1) in Section 3, but without other parental characteristics p^o which are not relevant in our model setting. Household characteristics x_i is a vector containing the house price when the household enters the economy (related to the year and regional control variables in the empirical regression) as well as income (y) and dummies for both income shocks (ν and ϵ). All of the individual level controls are measured at age j. The β_1 parameters capture the effect of parental wealth on the probability of being a homeowner at age j.

Next, we regress midlife wealth $\bar{w}$ on parental wealth, household characteristics and homeownership indicators:

$$\bar{w}_i = \alpha_0 + \alpha_1 p_i^w + \alpha_3 x_i + \sum_{j=27,30,33,36} \alpha_4^j h_i^j + \epsilon_i$$

This mirrors equation (5) in Section 4, again leaving out the other parental attributes. The α_4's capture the effect of homeownership on the probability of being above median wealthy at age 43. Here, the individual characteristics x_i are measured at age 43.

We then have what we need to calculate the (net) housing channel of intergenerational wealth persistence, as defined in equation (7), which is $\sum_j \alpha_4^j \beta_1^j$. The results are reported in Table 8.

D.4 Modeling Parental Support

To model the initial and the annual transfers without introducing additional state variables we modify the income process. We add an age-dependent transfer to the level of income

$$y_{i,a} = \exp(f(a) + \nu_{i,a} + \varepsilon_{i,a}) + \tau(a). \tag{26}$$

For the initial transfer we define

$$\tau(a) = \begin{cases} \tau_{T^s}^{PW} & \text{if } a = T^s, \\ 0 & \text{else.} \end{cases} \tag{27}$$

And similarly for the annual transfer

$$\tau(a) = \begin{cases} \tau^{PW} & \text{if } T^s \leq a < T^s + 20, \\ 0 & \text{else.} \end{cases} \tag{28}$$

D.5 Numerical Details

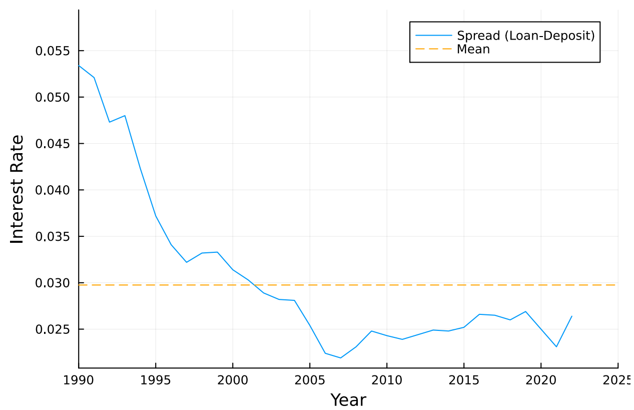
The problem is solved backwards, by first solving the value function of a retiree at age T, when death is certain. For each discrete choice, we solve for optimal consumption choice using Brent's root-finding algorithm. The optimal policy is then given by the discrete choice, and it's associated consumption choice, that maximizes utility. This process is repeated backwards, until age $a = T^s$.

The persistent income shock is discretized following Rouwenhorst (1995), while other shocks are discretized on an equal probability basis. That is, for n grid points, the probably of each outcome is $1/n$ and the values of the shock at each grid point is equal to the midpoints of the $n-1$ quantiles of the underlying distribution.

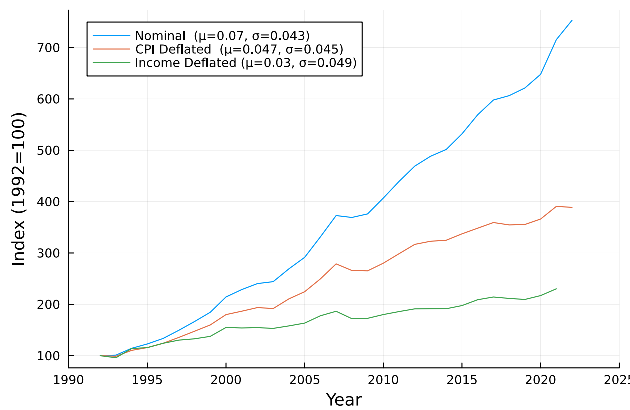
The persistent income shock ν follows a 4-state Markov chain process, and the transitory income shock is discretized to 2 states, while the house price shock has discretized to 5 states. The net worth x and price p grids are both unevenly spaced, with higher density for lower values with 63 and 7 grid points, respectively. For values not in the grids we use linear interpolation.

The model is solved in Julia `1.8.5`, and in addition to standard packages we use `Interpolations.jl v0.14.7` and `Optim v1.7.4` for interpolation and optimization routines.

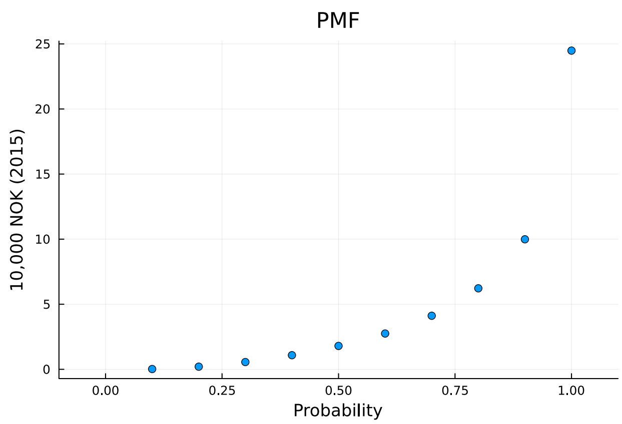
D.6 Supplementary Model Figures



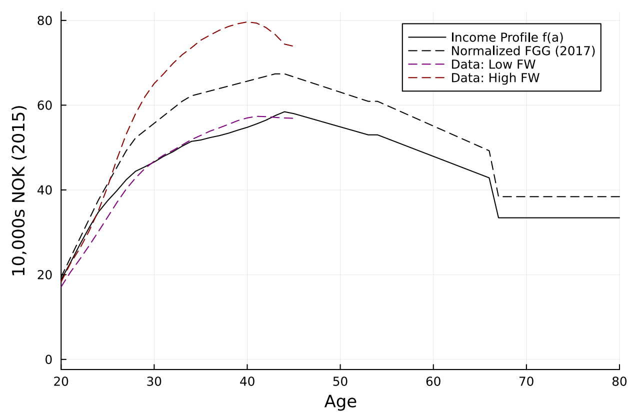
(a) Mortgage Premium r_m



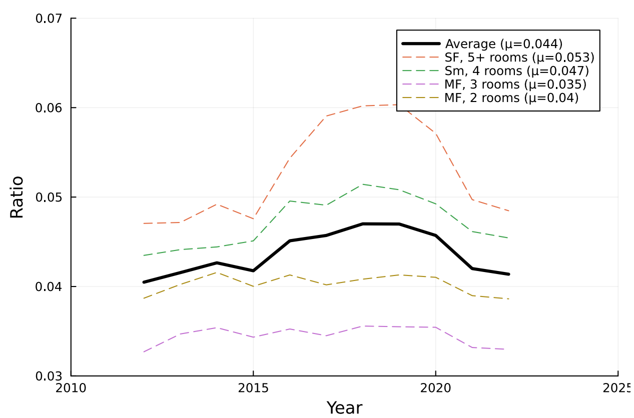
(b) House Prices



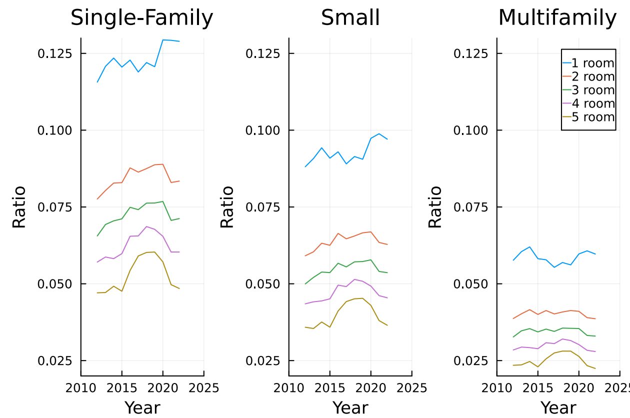
(c) Initial Wealth



(d) Calibrated Income Process



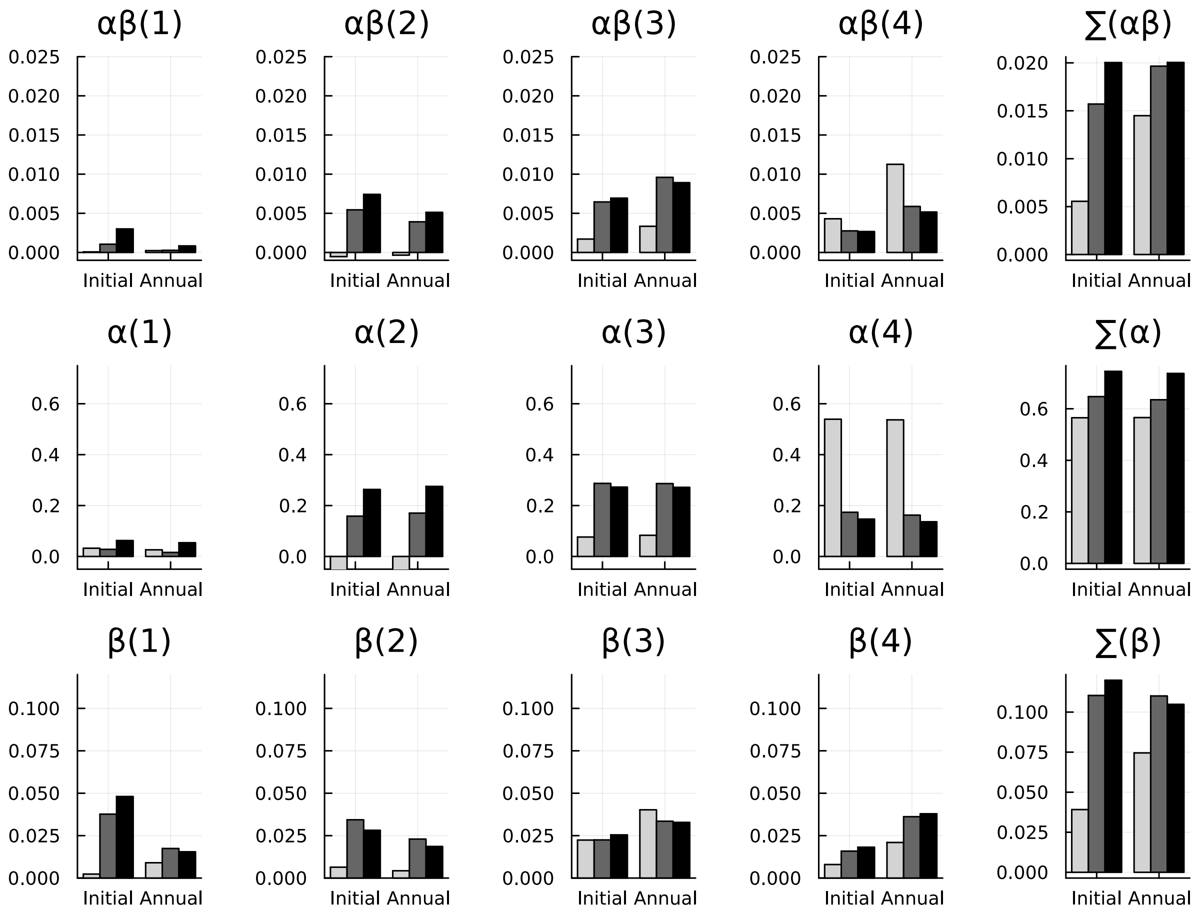
(e) Rent-to-Price Ratios, Select Sizes and Units



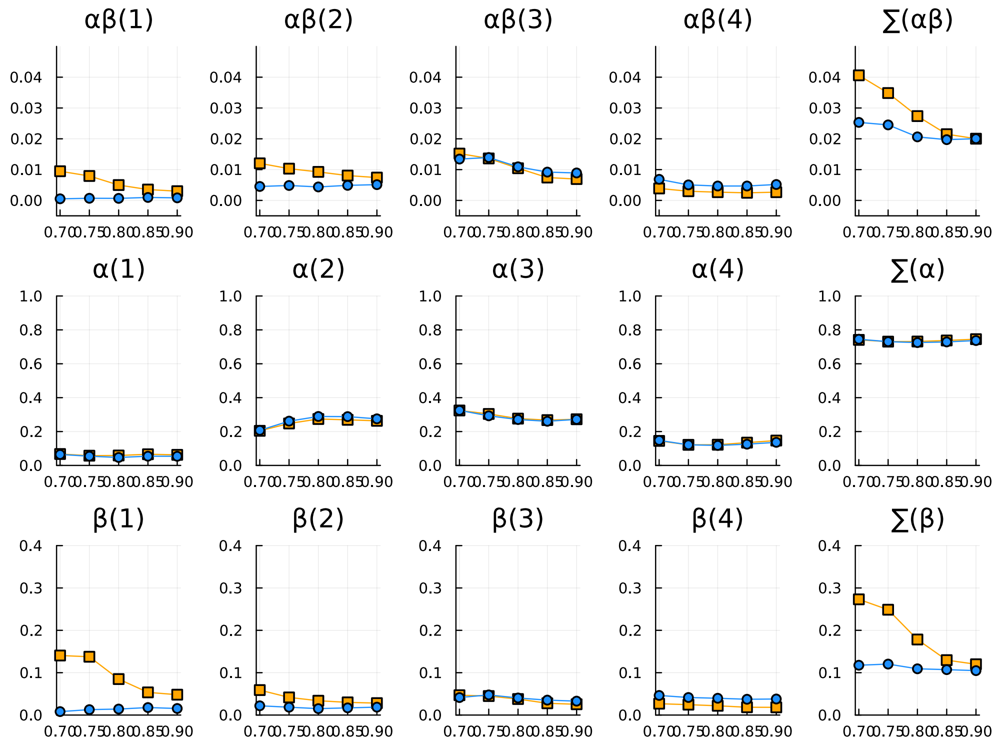
(f) Rent-to-Price Ratios, All Sizes and Units

Figure D.2: Calibration Figures

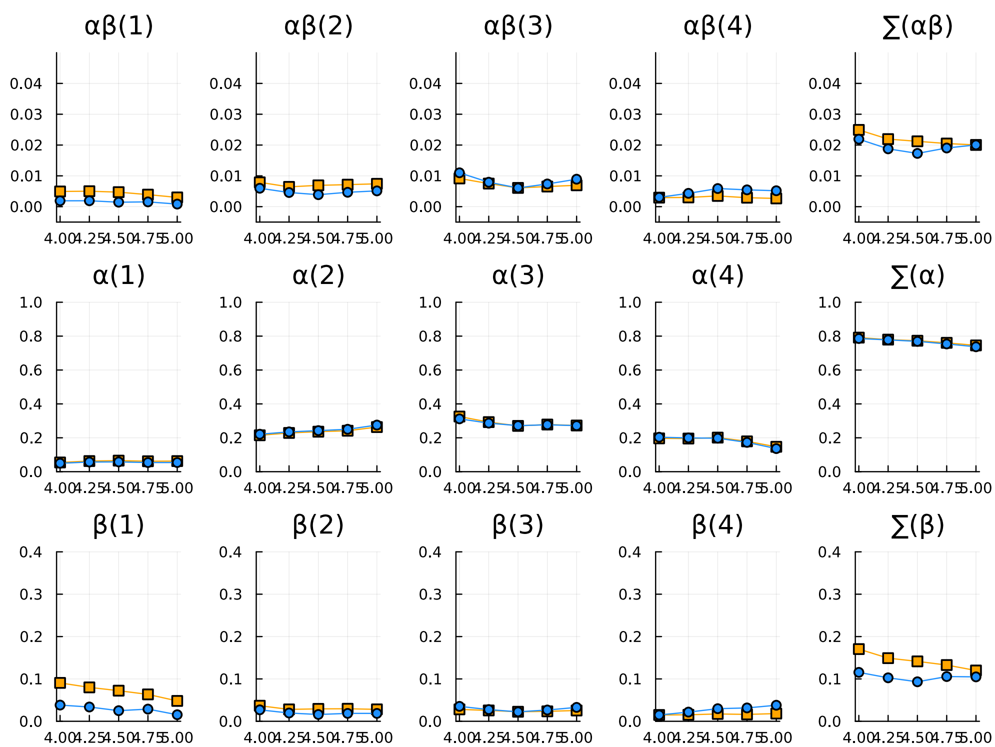
Figure D.3: The Parental Wealth Housing Channel and Price Growth - Coefficients



Notes: This figures plots the coefficients from the mediation analysis, see Section 6.3.1 for more.



(a) LTV



(b) LTI

Figure D.4: Coefficients from the Mediation Analysis

Notes: This figures plots the coefficients from the mediation analysis, see Section 6.3.2 for more.