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ABSTRACT

Rising wealth inequality has spurred an increased interest in understanding how and why wealth is correlated across generations. We exploit plausibly exogenous variation in housing wealth driven by home price changes in different areas to isolate the causal impact of parental housing wealth during different childhood periods on children's long-run wealth accumulation. Using population-level Danish administrative data, we find that 27% and 25% of each Krone of parental housing wealth change during early-childhood is transmitted to children's overall and housing wealth in adulthood, respectively. The corresponding transmission rates for parental housing wealth changes during middle-childhood are 25% and 15%, with a transmission to non-housing wealth of 10%. There is little evidence of transmission of parental housing wealth changes that occur during the teenage years. Examining mechanisms, we find that parental housing wealth changes in early and middle-childhood lead to modest increases in adult children's home ownership, educational attainment, and earnings. However, earnings and education can explain only 20-30% of the intergenerational transmission of parental wealth gains during these periods. We argue that the transmission of parental housing wealth changes in childhood are driven in large part by changes to unobserved household environment and parental behaviors that are passed on to children and shape their savings behavior in adulthood.

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1. Introduction

The persistent growth in wealth inequality in the prior four decades has led to a heightened interest in understanding how and why wealth is transmitted across generations. Starting with the seminal study of Charles and Hurst (2003), prior research has shown in numerous settings that the wealth of children is positively correlated with the wealth of their parents (e.g., Arrondel and Grange 2006; Clark and Cummins 2015; Fagereng, Mogstad, and Rønning 2021; Adermon, Lindahl, and Waldenstrom 2018; Boserup, Kopczuk, and Kreiner 2018; Black et al. 2020). Parent and child wealth could be positively correlated due to pre-determined correlated characteristics of parents and children, such as ability, that drive wealth accumulation for both groups (selection) or because parental wealth impacts the actions of parents that are important in children's accumulation of wealth (causation). Wealthy parents, for example, may directly transfer their wealth to their children, increase investments in child human capital accumulation and earnings capacity, or may shape child traits that determine future savings and investments.

Understanding the relative importance of selection versus causation in the intergenerational correlation of wealth is important for crafting policies to support wealth accumulation across generations. If wealth accumulation is driven by pre-determined correlated characteristics across generations, then policies focused on building wealth among parents may have little effect on wealth accumulation among children. Conversely, if wealth increases among parents *cause* more wealth accumulation among children, policies designed to help parents save and accumulate wealth when children are young could have large long-run impacts on children and on wealth inequality.

In this paper, we exploit plausibly exogenous variation in housing wealth driven by home price changes in different areas to isolate the causal impact of parental housing wealth on children's wealth in adulthood. We focus on housing wealth for a number of reasons. First, housing wealth is far more evenly distributed across the population than is other forms of non-retirement wealth (Daysal, Lovenheim, and Wasser 2022). For all but the wealthiest households, the main source of wealth is their home. Wealth from equities and business investments typically is isolated to a small set of very advantaged households. Second, housing wealth is relatively liquid, with households extracting between 20-25% of home equity increases to fund current expenditures (Mian and Sufi 2011; De Stefani and Hviid 2018). In the long run, parents can downsize once children leave the home, which increases the liquidity of housing assets. Finally, recent decades

have witnessed large increases in the volatility and liquidity of housing wealth. There is independent interest in understanding the intergenerational implications of this variation.

A particularly novel feature of our research design is our ability to investigate the effects of parental housing wealth changes occurring in distinct time periods of childhood. Specifically, we use population-level Danish administrative data covering the 1985 and 1987-1989 birth cohorts to study how parental housing wealth changes during early childhood (ages 0-5), middle childhood (ages 6-11), and teenage years (ages 12-17) impact children's overall wealth, housing wealth, and non-housing wealth at ages 29-33.[2] Thus, not only are we able to show new evidence on the transmission of parental housing wealth shocks, we also show how such transmission varies by the age of the child. This evidence is important for policymakers in targeting programs that can support asset accumulation among parents with different-aged children. Variation in transmission by child age also helps inform potential mechanisms.

We begin by estimating the correlation between parental housing wealth at the beginning of each childhood period and children's wealth outcomes at ages 29-33. We document that parental housing wealth is strongly correlated with offspring total wealth: 0.63 (at birth), 0.74 (age 6), 0.51 (age 12). Consistent with the rank-rank correlations in Daysal, Lovenheim, and Wasser (2022), we find that the correlation between parental housing wealth and the housing wealth of the next generation increases across the childhood developmental stages. In contrast, the correlation between parental housing wealth and adult child's non-housing wealth weakens across different developmental periods.

We next move beyond these raw correlations to estimate the effect of parental housing wealth changes during different childhood periods on long-run outcomes of adult children. We focus on children whose parents own a single residential property at the time of the child's birth and use the price changes of this childbirth home as an instrument for actual parental housing wealth changes. This allows us to abstract from concerns about endogenous mobility and property acquisition. Because homeowners obtain all the wealth from a home price increase, this method isolates the role of housing wealth changes *per se* rather than correlated characteristics of parents and children. In order to alleviate concerns that home price changes could be related to correlated characteristics of parents and children, we control for a rich set of observable characteristics,

[2] Housing data for the 1986 birth cohort are not available. Despite the relatively young ages of the children, 51.4% own a home when we observe them as adults.

including birth cohort fixed effects, municipality fixed effects interacted with both parental housing wealth at birth and parental net wealth at birth, parental characteristics measured at childbirth (income, education, and marital status), child birth parity and gender. We thus isolate variation in home prices that are orthogonal to baseline wealth, municipality, and parental background (e.g., socioeconomic status). Furthermore, we present extensive evidence that our results are robust to including a range of other controls that independently correlate with wealth, suggesting that our control set is sufficient to account for the endogenous correlation between parental housing wealth changes and child long-run wealth outcomes.

Our results suggest that parental housing wealth changes during childhood are differentially passed on to children later in life based on the age at which the wealth change occurs. For overall wealth, the largest effect is among the wealth changes occurring during early (aged 0-5) and middle childhood (aged 6-11), where we find that 27.2% and 25.3% of each Danish Krone of parental housing wealth increase is passed on to children in the form of higher wealth in adulthood, respectively. The estimate for parental housing wealth changes in the teen years (12-17) is close to zero and is not statistically significant. The effects on overall wealth are a combination of effects on housing and non-housing wealth. We find that parental housing wealth gains during early childhood are only transmitted to children's housing wealth, with 24.7% of each Danish Krone of parental housing wealth gain during early childhood transmitted to child's housing wealth at ages 29-33. The effects of parental housing wealth gains during middle childhood, on the other hand, affect both housing and non-housing wealth accumulation: transmission to housing wealth is 15.2% and transmission to non-housing wealth is 10.1%. These transmission estimates differ substantially from the raw correlations, and this difference varies by age and wealth measure. Hence, the intergenerational correlations reflect a varying mix of correlated parent-child characteristics and causal effects of wealth changes.

After examining baseline effects, we turn to understanding the mechanisms through which these results operate. We propose a simple conceptual framework that articulates the potential mechanisms through which wealth may be transmitted across generations. We argue that the effects could be driven by: 1) direct effects of wealth (i.e., transfers), 2) effects on asset allocation (other wealth), 3) increased child educational attainment, 4) changes to child labor market earnings, and 5) changes to unobserved parental behaviors that shape children's saving and investment behavior. We do not have data to examine the effects of the first two channels, but we

argue that in our setting there is little scope for them to drive the transmission effects (Kolodziejczyk and Leth-Petersen 2013).[3] The administrative data allows us to examine the effects on educational attainment and earnings, and we show that parental housing wealth changes in youth affect the likelihood of homeownership, educational attainment,[4] and earnings in adulthood. We then examine the role of earnings and education in explaining our housing wealth transmission estimates. We find that these two mechanisms explain at most 20-30% of the transmission of parental housing wealth changes during early-to-mid childhood to adult wealth. We attribute the large unexplained residual to changes in unobserved household environment and parental behaviors that are passed down to children and influence their savings propensity and investment behavior. Our finding that the transmission of wealth shocks is much smaller during the teenage years also is consistent with this interpretation, as younger children likely are more malleable with respect to parental behaviors and the household environment than are teens. These household factors act as within-household public goods since they are non-rival and non-excludable. Consistent with this interpretation, we find that effects change little with the number of children in the household, except at the youngest ages for non-housing wealth. This would not be the case if the main mechanisms required direct expenditures by parents on children.

Our paper contributes to a growing literature in economics that examines wealth correlations across generations. The magnitudes of correlations between parental housing wealth and child wealth we estimate align with prior estimates of the intergenerational transmission of net wealth (Charles and Hurst 2003; Boserup, Kopczuk, and Kreiner 2018; Black et al. 2020), the intergenerational transmission of equity market participation (Black et al. 2017), and the intergenerational transmission of debt default (Kreiner, Leth-Petersen, and Willerslev-Olsen 2020).

Prior literature investigating the role of selection versus causation in driving these

[3] Parental housing wealth could mechanically increase children's wealth in the longer-run due to bequests. However, children in Denmark tend to be much older than 33 (the age of the oldest offspring in our data) when their parents die, making the wealth less useful. Our approach examines the transmission of wealth shocks that operate through mechanisms other than bequests, which emphasizes the role of behavior rather than simply of direct wealth transfers.
[4] Estimates from the US setting, where college requires far more direct outlays among families than is the case in Denmark, show positive effects of housing wealth on educational attainment (Lovenheim 2011; Lovenheim and Reynolds 2013; Hotz et al. Forthcoming). Nonetheless, postsecondary attendance in Denmark still includes substantial opportunity cost in terms of foregone earnings, which may make parental resources important for these investment decisions.

correlations has mainly relied on adoptee designs.[5] Black et al. (2017) and Black et al. (2020) examine adoptees in Sweden, while Fagereng, Mogstad, and Ronning (2021) examines Korean-born children adopted by Norwegian parents. This empirical design allows researchers to separate the roles of nature versus nurture. All three studies document a much larger role for the adopted parents than the biological parents, suggesting that nurture is more powerful than nature (i.e., genetics) in driving wealth correlations across generations.

We add to this literature in three ways. First, we examine the causal impact of parental housing wealth changes, relying on plausibly exogenous variation in the price of one's childbirth home. We argue that focusing on housing wealth is important because it is much more evenly distributed across the population than other forms of wealth. As such, our estimates are arguably easier to generalize to the broader population. Second, we provide novel evidence on how parental wealth changes at different childhood periods affect longer-run wealth accumulation. To the best of our knowledge, we are the first to investigate the relative productivity of parental wealth changes occurring in different periods of childhood.[6] Third, our results speak to how wealth shocks experienced in childhood are mediated by changes to the household environment that are then passed down to children. Adoption studies (e.g., Fagereng, Mogstad, and Ronning 2021) show that household factors form a key set of mechanisms that shape future wealth outcomes of children. We add to this literature by presenting evidence that these household factors are influenced by wealth shocks, and the resulting changes are passed down to children in ways that impact their wealth accumulation.

The causal effects of parental housing wealth changes we document suggest that the relative importance of selection in driving the intergenerational correlations depends on when parental wealth is measured. In particular, we find that much of the correlation between child

[5] There is a small literature that examines intergenerational effects of wealth shocks driven by lottery winnings (Cesarini et al. 2016; Bulman et al. 2021). These papers focus on educational attainment and health outcomes of children and do not examine wealth transmission.

[6] Notable exceptions include Carneiro et al. (2021) and Carneiro et al. (2023). Carneiro et al. (2021) examine the relationship between the timing of parental income during childhood years and adult outcomes of children (education and earnings at age 30). Using administrative data from Norway, they show that conditional on permanent income and parental income in late childhood, higher income early in the child's life is more productive. Carneiro et al. (2023) show that disruptions to the household environment from involuntary job separations through mass layoffs have adverse effects on child educational and labor market outcomes and that the effects are largest for those experiencing parental layoffs in the teenage years. These papers highlight that the relative importance of the timing of shocks may differ depending on the nature of the shock. Our work complements these studies by focusing on parental wealth changes. This is an important distinction. As noted by Black et al. (2020), wealth may capture economic success better than income as it directly impacts consumption and investment possibilities.

wealth outcomes and parental housing wealth measured during a child's teen years represents selection, while a substantial portion of correlations relying on parental wealth at early and middle childhood reflect the causal impact of parental wealth changes. The importance of early-life parental wealth changes in generating long-run child wealth aligns with extensive empirical research highlighting the role of early childhood environments in long-run socio-economic outcomes (e.g., Currie and Almond 2011; Almond et al. 2018). The fact that we find a significant role for parental wealth changes during middle childhood speaks to an emerging literature that emphasizes opportunities for high-return investments in children beyond the early-childhood period (e.g., Hendren and Sprung-Keyser 2020).

Our paper also adds to a handful of papers examining the mechanisms behind the causal impact of parental wealth on children's long-run wealth accumulation. Fagereng, Mogstad, and Ronning (2021) conduct a mediation analysis and show that adult children's education, income, financial literacy, and direct transfers of wealth from parents can explain at most 40% of the causal impact on children's accumulation of wealth from wealthier families. In their sample of adoptees, child education and income are not the most important mediators. In our data, we find that parental wealth changes have modest effects on child education and earnings, and consistent with Fagereng, Mogstad, and Ronning (2021) these mediators explain at most 20-30% of the transmission of parental housing wealth changes during early-to-mid childhood to adult wealth.

We interpret our results as indicating unobserved household environment and parental behaviors shaping child saving and investment behavior as the most critical mechanism driving the intergenerational transmission of wealth. Two additional papers provide supporting evidence of the critical role of parents and the household for long-run wealth accumulation. Boserup, Kopczuk, and Kreiner (2018) show that children with higher wealth *in childhood* have higher wealth as adults. Wealth in childhood reflects early life transfers from parents, which affects only a small percentage of wealthy families. These transfers tend to be too small to independently drive later-life wealth accumulation, so they argue that the empirical relevance of this wealth reflects the intergenerational correlation of savings behavior. Kreiner, Leth-Petersen, and Willerslev-Olsen (2020) further demonstrate that parents who default on debt have children who are more likely to default. This is not driven by household finances but rather by inherited financial behavior. In contrast to the rest of the literature, we argue that shocks to parental housing wealth during childhood affect the household environment in important ways, and these changes are then passed

down to children and lead to higher wealth accumulation as adults. Prior research has demonstrated the importance of the household environment but not how wealth shocks can change that environment in ways that are passed down to children and impact their long-run outcomes.

Persistently-high intergenerational wealth correlations that have been documented in a wide variety of settings underscore the importance of understanding how and why wealth is transmitted across generations. This study advances our understanding of the drivers of intergenerational wealth transmission, which is essential to crafting policies that can support more equal wealth accumulation across the population. Overall, our results suggest that policies that support wealth accumulation (and more specifically housing wealth accumulation) among parents when children are young would lead to higher wealth accumulation of their children when they are young adults.

2. Conceptual Framework

In this section, we present a simple model that articulates the different mechanisms through which wealth can be transmitted across generations. Let W^c be the total wealth of the child at adulthood. Aligned with our empirical approach, we consider three child ages, a_1, a_2, and a_3. In our context, these refer to ages 0-5, 6-11, and 12-17, although it would be easy to extend the model to other ages or to consider more age ranges.

We model wealth of the child in adulthood (W^c) as a function of parental housing wealth at each age (H^{pa_1}, H^{pa_2}, H^{pa_3}), other (i.e., non-housing) parental wealth at each age ($OW^{pa_1}, OW^{pa_2}, OW^{pa_3}$), educational attainment (E^c), income of the child in adulthood (I^c), and a sequence of unobserved household/parental characteristics and preferences, X.[7] These include factors like propensity to save, preferences over different asset classes, and risk tolerance. Without loss of generality, assume there are N such factors and they are related to adult wealth through the function g: $g(X_1, X_2, \dots, X_N)$. The function $f()$ maps these factors into adult wealth:

$$\mathrm{W^c} = f(H^{pa_1}, H^{pa_2}, H^{pa_3}, OW^{pa_1}, OW^{pa_2}, OW^{pa_3}, E^c, I^c, g(X_1^{a_1}, \dots, X_N^{a_1}; X_1^{a_2}, \dots, X_N^{a_2}; X_1^{a_3}, \dots, X_N^{a_3})). \quad (1)$$

Changes in parental housing wealth at age a_s ($s \in \{1,2,3\}$) affects adult wealth of the children as

[7] One could more simply combine parental housing and non-housing wealth together and focus on total wealth. We separate them because of our interest in understanding how parental housing wealth affects wealth formation of the next generation.

follows:

$$\frac{\partial W^c}{\partial H^{pa_s}} = \frac{\partial f()}{\partial H^{pa_s}} + \frac{\partial f()}{\partial OW^{pa_s}}\frac{\partial OW^{pa_s}}{\partial H^{pa_s}} + \frac{\partial f()}{\partial E^c}\frac{\partial E^c}{\partial H^{pa_s}} + \frac{\partial f()}{\partial I^c}\frac{\partial I^c}{\partial H^{pa_s}} + \frac{\partial f()}{\partial g()}\left(\sum_{j=1}^{N}\left(\frac{\partial g()}{\partial X_j^{a_s}}\frac{\partial X_j^{a_s}}{\partial H^{pa_s}}\right)\right). \quad (2)$$

Equation (2) shows the different pathways through which housing wealth changes can be transmitted to child wealth in adulthood.[8] The first piece is the direct effect: parents can provide transfers to their children from their own housing wealth. The second part of equation (2) reflects potential shifts in parental assets when their housing wealth changes that also could be passed down directly to children. When housing wealth increases, it could induce parents to shift assets towards or away from other assets. These other assets could affect children's total wealth later in life. The third piece of equation (2) operates through changes to educational attainment of the child. Parents can use their housing wealth to make human capital investments in their children (e.g., Lovenheim 2011; Lovenheim and Reynolds 2013; Hotz et al. forthcoming), which can lead to more financial acumen. Higher parental wealth also provides some insurance against risk, which could support postsecondary investments. It additionally could lead to higher income or earnings, which is shown in the fourth part of equation (2). We separate the earnings and educational attainment channels because they can operate independently as well. For example, housing wealth can influence the networks to which children have access, helping them find better jobs or jobs in higher paying industries/occupations, thus increasing their income without necessarily affecting their education.

The final term in equation (2) reflects the possibility that housing wealth changes could influence the household environment and parents' unobserved behaviors that impact child traits related to saving and investment behavior. As discussed above, prior research has shown the importance of these factors in explaining intergenerational wealth correlations. To the extent that they are influenced by housing wealth *changes*, they may impact overall wealth accumulation of children as well as the relative importance of housing and non-housing wealth in the next generation.

In our empirical application below, we focus on estimating the total effect, $\frac{\partial W^c}{\partial H^{pa_s}}$, on total, housing, and non-housing wealth. The administrative data allow us to directly examine the effects

[8] Missing from equation (1) is child or adult health. We exclude health measures in youth because prior work shows that home price changes in Denmark have no effect on health at birth or in early childhood (Daysal et al., 2021). We exclude health as an adult because health should largely affect wealth through income, which we examine directly.

on educational attainment and earnings. We argue that in our setting there is little scope for parental transfers. Empirical support for this assertion is provided by Kolodziejczyk and Leth-Petersen (2013), who show that parental transfers are unimportant for the housing market in Denmark. The 29-33 year old adults we study are also too young to receive direct bequests from parents.[9] Based on these results and features of our sample, we argue that $\frac{\partial f()}{\partial H^{pa_s}} = 0$ and $\frac{\partial f()}{\partial OW^{pa_s}} \frac{\partial OW^{pa_s}}{\partial H^{pa_s}} = 0$.[10] We are unable to observe $\frac{\partial f()}{\partial g()} (\sum_{j=1}^{N} (\frac{\partial g()}{\partial X_j^{a_s}} \frac{\partial X_j^{a_s}}{\partial H^{pa_s}})$ in the register data. We instead attribute the remainder of the effect after we account for the observed mechanisms in equation (2) to these unobserved parental behaviors that shape children's saving and investment behavior.

3. Data and Sample

We use register data from Denmark for the period 1985 to 2018. The data include individual-level records with unique personal identifiers, allowing us to follow the entire population over time and to link children to their parents.

Outcome Variables. Our primary outcome variable consists of wealth in early adulthood, obtained from the *Income Statistics Register*. These data are based on tax records collected by the Danish Tax Agency and provide information on asset holdings and liabilities of all individuals measured on the last day of the calendar year. Data on asset holdings include the cash value of real estate owned by the individual as well as the value of deposits, stocks, bonds, and deposited mortgages.[11] Data on liabilities include the aggregate value of mortgage credit debt, credit and debit card debt, student debt, debt to Hypotekbanken (a public institution), debt to financial corporations, debt to the Danish municipalities, and other debt (e.g. outstanding tax payments). We measure wealth when the child is aged 29-33.

[9] 99.5% of children in our sample have at least one alive parent when we measure their outcomes. When children are aged 29-33, the average mother is 59.3 (s.d. 4.37) years old and the average father is 61.9 (s.d. 4.94) years old.
[10] We also show that our results are robust to dropping the top 5% of wealthiest households; households below the top 5% typically are not wealthy enough to provide substantial transfers to their children.
[11] The data do not include information on pension wealth. Self-reported information on car values, boat values, caravan values, premium bonds, cash deposits, and stocks are available until 1996 when taxpayers had to declare these as a requirement of the Danish wealth tax. Such items are not included in the calculations after the abolishment of the wealth tax in 1996. Similarly, values of cooperative dwellings are not included in the post-1996 period. The cash value of houses is assessed by the Danish Tax Authority using public valuations. If an individual co-owns a property, the cash value only reflects their share. For more details, see Leth-Petersen (2010) and Boserup et al. (2016).

In addition to total wealth, we separately examine effects on the next generation's housing and non-housing wealth. We measure housing wealth using the average cash value of owned properties when the child is aged 29-33, which is the cash value of all real estate holdings weighted by the ownership share of each holding. For the sole owner of one home, this is just the public valuation of the house in a given year.[12] We refer to this cash value as "housing wealth" for simplicity. We calculate average non-housing wealth at ages 29-33 as the difference between gross wealth (total assets) and housing wealth.

Finally, we use additional outcome variables, measured when children are 29-33 years old, to assess the mechanisms underlying the intergenerational transmission of housing wealth. These include the highest level of completed schooling and average earnings.

Parental Housing Wealth. Our main independent variables are derived from the *Income Statistics Register* and measure the change in the cash value of all real estate holdings of parents at different developmental stages of the child: ages 0-5, 6-11, and 12-17. We focus on these ages because they reflect pre-schooling years, middle childhood years, and teenage years, respectively.

In order to address concerns of endogenous mobility and property acquisition, we instrument for changes in parental home prices using simulated wealth changes based on changes in the public valuation of the house the parents owned at the time of the birth of the child, regardless of their future mobility or property acquisition.[13] We obtain this information from the *State's Sales and Valuation Register*, a property-level dataset with information on public valuations, ownership, and housing type. Public valuations take into account an extensive set of observable housing characteristics, such as geographic location, year of construction, size, type of heating, and type of roof, and they are used as the taxable value for properties observed in the *Income Statistics Register*.[14] We winsorize both changes in parental housing wealth and changes in simulated parental housing wealth at the 1st and 99th percentiles of the distribution of changes within each age bin to reduce the influence of outliers.

[12] We believe this is the ideal measure for housing wealth as the cash value reflects the long-run wealth associated with the home. An alternative measure would be home equity, but the register data do not contain information on the equity an individual has in their home.

[13] Daysal et al. (2021) use simulated housing wealth changes to examine the effect of housing wealth changes on fertility and early life health outcomes in Denmark.

[14] Very few properties, such as churches, are exempt from public valuations. All privately-owned properties are valued in uneven years and adjusted in even years, yielding estimated values in every year. The public valuations occur in January of the prior year until the end of 2003. Afterwards, they occur in October of the prior year.

Control Variables. Using data from the formerly-described registers as well as the *Population Register*, we include a rich set of child and parent characteristics. The *Population Register* provides a snapshot of demographics on all Danish residents as of January 1st of each year, allowing us to control for birth cohort fixed effects and municipality fixed effects. In our preferred specification, we interact the municipality fixed effects with parental net wealth at birth and housing wealth at birth. In addition, we control for child gender, parity, mother's and father's years of schooling, age, and marital status at childbirth. Finally, we control for mother's and father's gross personal income in the year preceding the child's birth.

All monetary variables are in 100,000 Danish Kroner (DKK) deflated to 2018 prices using the consumer price index (CPI). Taking into account differences in purchasing power, the exchange rate in 2018 is 0.148.[15]

Analysis Sample. To construct our analysis sample, we begin with the universe of 222,173 children born in 1985 and between 1987 and 1989 in Denmark (data on housing wealth at birth for the 1986 cohort is unavailable). We focus on these birth cohorts because housing valuation data first becomes available in 1984, and after the 1989 birth cohort the children are too young to observe their adult outcomes with contemporaneous data. We make a number of restrictions to construct our analysis sample. First, we exclude children whose parents were renters at the time of the child's birth. Second, we only include children whose parents owned a single residential property at child's birth.[16] Third, we exclude children with incomplete data on parental housing wealth and missing parental control variables. Online Appendix Table A.1 shows the number of children excluded due to each of these conditions, while Online Appendix Table A.2 shows how our sample restrictions affect the number of houses. With these sample restrictions, our final analysis sample contains 91,475 children and 87,777 houses.

Descriptive Statistics. Table 1 and Figures 1 - 4 present descriptive statistics on some of the key variables used in our analysis. Panel A of Table 1 shows means and standard deviations of family

[15] These exchange rates can be found at: https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm#indicator-chart.

[16] Children are included in the sample if the parents are renting the primary residence at the time of the child's birth but own a vacation home.

background characteristics in the base year of the childhood periods on which we focus. Panel B presents characteristics of children and their long-run outcomes measured at ages 29-33.

The average parent in our sample has some college attainment and relatively high income that grows as children age. This is expected, as the sample is positively selected in terms of socioeconomic status because of the requirement that parents are homeowners at childbirth. Average parental income in the year preceding childbirth is 324,020 DKK, which is approximately $47,955. By age 12, average parental income rises to 593,450 DKK, or $87,830. Parental housing wealth also grows over time, from 535,550 DKK ($79,261) at childbirth to 1,012,240 DKK ($149,812) at age 12.

The main source of variation used in our empirical analysis is the change in simulated parental housing wealth over different periods of time, which is the change in cash value of the home the parents owned at childbirth. To help visualize the variation in this variable, we first plot in Figure 1 the evolution of average home values from 1985 through 2006. This period covers the different childhood periods of the cohorts included in our analysis sample. The solid line shows the values of all residential properties in Denmark, while the dashed line shows the values of the residential properties included in our analysis sample. Aggregate home prices are flat through the mid-1990s, and they rise considerably during the period of the housing boom. While the housing boom provides extensive variation, it is important to note that this period comes after the early-childhood years of any of our birth cohorts. Hence, the early childhood estimates are identified prior to the housing boom when aggregate home prices are more stable.

In Panel A of Table 1, we show the average simulated parental housing wealth at the base year of each childhood period, while in Figure 2 we show the distribution of this variable. Consistent with Figure 1, the aggregate distribution of simulated parental housing wealth varies little between the first two childhood periods but rises substantially when children are teenagers. This is due to the overlap between the teenage years in our sample and the housing boom. Despite the relative stability of simulated parental housing wealth at younger ages, Figure 2 shows that there is a wide distribution of parental home values in each childhood period.

Panel A of Table 1 also presents means and standard deviations of the change in simulated parental housing wealth at different childhood periods. Between birth and age 5, the average parent in our sample experiences a small negative change in simulated housing wealth. Turning to the two older childhood periods, simulated parental housing wealth universally rises: it increases by

276,600 DKK ($40,937) on average during middle childhood, while it increases by 366,730 DKK ($54,276) on average during late childhood. These large average increases are driven in part by the housing boom. In Figure 3, we demonstrate the central source of variation used in our empirical model (described in more detail below) – we regress the change in simulated parental housing wealth at different childhood periods on birth cohort and municipality fixed effects and plot the distribution of the residuals. The figure shows that the small mean reduction observed in the simulated parental housing wealth at early childhood masks considerable variation. The distribution of changes becomes even more dispersed in the middle childhood and teenage years. Overall, the figure demonstrates that there is an extensive amount of variation in simulated parental housing wealth changes at each developmental stage, even after location and time fixed effects are removed.

In Panel B of Table 1, we report means of outcomes of children in adulthood. Despite the relatively young ages at which the outcomes are measured, 51.37% of children own a home at ages 29-33, and these homes are quite high in value. Figure 4 presents the distribution of child housing wealth, both unconditionally and conditional on owning a home. There is a wide distribution of housing wealth among children in adulthood. Panel B of Table 1 shows that child housing wealth is over four times larger than non-housing wealth at ages 29-33. Finally, Table 1 also shows that children in our analysis sample have relatively high levels of both earnings and educational attainment in adulthood. That the adult children of relatively advantaged parents have high incomes and wealth levels is not surprising given the body of research documenting the intergenerational correlation of socioeconomic status. In the next section, we turn to the intergenerational transmission of parental housing wealth.

4. Descriptive Analysis and Empirical Design

4.1. Intergenerational Wealth Correlations

We begin our investigation by estimating the elasticity of adult children's wealth with respect to their parents' housing wealth. In the spirit of former studies on the intergenerational transmission of wealth, we use population-level data and estimate the following age-adjusted regression:

$$WC_i = \delta_0 + \delta_1 HP_p^j + \delta_2 \boldsymbol{Age}_p^j + u_i, \qquad (3)$$

where WC_i measures the average (total, housing, and non-housing) wealth of child i during ages

29-33, HP_p^j measures parents' housing wealth at child age j, and $\boldsymbol{Age}_p^j$ controls for mother's and father's age fixed effects at child age j. The coefficient of interest, δ_1, measures the age-adjusted transmission of parental housing wealth.[17]

Table 2 presents these estimates for j = {0, 6, 12, 29-33}. Panel A focuses on the relationship between parental housing wealth and the total wealth of adult children. The estimated correlations – 0.63 (at birth), 0.74 (age 6), 0.51 (age 12) – suggest that parental housing wealth is strongly related to the total wealth of children in early adulthood. The elasticities are large across all three developmental stages of childhood and are slightly higher than the magnitudes from prior literature documenting rank-rank wealth correlations that are between 0.2 and 0.4 (Boserup, Kopczuk, and Kreiner 2018; Black et al. 2020).[18]

Panels B and C examine the correlation between parental housing wealth and the housing and non-housing wealth of adult children, respectively. The results show that parental housing wealth during childhood years is meaningfully related to both housing and non-housing wealth of the next generation but that the strength of these correlations have contrasting patterns for housing versus non-housing wealth. In particular, we find that the correlation between parental housing wealth and the housing wealth of the next generation gets stronger across the three childhood developmental stages. These estimates are consistent with the rank-rank correlations in Daysal, Lovenheim, and Wasser (2022), where the correlation between parental and adult child housing wealth increases from 0.11 to 0.18 as children age. The correlation between parental housing wealth and non-housing wealth of children in adulthood, on the other hand, gets weaker as children grow, particularly once they are teenagers.

The last row of each Panel in Table 2 provides the age-adjusted correlation between the adult child's corresponding wealth and the value of the parents' housing when the offspring is an adult. We find that this correlation is much weaker across all measures of child wealth. The fact that offspring wealth is much more strongly correlated with parental housing wealth when children are young relative to when children are adults is suggestive of a causal role of parental wealth in generating wealth outcomes of their children. We next discuss the empirical strategy we use for directly estimating this causal relationship.

[17] In these regressions, renters are included with a housing wealth of zero. Hence, the results include both the extensive and intensive margin. Standard errors are clustered at the municipality level.

[18] We note that the correlations we show differ from prior correlations in focusing on parental housing wealth rather than overall wealth. Hence, some differences with prior studies are expected.

4.2. Empirical Strategy for Estimating the Causal Effects of Parental Housing Wealth Changes

Our empirical approach relates changes in parental housing wealth during different childhood periods to children's long-run outcomes at ages 29-33. The baseline model takes the form:

$$Y_{ipmc} = \gamma_0 + \gamma_1 \Delta HP_{ipm}^{0-5} + \gamma_2 \Delta HP_{ipm}^{6-11} + \gamma_3 \Delta HP_{ipm}^{12-17} + \rho \boldsymbol{X}_{ip} + \tau_c + \psi_{m1} * HP_{ipm}^{0} + \psi_{m2} * NP_{ipm}^{0} + \eta_{ipmc}\,, \quad (4)$$

where Y_{ipmc} is the adult wealth measure (or intermediate outcome) for child *i* born in year *c* to parents *p* who owned a house in municipality *m*. The variables of interest are ΔHP_{ipm}^{0-5}, ΔHP_{ipm}^{6-11}, and ΔHP_{ipm}^{12-17}, which are changes in parental housing wealth. $\boldsymbol{X}_{ip}$ is a vector of individual and family control variables measured at child's birth: indicator for the child being female, indicators for birth parity, indicators for mother's and father's years of schooling, indicators for mother's and father's age, and an indicator for parents being married or cohabiting. It also includes mother and father's gross personal income in the year preceding the child's birth. Our model includes birth cohort fixed effects (τ_c),[19] as well as municipality fixed effects interacted with parental housing wealth at birth ($\psi_{m1} * HP_{ipm}^{0}$) and parental net wealth at birth ($\psi_{m2} * NP_{ipm}^{0}$). The municipality fixed effects are important for our model because they account for systematic differences across households based on where they own a house at childbirth, which could be correlated with housing values they and their children face. Changes in housing wealth also are likely to be mechanically correlated with home price levels, and the distribution of home values differs across areas. To address these issues, we include interactions of the initial housing wealth with municipality fixed effects. We also control for the interactions of the parental net wealth at childbirth with municipality fixed effects to account for differences in the distribution of non-housing wealth across areas. Finally, η_{ipmc} is an error term, and we cluster standard errors at the municipality

[19] Because we measure outcomes at specific ages, birth cohort fixed effects act as year fixed effects as well.

level throughout the analysis.

A central concern in estimating the intergenerational transmission of housing wealth is endogenous mobility and home purchases. In order to address this concern, we construct simulated parental housing wealth changes based on changes in the price of the home parents owned at childbirth. These simulated instruments, denoted by $\Delta HP\_sim^{a}_{ipm}$, show the change in housing wealth the family would expect if they did not move or acquire new property. The corresponding first-stage equations are given by:

$$\Delta HP^{a}_{ipm} = \alpha_0 + \alpha_1 \Delta HP\_sim^{0-5}_{ipm} + \alpha_2 \Delta HP\_sim^{6-11}_{ipm} + \alpha_3 \Delta HP\_sim^{12-17}_{ipm} + \lambda \boldsymbol{X}_p + \tau_c + \psi_{m1} * HP^{0}_{ipm} + \psi_{m2} * NP^{0}_{ipm} + \nu_{ipmc}, \quad (5)$$

where *a* denotes the three age groups on which we focus. There are three first-stage regressions, one for each age group. The reduced form equation is defined as:

$$Y_{ipmc} = \pi_0 + \pi_1 \Delta HP\_sim^{0-5}_{ipm} + \pi_2 \Delta HP\_sim^{6-11}_{ipm} + \pi_3 \Delta HP\_sim^{12-17}_{ipm} + \phi \boldsymbol{X}_{ip} + \tau_c + \psi_{m1} * HP^{0}_{ipm} + \psi_{m2} * NP^{0}_{ipm} + \mu_{ipmc} \quad (6)$$

The key coefficients of interest are $\beta_1 - \beta_3$ in the second-stage model below:

$$Y_{ipmc} = \beta_0 + \beta_1 \widehat{\Delta HP^{0-5}_{ipm}} + \beta_2 \widehat{\Delta HP^{6-11}_{ipm}} + \beta_3 \widehat{\Delta HP^{12-17}_{ipm}} + \rho \boldsymbol{X}_p + \tau_c + \psi_{m1} * HP^{0}_{ipm} + \psi_{m2} * NP^{0}_{ipm} + \epsilon_{ipmc} \quad (7)$$

We compare these estimates to the correlations in Table 2 in order to determine how much of these correlations reflect the impact of plausibly exogenous changes to parental housing wealth during childhood.

Identifying Assumption. The key identification assumption underlying the reduced form and IV models is that, conditional on the observables, changes in parental housing wealth should be uncorrelated with potential wealth outcomes of children. Put differently, we assume that, conditional on the observables, the relationship between changes in home values during youth and

the value of the child's wealth in adulthood is driven by the home value changes rather than by any correlation between home value changes and household unobservables that also affect wealth.[20] While this assumption is not directly testable, the extensive set of observable characteristics and fixed-effects allow us to assess its plausibility. Furthermore, we show below that our results are robust to including a range of additional variables that independently correlate with wealth, such as father's industry and occupation. The robustness of our results to such controls are consistent with our control set adequately accounting for any endogenous correlation between home price changes and child outcomes when they are adults. We also show that our results are not driven by outliers in home price variation or by the wealthiest families in the sample. Finally, we present a falsification check using renters and confirm that there is no relationship between parental wealth changes and long-run child wealth among these individuals.

5. Results

5.1. Baseline Results

We first document that simulated parental housing wealth changes are strongly related to parental housing wealth changes. Table 3 presents the first stage estimates. Each column corresponds to the first-stage regression of a different age group. The results show that the instruments are strong for each childhood period, with the strongest correlation between simulated and actual parental housing wealth changes occurring on the diagonals of the table with matching age groups. There is little evidence that increases during one period lead to reductions at future ages, suggesting that the wealth variation off of which our models are identified is persistent. While some of the off-diagonal estimates are positive and significant, the point estimates are small in magnitude. These results indicate that there are modestly-sized trends in home price changes over time. We show below that our estimates are robust to controlling for lags of parental home value, which suggests that these trends are not inducing a bias in our estimates.

We provide further evidence on the persistence of parental housing wealth shocks in Table 4. In Column (1), we investigate the relationship between simulated parental housing wealth

[20] This identification strategy has been used previously to study outcomes such as education (Lovenheim, 2011; Lovenheim and Reynolds, 2013; Hotz et al., forthcoming), fertility (Lovenheim and Mumford, 2013; Dettling and Kearney, 2014; Daysal et al., 2021), adult health (Fichera and Gathergood, 2016), retirement behavior (Zhao and Burge, 2017), and consumer debt (Brown, Stein and Zafar, 2015).

changes in different childhood periods and the simulated value of the parent's house when the child is 18. In Column (2), we present IV estimates relating observed parental housing wealth change in different childhood periods to the observed parental housing wealth when the child is 18. Consistent with the first-stage estimates shown in Table 3, the estimates in Columns (1) and (2) all are above one and are statistically significant at the 1% level, indicating that parental housing wealth changes are persistent. Importantly, the magnitudes of the estimates across age groups suggest that there are no major differences in the persistence of the shocks.[21] Overall, the results in Table 4 underscore that our models are not identified off of transitory shocks.

Having established the persistence of parental housing wealth changes, we turn to our baseline IV estimates in Table 5, which presents estimates that instrument parental housing wealth changes at each childhood period with simulated parental housing wealth changes. Reduced form estimates are shown in Online Appendix Table A-3. The first panel of Tables 5 and A-3 shows estimated effects on child total wealth at ages 29-33, while Panels B and C present effects on housing and non-housing components of wealth, respectively. Each column in each panel comes from a different regression. In order to shed light on the plausibility of our key identifying assumptions, we change the set of controls across columns. Column (1) presents results from a model controlling for municipality and birth cohort fixed effects as well as parental home value and net wealth at birth. This is our most basic model, as the design of our empirical approach requires these controls at a minimum. In Column (2), we add interactions between the municipality fixed effects and both housing wealth and net wealth at birth. The estimates change only modestly from the addition of these controls, other than the non-housing wealth effect for 0-5 year olds in Panel C. Columns (3) and (4) then add child and parental observed characteristics at birth, respectively. That the estimates change only slightly when these controls are added supports our main identifying assumption, as these characteristics are individually strongly correlated with long-run child outcomes. We focus the remainder of our discussion on our preferred estimates in Column (4).

[21] We also investigated the impact of parental housing wealth shocks on total parental wealth at child age 18. We find no evidence that housing wealth shocks crowd out non-housing wealth accumulation. We find some evidence of positive spillover to parental non-housing wealth from housing wealth shocks occurring during early childhood. These spillovers are mainly driven by families in the top 5% of the distribution of parental net wealth when the child is born. In section 5.3, we confirm the robustness of our results to excluding the top 5% wealthiest households.

In Panel A of Table 5, the estimate corresponding to parental wealth changes during early childhood is 0.2718, meaning that 27.2% of each Danish Krone increase in parental housing wealth is transmitted to children in the form of higher wealth in adulthood. The estimate of the effect of parental housing wealth changes during middle childhood is similar, at 0.2532. These results are statistically significantly different from zero at the 1% level. The effect of parental housing wealth changes during teen years (0.0351), on the other hand, is almost an order of magnitude smaller than the effects of wealth changes during the early and middle developmental periods and is not significant at even the 10% level.

The results in Panels B and C document interesting differences in the importance of the timing of parental housing wealth shocks in the formation of adult children's housing and non-housing wealth. We find that parental housing wealth gains during early childhood are primarily transmitted to children in adulthood in the form of higher home values, with no evidence of an effect on their non-housing wealth in adulthood. Our results in Table 5, Panel B, Column (4) suggest that 24.7% of each Danish Krone increase in parental housing wealth during early-childhood are transmitted to children's housing wealth in adulthood. Early childhood effects on non-housing wealth in Panel C are close to zero and are not statistically significant at conventional levels.

In contrast, parental housing wealth changes occurring during middle childhood are transmitted to adult children's housing and non-housing wealth. We find that 15.19% and 10.13% of each Danish Krone increase in parental housing wealth during middle-childhood are transmitted to children's housing and non-housing wealth in adulthood, respectively (Table 5, Panels B and C, Column 4). These are modest effects and are statistically significant at the 1% level. The effects of parental housing wealth gains in the teenage period are much smaller (0.21% - 3.30%), neither of which is significant at the 10% level. The upper bound of the 95% confidence interval for these estimates suggest that we can rule out transmission rates larger than 4.6-7.5%. The null effect on child housing wealth is particularly interesting because children in our sample, on average, experience larger home price increases from the housing boom during their teen years.[22]

[22] One may be concerned that this is an artifact of housing wealth being treated differently during the housing boom. However, the correlation in Table 2, Panel B is the largest for the age 12 sample, which similarly uses observations from the boom period.

Comparisons of these results with the age-adjusted correlations in Table 2 provides insight into how much of these correlations are driven by the causal effect of wealth. The IV estimates in Panel A of Table 5 suggest that roughly 35-45% of the correlations for early- and middle-childhood periods and about 7% of the correlation later in childhood reflect the causal effect of parental housing wealth on adult children's total wealth. In addition, the age patterns of correlations between parental housing wealth and adult children's housing and non-housing wealth differ widely from the causal effects reported in Panels B and C. While the age-adjusted correlations in Table 2 point to an increasing transmission of parental housing wealth as children age, the IV estimates in Table 5 indicate a more important role for the causal effects of parental housing wealth changes in early and middle childhood. Similarly, the correlations suggest large transmissions of parental housing wealth during early and middle childhood to adult child's non-housing wealth. Our IV estimates, on the other hand, document a much smaller causal effect from parental wealth changes that is only meaningful in magnitude for the middle childhood years. Finally, across all measures of adult child wealth, IV estimates suggest limited transmission from wealth gains occurring during the child's teen years, while the age-adjusted correlations suggest economically large transmissions, especially for housing wealth. This means that the intergenerational correlation in late childhood is driven by factors other than the direct impact of parental wealth itself.

Overall, the results in Table 5 suggest that parental housing wealth increases in early to middle childhood ages are transmitted to children, whereas parental housing wealth gains experienced during the teenage years do not have an effect on wealth in adulthood. Put differently, the intergenerational wealth correlations shown in Table 2 represent a mix between the causal effect of wealth and other factors, and this mix varies with the age of the child. In addition, while the housing boom of the late 1990s-mid 2000s led to an historic increase in the value and liquidity of housing, the boom had a limited impact on the housing wealth of the children in our sample who were exposed to these changes in their teen years.

5.2. Robustness Checks

As discussed in Sections 3 and 4, our empirical approach embeds several assumptions with respect to the comprehensiveness of the control variables and the specifics of the sample

construction. In this section, we examine the sensitivity of our estimates to several of these assumptions.

The main identification assumption we invoke when estimating equation (7) is that the controls in our model are sufficient to account for endogenous correlations between home price variation in youth and later outcomes. The most likely source of such endogeneity is that parents who experience higher home price growth have unobserved characteristics that lead to higher wealth among their children when they are adults. In Table 6, we assess the robustness of our results to additional controls that are independently correlated with long-run outcomes.[23] To the extent that the results change little with these controls, it supports our assertion that the controls in the model are sufficient to account for underlying correlations between home price growth in childhood and adult wealth.

Column (1) of Table 6 shows baseline IV estimates from column (4) of Table 5. In column (2), we add fixed effects for the father's industry of employment, in column (3) we control for interactions between father's industry fixed effects and father's educational attainment, and in column (4) we control for father's occupation fixed effects. The estimates of the impact of parental housing wealth changes during early childhood in Panel A are larger, while we find attenuated but still economically large effects of parental housing wealth changes occurring in middle childhood. These differences all come from changes to the estimates on non-housing wealth. Results in Panel B show that the effects of parental housing gains on offspring housing wealth is virtually unchanged when we control for father's industry and occupation: about 23-25% and 13-15% of each Danish Krone increase in parental housing wealth during early and middle childhood are transmitted to children's housing wealth in adulthood, respectively. Results in Panel C, on transmission of wealth changes to non-housing wealth, are more sensitive to including these additional controls: early-life parental housing gains now have a positive and statistically significant impact on adult child's non-housing wealth of about 15%, while the effects of parental housing wealth gains in middle childhood are economically small and are not statistically significant. Across all columns, the effects of parental housing wealth changes in the late-childhood period remain small and statistically insignificant. Taken together, these results show that our main findings and conclusions are robust to including these additional controls, with the

[23] In the remainder of the paper (except Table 10), we focus on IV models for ease of exposition and interpretation. Reduced form models yield similar results and are available from the authors upon request.

quantitative estimates varying somewhat due to sensitivity of the non-housing wealth transmission effects.

One selection concern with our main approach is that more sophisticated parents may buy homes in areas where home prices are growing more rapidly. To test for such a bias, in column (5), we include lags of housing wealth from the two years prior to the child's birth. Recall that we control for housing wealth in the year of birth as well, so this specification includes three years of pre-treatment housing wealth. The effects of parental housing wealth gains occurring in middle and late childhood are very similar to baseline, while the effects of changes in early childhood are now larger. The increased transmission of early-life gains to adult child's wealth is primarily driven by an increase in their housing wealth. This suggests that, if anything, our results represent a lower bound of the impact of shocks occurring early in life.

Finally, in column (6) we control for municipality by birth cohort fixed effects in order to account for any municipality shocks or policies that could affect specific cohorts as well as housing prices. We again find larger effects for early-life parental housing wealth changes, driven by higher transmission to housing wealth. The effects for other age groups are similar to baseline.

We next assess the robustness of our results to changes in the sample in Table 7. Column (1) again reports the baseline estimates from column (4) of Table 5. Column (2) shows IV estimates where we drop all observations for which the change in housing wealth is in the 4th quartile of the distribution of housing wealth changes for that age group. This exercise allows us to assess the role of outliers in driving our results. We find that the effects of wealth changes during ages 0-5 are larger but the reduced variation leads to substantially larger standard errors, rendering the coefficient insignificant. The effects of wealth changes during ages 6-11 are smaller, but the confidence intervals include the baseline estimates. The differences are driven by effects on non-housing wealth. The results on housing wealth in Panel B are very similar to baseline.

Column (3) shows results from a sample that excludes parents in the top 5% of the wealth distribution when the child is born. We find larger effects from wealth changes occurring during both early and middle childhood. The increased transmission from wealth changes in early-childhood are driven by both housing and non-housing wealth: we now find that 30% and 6.39% of each Danish Krone increase in parental housing wealth during ages 0-5 is transmitted to the housing and non-housing wealth of the child, respectively. The change in the effects of wealth changes in middle childhood, on the other hand, are driven by transmission of parental housing

wealth to adult child's non-housing wealth. The estimates for housing wealth in panel B change little from baseline. The robustness of the housing wealth transmission is particularly important in supporting our claim that direct transfers are likely negligible in our context. Families below the top 5% have few non-housing assets, which limits the opportunity for large direct transfers to children.

In column (4), we exclude vacation homes, as these homes may be treated differently than primary homes with respect to future wealth accumulation. We again document economically and statistically significant transmissions from parental housing wealth gains early in life to wealth in adulthood that mirror the baseline estimates in magnitude and statistical significance.

Finally, in column (5) we perform a falsification test using the sample of those who were renters at the time of their child's birth. If the main mechanism underlying our findings is from real wealth changes, then renters should be unaffected or negatively affected (as their cost of living rises with home prices but not their wealth). Alternatively, if our results reflect unobserved trends or shocks at the local municipality level that are correlated with home price changes, then outcomes for the children of renters should be positively correlated with home price increases. Using changes in municipality-average home prices during each child age range as the independent variable of interest in column (5), we find no relationship between housing price changes at the municipality level and long run wealth outcomes of renters' children. These results strongly support our identification assumptions.

5.3. Mechanisms

In this section, we shed light on the role of the different mechanisms discussed in Section 2 that can explain the causal effects of parental housing wealth changes on the wealth of their offspring. In column (1) of Table 8, we show estimates of equation (7) where the dependent variable is the likelihood of owning a home. The estimates indicate a modest effect on home ownership: a 100,000 DKK increase in parental housing wealth during ages 0-5 (6-11) years increases the likelihood of homeownership at ages 29-33 by 2.1 (0.9) percentage points. Parental housing wealth changes occurring during teen years have a negative and close to zero impact.

Next, we examine the effects on years of educational attainment in column (2). As with the results in column (1), the effects of housing wealth gains occurring in early and middle childhood are positive and statistically significant. Each 100,000 DKK of housing wealth during these periods

leads to 0.06-0.07 more years of educational attainment, which is about 2-3% of a standard deviation (see Table 1). In column (3), we show results using adult earnings as the dependent variable. The effects of wealth gains in the first two age groups are again positive and statistically significant. Each 100,000 DKK of housing wealth leads to 5,630 DKK ($833) and 3,380 DKK ($500) higher annual earnings among 0-5 and 6-11 year olds, respectively, which is 1.1% and 1.9% of the mean. The effects of parental housing wealth changes in teen years are negative but economically small and only marginally significant. Overall, our results suggest that parental housing wealth gains occurring before adolescence have a modest positive impact on intermediate later life outcomes that can affect wealth accumulation. In the terminology of equation (2), $\frac{\partial E^c}{\partial H^{pa_s}}$ and $\frac{\partial I^c}{\partial H^{pa_s}}$ are positive for housing wealth changes at ages 0-5 and 6-11.

How do the effects on education and earnings impact the overall wealth transmissions estimates? We follow Charles and Hurst (2003) and control for these intermediate factors, which effectively nets them out from the overall transmission effect. The results from this exercise are shown in Table 9. Column (1) presents baseline estimates from Column (4) of Table 5. In column (2), we control for fixed effects for years of completed education. We find that effects on education can account for at most 20% of the impact of early and middle childhood parental wealth gains: 14-15% of the overall wealth transmission, 15-20% of the transmission to housing wealth, and 5-20% of the transmission to non-housing wealth.[24] Column (3) presents estimates that control for earnings in adulthood, which explains slightly more of the aggregate wealth transmission. About 17% and 27% of the transmission to total wealth is explained by adult earnings, respectively, while for housing wealth earnings explains around 24% of the transmission. Non-housing wealth estimates are changed little by the inclusion of adult earnings.

Finally, we show the combined effect of educational attainment and earnings as intermediate mechanisms in Column (4) of Table 9. These two mechanisms explain 29% of the transmission to total wealth for early-life shocks and 21.5% for shocks occurring in middle childhood. These mechanisms operate mostly through the transmission of housing wealth: they explain 27.8% of the housing wealth transmission effect for housing wealth changes at ages 0-5 and 30.6% of the transmission of wealth changes at ages 6-11. The effect of controlling for

[24] Given the lack of effects from parental housing wealth shocks occurring during the teenage years, we only discuss the effects of the intermediate mechanisms for the two younger age groups. Estimates of shocks at ages 12-17 are shown in the table for completeness.

intermediate mechanisms on the transmission to non-housing wealth is minor, with less than 8% of the effect of shocks in middle childhood explained by earnings and education. Hence, education and earnings can explain at most 20-30% of the transmission of housing wealth changes during early-mid childhood to adult wealth. These results are consistent with Fagereng et al. (2021), who find that a substantial portion of the causal impact on children's accumulation of wealth from wealthier families are unexplained by observable mediators, including child education, income, financial literacy as well as direct transfers from parents.

As discussed above, we argue that $\frac{\partial f()}{\partial H^{pas}}$ and $\frac{\partial f()}{\partial OW^{pas}}\frac{\partial OW^{pas}}{\partial H^{pas}}$ in equation (2) are zero in Denmark because of the age of our sample, the robustness of our results to a sample with little liquid wealth to transmit directly, and evidence that parents in Denmark do not assist their adult children with buying homes (Kolodziejczyk and Leth-Petersen 2013). We therefore interpret the results in Table 9 as reflecting the importance of unobserved parental behaviors in the intergenerational transmission of housing wealth. We argue that this is the most plausible mechanism that can explain the overall pattern of our results. Younger children are both more mutable in terms of the development of their preferences but also are exposed to the wealth treatment for longer. These factors will naturally make wealth increases early in life more impactful, which is what we find.

We provide further suggestive evidence in support of this claim in Table 10. One can conceptualize parental behaviors and preferences as within-household public goods since they are non-rival and non-excludable. An implication of this interpretation is that the effects should not diminish much with the number of children. In contrast, if housing wealth transmission operates through direct expenditures, effects should differ with the number of children over whom the wealth is split. Table 10 presents reduced form estimates that include interactions between simulated parental housing wealth changes and the number of children ever born to the focal mother. Aligned with our hypothesis, we generally find that parental housing wealth effects do not vary systematically with the number of children: the interaction estimates are close to zero and are not statistically significant. The only exception is the impact of parental housing wealth shocks in early childhood on offspring non-housing wealth in adulthood, suggesting that for younger children there is a role for increased childhood expenditures that lead to higher non-housing wealth.

The vast majority of households in Denmark have 1-2 children; scaling these estimates for two-child families shows that parental housing wealth increases lead to large changes in adult housing wealth of the children, with more modest effects on non-housing wealth from shocks occurring before the age of 6. Put differently, the transmission of housing wealth changes during childhood to adult housing wealth is mostly unrelated to the number of children in the household, while for transmission of early-life parental housing wealth gains to non-housing wealth there is more of a role for direct expenditures by the parents. It is important to emphasize that even for this group, the number of children does not fully explain the transmission effect to non-housing wealth. This suggests that the household environment and unobserved parental behavior are still important mechanisms. Overall, the findings support our argument that the main transmission mechanism comes from a within-household public good in the form of changing parental behaviors that shape children's saving and investment behavior in adulthood.

The finding that changing parental behaviors are the main determinants of the intergenerational transmission of wealth aligns with the prior research showing the importance of the home environment on later life outcomes. Boserup, Kopczuk, and Kreiner (2018) show that those with higher childhood wealth have higher adult wealth, which they argue is driven by the intergenerational transmission of savings behavior. Kreiner, Leth-Petersen, and Willerslev-Olsen (2020) further demonstrate the intergenerational transmission of adverse credit outcomes, which is driven by correlated behaviors between parents and children in how they interact with debt. Our work strongly complements these results by demonstrating how parental housing wealth gains in childhood affect the development and transmission of savings behavior.

6. Conclusion

This paper extends the growing literature on the intergenerational transmission of wealth by examining how housing wealth shocks experienced during childhood translate to wealth in adulthood as well as the mechanisms that underlie this transmission. We focus on housing wealth because it is the single most important component of wealth for most households and is more evenly distributed across the population than are others forms of wealth. In addition, the past several decades have experienced historic volatility in the housing market, which underscores the importance of understanding the effect of this volatility on subsequent generations.

Using rich administrative data from Denmark, we exploit home price changes experienced by the household during three distinct periods of childhood – ages 0-5, 6-11, and 12-17 – to isolate the causal impact of parental housing shocks on children's wealth between the ages of 29 and 33. To abstract from endogenous mobility and property acquisition issues, we fix each child in the home in which they were born and then calculate the change in the value of this house over these three different child age ranges. Our empirical models include an extensive set of observable child and parent characteristics, including parental education and income, municipality and birth cohort fixed effects, as well as municipality fixed effects interacted with parental housing wealth at birth and parental net wealth at birth.

Our main results indicate that parental housing wealth shocks experienced during youth are passed through to children but that the transmission happens differentially based on the age of the child when the shock occurred. We find that 25-27% of each Danish Krone increase in parental housing wealth during early and middle childhood is transmitted to children in the form of higher wealth in adulthood. While parental housing wealth gains in early childhood are primarily reflected in higher housing wealth of children, wealth gains during middle childhood affect both adult children's housing and non-housing wealth. In contrast, we find no evidence that parental housing shocks during teenage years affect later life wealth outcomes.

We present a simple model that shows the potential mechanisms through which wealth shocks are transmitted across generations. Our model highlights the following factors: 1) the direct effect of the wealth shock, 2) changes to parental asset allocations (other wealth), 3) higher educational attainment, 4) higher earnings of the child, and 4) changes to unobserved parent behaviors that shape children's savings and investment preferences in the future. The first two mechanisms are likely to be negligible in the Danish context. Our empirical examination of the role of earnings and education indicate that they explain between 20-30% of the transmission of parental housing wealth gains occurring before adolescence. Taking the evidence together, we argue that housing wealth changes during childhood alter parental behaviors that impact children's housing wealth accumulation as adults. This interpretation of the evidence is supported by the larger transmission among children prior to their teenage years, as younger children are likely to be more influenced by their parents than are teens. Parent behaviors act as public goods within the household, and our conclusions are bolstered by the finding that the effects change little with the

number of children in the household. Any mechanisms that require financial outlays by parents would not have this feature.

Our results have a number of important implications. First, from a policy perspective, they suggest that policies that support wealth accumulation of parents, especially among parents of young children, will foster higher wealth accumulation among children as they age. Second, our preferred interpretation of the results highlights the role of parental behaviors in driving the intergenerational transmission of wealth. These behaviors could be independently targeted by policy interventions, for example by helping develop financial literacy. Third, our estimates add to the evidence on the long-run impact of housing market volatility. In particular, the large fluctuations in home prices during the housing boom and bust are likely to meaningfully impact wealth accumulation among the next generation who were young children during this period. Subsequent work directly examining these cohorts and understanding how parental behaviors are shaped by wealth fluctuations would be of high value.

References

Adermon, Adrian, Mikael Lindahl, and Daniel Waldenström. 2018. "Intergenerational Wealth Mobility and the Role of Inheritance: Evidence from Multiple Generations." *The Economic Journal* 128(612): F482-F513.

Almond, Douglas, Janet Currie, and Valentina Duque. 2018. "Childhood Circumstances and Adult Outcomes: Act II." *Journal of Economic Literature* 56(4): 1360-1446.

Arrondel, Luc and Cyril Grange. 2006. "Transmission and Inequality of Wealth: An Empirical Study of Wealth Mobility from 1800 to 1938 in France." *The Journal of Economic Inequality* 4: 209-232.

Black, Sandra E., Paul J. Devereux, Petter Lundborg, and Kaveh Majlesi. 2020. "Poor Little Rich Kids? The Role of Nature versus Nurture in Wealth and Other Economic Outcomes and Behaviours." *Review of Economic Studies* 87(4): 1683-1725.

Black, Sandra E., Paul J. Devereux, Petter Lundborg, and Kaveh Majlesi. 2017. "On the Origins of Risk-taking in Financial Markets." *The Journal of* Finance 72(5): 2229-2278.

Boserup, Simon H., Wojciech Kopczuk, and Claus T. Kreiner. 2016. "The Role of Bequests in Shaping Wealth Inequality: Evidence from Danish Wealth Records." *American Economic Review* 106(5): 656-61.

Boserup, Simon Halphen, Wojciech Kopczuk, and Claus Thustrup Kreiner. 2018. "Born with a Silver Spoon? Danish Evidence on Wealth Inequality in Childhood." *The Economic Journal* 128(612): F514-F544.

Brown, Meta, Sarah Stein, and Basit Zafar. 2015. "The Impact of Housing Markets on Consumer Debt: Credit Report Evidence from 1999 to 2012." *Journal of Money, Credit and Banking* 47(1): 175-213.

Bulman, George, Robert Fairlie, Sarena Goodman, and Adam Isen. 2021. "Parental Resources and College Attendance: Evidence from Lottery Wins." *American Economic Review* 111(4): 1201-40.

Carneiro, Pedro, Italo Lopez Garcia, Kjell G. Salvanes, and Emma Tominey. 2021. "Intergenerational Mobility and the Timing of Parental Income." *Journal of Political Economy* 129(3): 757-788.

Carneiro, Pedro, Kjell G. Salvanes, Barton Willage, and Alexander Willén. 2023. Childhood Shocks Across Ages and Human Capital Formation. Working paper.

Cesarini, David, Erik Lindqvist, Robert Östling, and Björn Wallace. 2016. "Wealth, Health, and Child Development: Evidence from Administrative Data on Swedish Lottery Players." *Quarterly Journal of Economics* 131(2): 687-738.

Charles, Kerwin Kofi, and Erik Hurst. 2003. "The Correlation of Wealth Across Generations." *Journal of political Economy* 111(6): 1155-1182.

Clark, Gregory and Neil Cummins. 2015. "Intergenerational Wealth Mobility in England, 1858–2012: Surnames and Social Mobility." *The Economic Journal* 125(582): 61-85.

Currie, Janet and Douglas Almond, "Human capital development before age five," in "Handbook of labor economics," Vol. 4, Elsevier, 2011, pp. 1315–1486.

Daysal, N. Meltem, Michael F. Lovenheim, and David N. Wasser. 2022. "The Correlation of Net and Gross Wealth across Generations: The Role of Parent Income and Child Age." *AEA Papers and Proceedings* 112: 73-77.

Daysal, N. Meltem, Michael Lovenheim, Nikolaj Siersbæk, and David N. Wasser. 2021. "Home prices, fertility, and early-life health outcomes." *Journal of Public Economics* 198: 104366.

De Stefani, Alessia and Simon Juul Hviid. 2018. "Housing Collateral and Home-equity Extraction." Danmarks Nationalbank Working Paper No. 135, February 20.

Dettling, Lisa J. and Melissa S. Kearney. 2014. "House Prices and Birth Rates: The Impact of the Real Estate Market on the Decision to Have a Baby" *Journal of Public Economics* 110: 82-100.

Fagereng, Andreas, Magne Mogstad, and Marte Rønning. 2021. "Why Do Wealthy Parents have Wealthy Children?" *Journal of Political Economy* 129(3): 703-756.

Fichera, Eleonora and John Gathergood. 2016. "Do Wealth Shocks Affect Health? New Evidence from the Housing Boom." *Health Economics* 25: 57-69.

Hendren, Nathaniel and Ben Sprung-Keyser. 2020. "A Unified Welfare Analysis of Government Policies." *Quarterly Journal of Economics* 135(3): 1209-1318.

Hotz, V. Joseph, Emily E. Wiemers, Joshua Rasmussen, and Kate Maxwell Koegel. Forthcoming. "The Role of Parental Wealth and Income in Financing Children's College Attendance and its Consequences." *Journal of Human Resources*.

Kolodziejczyk, Christophe and Søren Leth-Petersen. 2013. "Do First-Time House Buyers Receive Financial Transfers from Their Parents?" *The Scandinavian Journal of Economics* 115(4): 1020-1045.

Kreiner, Claus Thustrup, Søren Leth-Petersen, and Louise Charlotte Willerslev-Olsen. 2020. "Financial Trouble across Generations: Evidence from the Universe of Personal Loans in Denmark." *The Economic Journal* 130(625): 233-262.

Leth-Petersen, Søren. 2010. "Intertemporal Consumption and Credit Constraints: Does Total Expenditure Respond to an Exogenous Shock to Credit?" *American Economic Review* 100(3): 1080-1103.

Lovenheim, Michael F. 2011. "The Effect of Liquid Housing Wealth on College Enrollment." *Journal of Labor Economics* 29(4): 741-771.

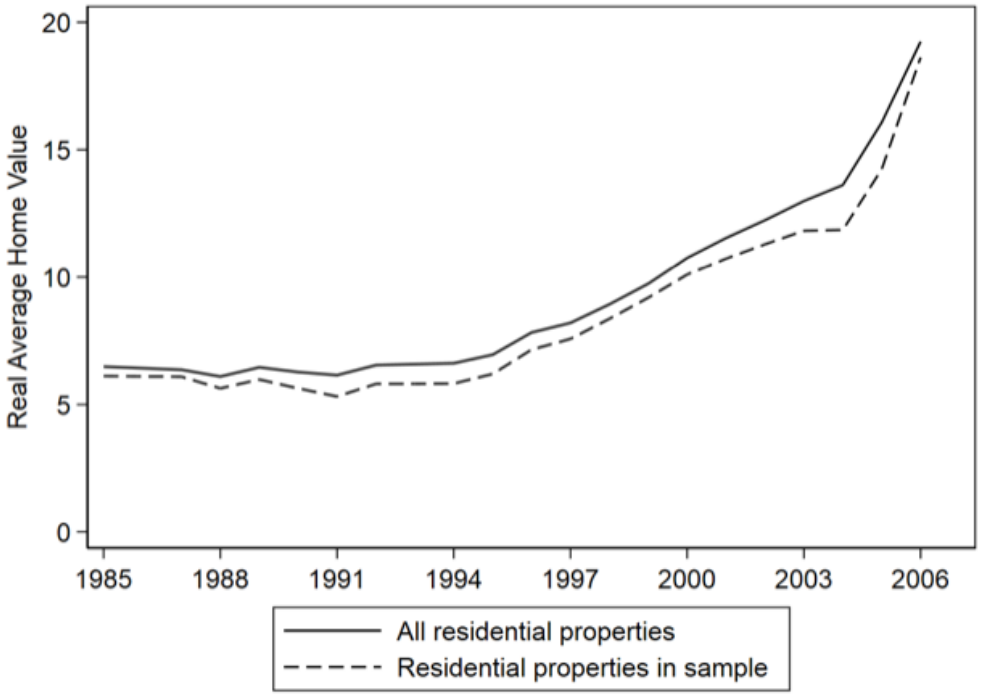
Lovenheim, Michael F. and Kevin J. Mumford. 2013. "Do Family Wealth Shocks Affect Fertility Choices? Evidence from the Housing Market." *Review of Economics and Statistics* 95(2): 464-475.

Lovenheim, Michael F. and C. Lockwood Reynolds. 2013. "The Effect of Housing Wealth on College Choice: Evidence from the Housing Boom." *Journal of Human Resources* 48(1): 1-35.

Mian, Atif and Amir Sufi. 2011. "House Prices, Home Equity-based Borrowing, and the US Household Leverage Crisis." *American Economic Review* 101(5): 2132-56.

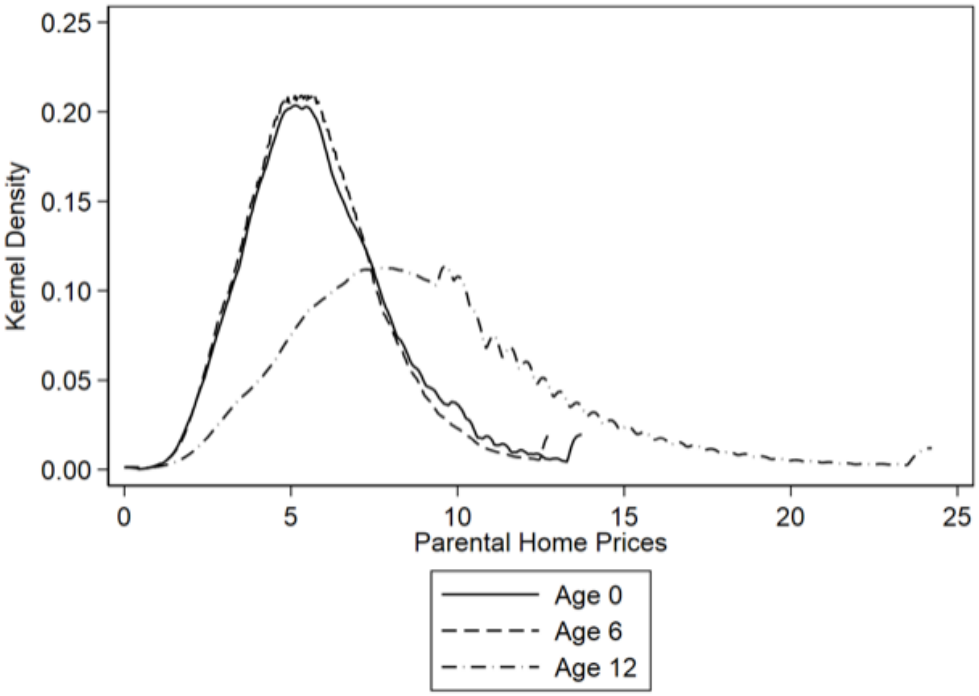
Zhao, Lingxiao, and Gregory Burge. 2017. "Housing Wealth, Property Taxes, and Labor Supply among the Elderly." *Journal of Labor Economics* 35(1): 227-263.

Figure 1: Average Value of Residential Properties, 1985-2006



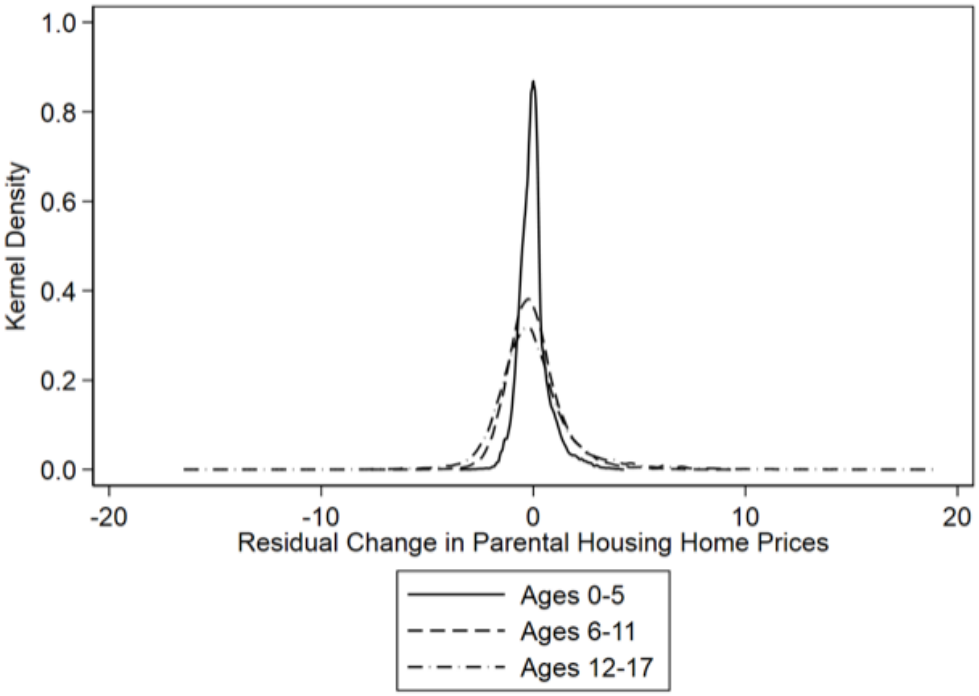
Average value of residential properties in the full population (solid line) and our analysis sample (dashed line). Home values are in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index ($\approx$ \$14,800).

Figure 2: Distribution of Simulated Parental Housing Wealth



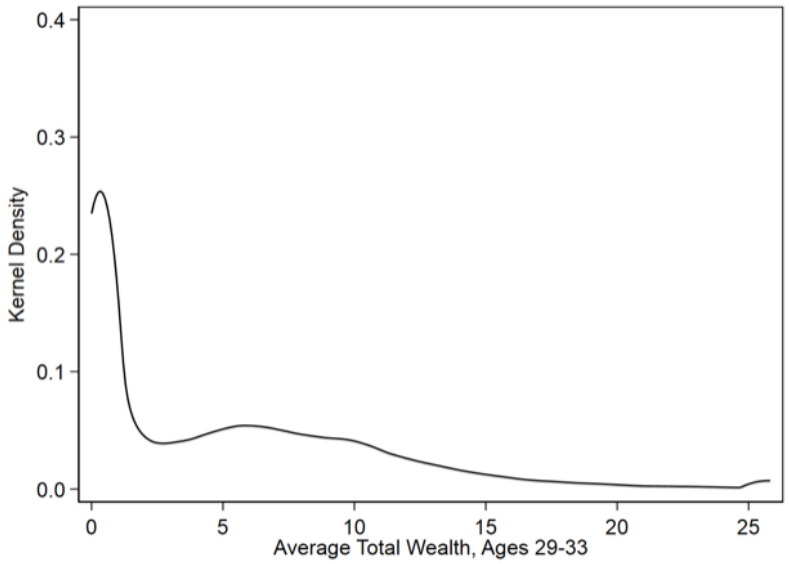
Kernel densities estimated using Epanechnikov kernel with optimal bandwidth. Simulated parental housing wealth levels are winsorized at the 99th percentile within each age group. Home prices are in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index ($\approx$ \$14,800).

Figure 3: Distribution of Changes in Simulated Parental Housing Wealth

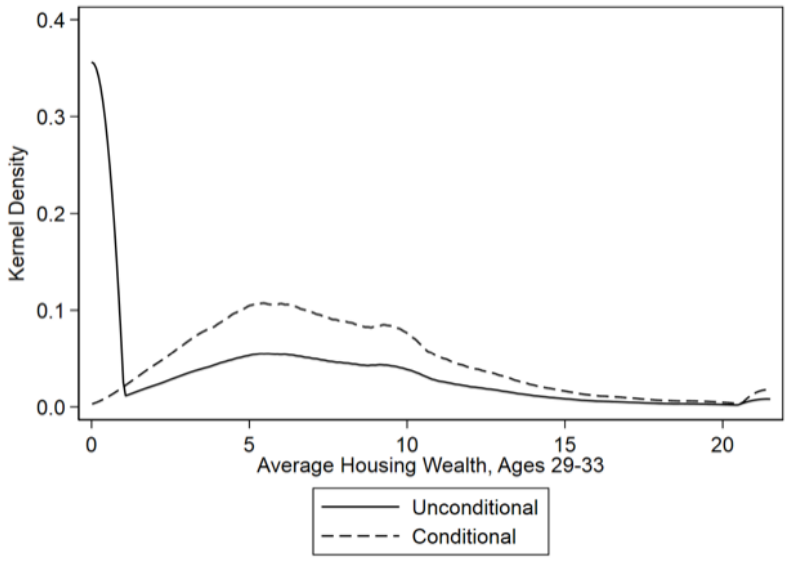


Kernel densities estimated using Epanechnikov kernel with optimal bandwidth. Simulated housing wealth is the value of the home in which the child was born. We residualize the change in simulated home prices with respect to birth cohort and municipality fixed effects. Changes in simulated home prices are in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index ($\approx$ \$14,800).

Figure 4: Distribution of Housing Wealth of Children in Adulthood, Ages 29-33



(a) Total Wealth



(b) Housing Wealth

Kernel densities estimated using Epanechnikov kernel with optimal bandwidth. Housing wealth level is winsorized at the 99th percentile. Housing wealth is in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index ($\approx$ \$14,800).

Table 1: Summary Statistics

	(1) Ages 0-5	(2) Ages 6-11	(3) Ages 12-17	(4) Ages 29-33
Family Background Characteristics				
Mother's Age	28.4975	34.4975	40.4975	
	(4.4227)	(4.4227)	(4.4227)	
Father's Age	31.2575	37.2575	43.2575	
	(5.1596)	(5.1596)	(5.1596)	
Mother's Education (years)	13.2646	13.3675	13.5343	
	(2.4772)	(2.4914)	(2.4924)	
Father's Education (years)	13.8798	13.9437	13.9837	
	(2.6700)	(2.6832)	(2.6881)	
Mother's Income	1.2586	1.8902	2.4420	
	(0.4596)	(0.8057)	(1.1187)	
Father's Income	1.9816	2.7102	3.4925	
	(0.9546)	(1.7134)	(2.8779)	
Parents are Married/Cohabiting	0.9866	0.8531	0.7702	
	(0.1152)	(0.3540)	(0.4207)	
Parental Net Wealth	0.2790	0.5184	1.5947	
	(7.1302)	(10.5243)	(8.8772)	
Parental Housing Wealth	5.3555	5.5450	10.1224	
	(2.7945)	(3.2016)	(8.3863)	
Change in Parental Housing Wealth	0.2531	3.7634	5.9924	
	(2.8429)	(4.8859)	(9.5000)	
Simulated Parental Housing Wealth	5.9711	5.7891	9.2976	
	(2.5811)	(2.7520)	(4.8261)	
Change in Simulated Parental Housing Wealth	-0.1759	2.7660	3.6673	
	(0.8928)	(1.9674)	(3.6498)	
Child Characteristics and Outcomes				
Female				0.4842
				(0.4998)
Birth parity				1.7519
				(0.7985)
Average Total Wealth				5.2596
				(12.0052)
Average Housing Wealth				4.2149
				(9.0140)
Average Non-housing Wealth				1.0447
				(6.6596)
Pr(Homeowner)				0.5137
				(0.4998)
Education (Max Years)				15.1219
				(2.4163)
Average Earnings				3.0073
				(1.9869)

Number of observations = 91,475 from the 1985 and 1987-1989 birth cohorts. Standard deviations in parentheses. Family background characteristics are measured in the base year for each age group. Child outcomes are measured at ages 29-33. All monetary variables are in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index ($\approx$ \$14,800).

Table 2: Intergenerational Transmission of Housing Wealth

Panel A: Total Wealth				
	(1)	(2)	(3)	(4)
Parental housing wealth, age 0	0.6276***			
	(0.0267)			
Parental housing wealth, age 6		0.7420***		
		(0.0272)		
Parental housing wealth, age 12			0.5065***	
			(0.0057)	
Parental housing wealth, ages 29-33				0.0757***
				(0.0001)
Observations	202,789	201,768	201,119	202,797
R^2	0.0043	0.0053	0.0388	0.6099

Panel B: Housing Wealth				
	(1)	(2)	(3)	(4)
Parental housing wealth, age 0	0.1578***			
	(0.0107)			
Parental housing wealth, age 6		0.2972***		
		(0.0109)		
Parental housing wealth, age 12			0.3846***	
			(0.0022)	
Parental housing wealth, ages 29-33				0.0371***
				(0.0007)
Observations	202,789	201,768	201,119	202,797
R^2	0.0024	0.0050	0.1348	0.0137

Panel C: Non-housing Wealth				
	(1)	(2)	(3)	(4)
Parental housing wealth, age 0	0.4698***			
	(0.0243)			
Parental housing wealth, age 6		0.4448***		
		(0.0247)		
Parental housing wealth, age 12			0.1219***	
			(0.0053)	
Parental housing wealth, ages 29-33				0.0515***
				(0.0017)
Observations	202,789	201,768	201,119	202,797
R^2	0.0031	0.0029	0.0039	0.0059

Each column of each panel is a separate regression that includes fixed effects for each parent's age in the first year of each age group. All monetary variables are in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index ($\approx$ \$14,800). Standard errors clustered at the municipality level in parentheses: significant at *10%, **5%, and ***1%.

Table 3: Instrumental Variables Estimates: First Stage

	(1) Change in Housing Wealth, Age 0-5	(2) Change in Housing Wealth, Ages 6-11	(3) Change in Housing Wealth, Ages 12-17
Change in simulated housing wealth, ages 0-5	0.5577***	0.0999***	0.1928***
	(0.0257)	(0.0215)	(0.0476)
Change in simulated housing wealth, ages 6-11	0.1539***	0.5968***	0.1359***
	(0.0092)	(0.0146)	(0.0259)
Change in simulated housing wealth, ages 12-17	0.0092	0.0136	0.5634***
	(0.0061)	(0.0110)	(0.0238)
Municipality FE	X	X	X
Birth Cohort FE	X	X	X
Municipality FE x Housing Wealth at Birth	X	X	X
Municipality FE x Net Wealth at Birth	X	X	X
Child Characteristics	X	X	X
Parental Controls at Birth	X	X	X
Observations	91,475	91,475	91,475
R^2	0.3054	0.1696	0.1555
F-stat	327.5947	413.3897	304.3756

Child characteristics include fixed effects for child gender and birth parity. Parental controls include each parent's real income in the year before child's birth, age fixed effects at birth, years of education at birth fixed effects, and an indicator for the parents being married and/or cohabiting at birth. All monetary variables are in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index (≈ $14,800). Standard errors clustered at the municipality level in parentheses: significant at *10%, **5%, and ***1%.

Table 4: Persistence of Parental Housing Wealth Shocks

	(1) Reduced Form	(2) IV Estimate
	Simulated Parental Housing Wealth	Parental Housing Wealth
(Simulated) Change in housing wealth, ages 0-5	1.1686***	1.4004***
	(0.1251)	(0.1493)
(Simulated) Change in housing wealth, ages 6-11	1.7383***	1.5280***
	(0.0546)	(0.0896)
(Simulated) Change in housing wealth, ages 12-17	1.4801***	1.3477***
	(0.0786)	(0.0535)
Municipality FE	X	X
Birth Cohort FE	X	X
Municipality FE x Housing Wealth at Birth	X	X
Municipality FE x Net Wealth at Birth	X	X
Child Characteristics	X	X
Parental Controls at Birth	X	X
Observations	91,473	91,243
Dep. Var. Mean	14.8810	16.7105

The table presents reduced form (column 1) and IV estimates (column 2) of equation (4), where the outcome variables are the simulated value of the parents' home (column 1) and the observed parental housing wealth (column 2), both measured when the child is age 18. Child characteristics include fixed effects for child gender and birth parity. Parental controls include each parent's real income in the year before child's birth, age fixed effects at birth, years of education at birth fixed effects at birth, and an indicator for the parents being married and/or cohabiting at birth. All monetary variables are in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index ($\approx$ \$14,800). Standard errors clustered at the municipality level in parentheses: significant at *10%, **5%, and ***1%.

Table 5: Effects of Parental Housing Wealth Shocks on Child's Wealth in Adulthood, IV Estimates

Panel A: Total Wealth				
	(1)	(2)	(3)	(4)
Change in housing wealth, ages 0-5	0.3762***	0.3353***	0.3085***	0.2718***
	(0.1049)	(0.0936)	(0.0930)	(0.0925)
Change in housing wealth, ages 6-11	0.2854***	0.2712***	0.2893***	0.2532***
	(0.0630)	(0.0576)	(0.0570)	(0.0559)
Change in housing wealth, ages 12-17	0.0680*	0.0303	0.0320	0.0351
	(0.0359)	(0.0312)	(0.0313)	(0.0330)
Observations	91,475	91,475	91,475	91,475
Dep. Var. Mean	5.2596	5.2596	5.2596	5.2596
Panel B: Housing Wealth				
	(1)	(2)	(3)	(4)
Change in housing wealth, ages 0-5	0.2504***	0.3110***	0.2900***	0.2467***
	(0.0797)	(0.0641)	(0.0637)	(0.0632)
Change in housing wealth, ages 6-11	0.1969***	0.1657***	0.1803***	0.1519***
	(0.0478)	(0.0395)	(0.0390)	(0.0382)
Change in housing wealth, ages 12-17	0.0336	-0.0058	-0.0043	0.0021
	(0.0273)	(0.0214)	(0.0214)	(0.0226)
Observations	91,475	91,475	91,475	91,475
Dep. Var. Mean	4.2149	4.2149	4.2149	4.2149
Panel C: Non-housing Wealth				
	(1)	(2)	(3)	(4)
Change in housing wealth, ages 0-5	0.1258**	0.0243	0.0186	0.0251
	(0.0584)	(0.0606)	(0.0602)	(0.0600)
Change in housing wealth, ages 6-11	0.0885**	0.1055***	0.1091***	0.1013***
	(0.0350)	(0.0373)	(0.0369)	(0.0363)
Change in housing wealth, ages 12-17	0.0344*	0.0361*	0.0363*	0.0330
	(0.0200)	(0.0202)	(0.0203)	(0.0214)
Observations	91,475	91,475	91,475	91,475
Dep. Var. Mean	1.0447	1.0447	1.0447	1.0447
Municipality FE	X	X	X	X
Birth Cohort FE	X	X	X	X
Housing Wealth at Birth	X			
Net Wealth at Birth	X			
Municipality FE x Housing Wealth at Birth		X	X	X
Municipality FE x Net Wealth at Birth		X	X	X
Child Characteristics			X	X
Parental Controls at Birth				X

Each column in each panel comes from a separate regression. Child characteristics include fixed effects for child gender and birth parity. Parental controls include each parent's real income in the year before child's birth, age fixed effects at birth, years of education at birth fixed effects, and an indicator for the parents being married and/or cohabiting at birth. All monetary variables are in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index (≈ $14,800). Standard errors clustered at the municipality level in parentheses: significant at *10%, **5%, and ***1%.

Table 6: Robustness Checks – Controls

	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline Effects	Father's Industry FE	Father's Education-Industry FE	Father's Occupation FE	Lags of Parental Housing Wealth	Municipality x Birth Cohort FE
Panel A: Total Wealth						
Change in housing wealth, ages 0-5	0.2718***	0.3791***	0.3776***	0.3970***	0.4005***	0.3710***
	(0.0925)	(0.0743)	(0.0766)	(0.0746)	(0.0819)	(0.0883)
Change in housing wealth, ages 6-11	0.2532***	0.1469***	0.1367***	0.1318***	0.2674***	0.2632***
	(0.0559)	(0.0449)	(0.0462)	(0.0450)	(0.0626)	(0.0597)
Change in housing wealth, ages 12-17	0.0351	0.0148	0.0184	0.0064	0.0180	0.0444
	(0.0330)	(0.0266)	(0.0274)	(0.0267)	(0.0398)	(0.0392)
Observations	91,475	88,046	86,702	88,437	65,656	91,475
Dep. Var. Mean	5.2596	5.2632	5.2665	5.2642	5.1077	5.2596
Panel B: Housing Wealth						
Change in housing wealth, ages 0-5	0.2467***	0.2305***	0.2242***	0.2398***	0.3082***	0.3023***
	(0.0632)	(0.0641)	(0.0661)	(0.0642)	(0.0499)	(0.0603)
Change in housing wealth, ages 6-11	0.1519***	0.1408***	0.1301***	0.1321***	0.1679***	0.1573***
	(0.0382)	(0.0388)	(0.0399)	(0.0387)	(0.0382)	(0.0408)
Change in housing wealth, ages 12-17	0.0021	0.0039	0.0095	-0.0022	-0.0112	0.0090
	(0.0226)	(0.0229)	(0.0237)	(0.0229)	(0.0243)	(0.0268)
Observations	91,475	88,046	86,702	88,437	65,656	91,475
Dep. Var. Mean	4.2149	4.2415	4.2456	4.2403	4.0478	4.2149
Panel C: Non-housing Wealth						
Change in housing wealth, ages 0-5	0.0251	0.1485***	0.1533***	0.1572***	0.0923	0.0687
	(0.0600)	(0.0282)	(0.0292)	(0.0288)	(0.0593)	(0.0573)
Change in housing wealth, ages 6-11	0.1013***	0.0062	0.0066	-0.0003	0.0996**	0.1059***
	(0.0363)	(0.0171)	(0.0176)	(0.0174)	(0.0454)	(0.0387)
Change in housing wealth, ages 12-17	0.0330	0.0109	0.0089	0.0087	0.0293	0.0354
	(0.0214)	(0.0101)	(0.0104)	(0.0103)	(0.0289)	(0.0254)
Observations	91,475	88,046	86,702	88,437	65,656	91,475
Dep. Var. Mean	1.0447	1.0217	1.0209	1.0239	1.0599	1.0447
Municipality FE	X	X	X	X	X	X
Birth Cohort FE	X	X	X	X	X	X
Municipality FE x Housing Wealth at Birth	X	X	X	X	X	X
Municipality FE x Net Wealth at Birth	X	X	X	X	X	X
Child characteristics	X	X	X	X	X	X
Parental Controls at Birth	X	X	X	X	X	X

The table presents IV estimates of equation (7). Child characteristics include fixed effects for child gender and birth parity. Parental controls include each parent's real income in the year before child's birth, age fixed effects at birth, years of education at birth fixed effects, and an indicator for the parents being married and/or cohabiting at birth. Column (2) adds fixed effects for the father's industry of employment when the child is 18, whereas Column (3) includes fixed effects for the father's education and industry when the child is 18. In column (4), we add fixed effects for the father's occupation when the child is age 18. Column (5) includes two lags of parental housing wealth prior to the child's birth. Finally, Column (6) includes interactions between municipality and birth cohort fixed effects. All monetary variables are in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index (≈ $14,800). Standard errors clustered at the municipality level in parentheses: significant at *10%, **5%, and ***1%.

Table 7: Robustness Checks – Sample

	(1)	(2)	(3)	(4)	(5)
	Baseline Effects	Drop 4th Quartile	Drop Top 5% of Housing and Net Wealth at Birth	Drop Vacation Homes	Renters
Panel A: Total Wealth					
Change in housing wealth, ages 0-5	0.2718***	0.3270	0.3637***	0.2424***	-0.0297
	(0.0925)	(0.2627)	(0.0616)	(0.0900)	(0.1528)
Change in housing wealth, ages 6-11	0.2532***	0.1937***	0.3171***	0.2984***	-0.0593
	(0.0559)	(0.0383)	(0.0531)	(0.0530)	(0.0678)
Change in housing wealth, ages 12-17	0.0351	0.0141	0.0203	0.0191	-0.0028
	(0.0330)	(0.0241)	(0.0319)	(0.0323)	(0.0430)
Observations	91,475	43,914	83,625	89,546	43,162
Dep. Var. Mean	5.2596	4.9249	4.9776	5.2288	3.1830
Panel B: Housing Wealth					
Change in housing wealth, ages 0-5	0.2467***	0.3114	0.2998***	0.2236***	-0.0391
	(0.0632)	(0.2394)	(0.0555)	(0.0582)	(0.1456)
Change in housing wealth, ages 6-11	0.1519***	0.1688***	0.1651***	0.1927***	-0.0529
	(0.0382)	(0.0332)	(0.0348)	(0.0343)	(0.0644)
Change in housing wealth, ages 12-17	0.0021	-0.0025	-0.0163	-0.0116	0.0056
	(0.0226)	(0.0209)	(0.0209)	(0.0209)	(0.0433)
Observations	91,475	43,914	83,625	89,546	43,162
Dep. Var. Mean	4.2149	4.0580	4.0679	4.1877	2.5176
Panel C: Non-housing Wealth					
Change in housing wealth, ages 0-5	0.0251	0.0156	0.0639***	0.0188	0.0094
	(0.0600)	(0.0758)	(0.0199)	(0.0615)	(0.0379)
Change in housing wealth, ages 6-11	0.1013***	0.0249	0.1520***	0.1056***	-0.0064
	(0.0363)	(0.0152)	(0.0364)	(0.0362)	(0.0202)
Change in housing wealth, ages 12-17	0.0330	0.0166*	0.0366*	0.0307	-0.0083
	(0.0214)	(0.0095)	(0.0219)	(0.0221)	(0.0103)
Observations	91,475	43,914	83,625	89,546	43,162
Dep. Var. Mean	1.0447	0.8669	0.9097	1.0124	0.6654
Municipality FE	X	X	X	X	X
Birth Cohort FE	X	X	X	X	X
Municipality FE x Housing Wealth at Birth	X	X	X	X	X
Municipality FE x Net Wealth at Birth	X	X	X	X	X
Child characteristics	X	X	X	X	X
Parental Controls at Birth	X	X	X	X	X

The table presents IV estimates of equation (7), except for column (5) that shows reduced form estimates akin to equation (4). Child characteristics include fixed effects for child gender and birth parity. Parental controls include each parent's real income in the year before child's birth, age fixed effects at birth, year of education at birth fixed effects, and an indicator for the parents being married and/or cohabiting at birth. Column (2) drops all observations where the changes in housing wealth for each age group is in the 4th quartile of the distribution of housing wealth changes for that age group. Column (3) drops observations where the parents are in the top 5% of both the net wealth distribution and the housing wealth distribution when the child is born (measured across all cohorts). Column (4) drops observations where the parents only own a vacation home at the birth of the child. Column (5) uses changes in average municipality-level simulated housing wealth among the families in the sample. All monetary variables are in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index ($\approx$ \$14,800). Standard errors clustered at the municipality level in parentheses: significant at *10%, **5%, and ***1%.

Table 8: Instrumental Variables Estimates of Mechanisms

	(1)	(2)	(3)
		Highest Education (Years),	Average Earnings
	Pr(Homeowner)	Ages 29-33	Ages 29-33
Change in housing wealth, ages 0-5	0.0213***	0.0556***	0.0563***
	(0.0046)	(0.0202)	(0.0179)
Change in housing wealth, ages 6-11	0.0090***	0.0725***	0.0338***
	(0.0028)	(0.0122)	(0.0108)
Change in housing wealth, ages 12-17	-0.0038*	0.0090	-0.0121*
	(0.0016)	(0.0072)	(0.0064)
Municipality FE	X	X	X
Birth Cohort FE	X	X	X
Municipality FE x Housing Wealth at Birth	X	X	X
Municipality FE x Net Wealth at Birth	X	X	X
Child Characteristics	X	X	X
Parental Controls at Birth	X	X	X
Observations	91,475	91,475	91,475
Dep. Var. Mean	0.5137	15.1174	3.0073

The table presents IV estimates of equation (7), with each potential mechanism as the outcome variable. All columns include controls for each parent's real income at birth, age fixed effects at birth, years of education at birth fixed effects, and an indicator for the parents being married and/or cohabiting at birth. Child characteristics include fixed effects for child gender and birth parity. All monetary variables are in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index ($\approx$ \$14,800). Standard errors clustered at the municipality level in parentheses: significant at *10%, **5%, and ***1%.

Table 9: Instrumental Variables Estimates with Endogenous Mechanisms

Panel A: Total Wealth				
	(1)	(2)	(3)	(4)
	Baseline Effects	Mechanisms: Education	Mechanisms Earnings	Mechanisms: Earnings and Earnings
Change in housing wealth, ages 0-5	0.2718***	0.2290**	0.1992**	0.1921**
	(0.0925)	(0.0919)	(0.0898)	(0.0898)
Change in housing wealth, ages 6-11	0.2532***	0.2172***	0.2095***	0.1987***
	(0.0559)	(0.0552)	(0.0540)	(0.0539)
Change in housing wealth, ages 12-17	0.0351	0.0403	0.0507	0.0529*
	(0.0330)	(0.0328)	(0.0320)	(0.0320)
Observations	91,475	91,475	91,475	91,475
Dep. Var. Mean	5.2596	5.2596	5.2596	5.2596
Panel B: Housing Wealth				
	(1)	(2)	(3)	(4)
Change in housing wealth, ages 0-5	0.2467***	0.2091***	0.1858**	0.1781***
	(0.0632)	(0.0624)	(0.0603)	(0.0602)
Change in housing wealth, ages 6-11	0.1519***	0.1209***	0.1153***	0.1054***
	(0.0382)	(0.0375)	(0.0363)	(0.0361)
Change in housing wealth, ages 12-17	0.0021	0.0082	0.0152	0.0188
	(0.0226)	(0.0223)	(0.0215)	(0.0214)
Observations	91,475	91,475	91,475	91,475
Dep. Var. Mean	4.2149	4.2149	4.2149	4.2149
Panel C: Non-housing Wealth				
	(1)	(2)	(3)	(4)
Change in housing wealth, ages 0-5	0.0251	0.0200	0.0134	0.0140
	(0.0600)	(0.0603)	(0.0601)	(0.0603)
Change in housing wealth, ages 6-11	0.1013***	0.0963***	0.0942***	0.0933***
	(0.0363)	(0.0362)	(0.0362)	(0.0362)
Change in housing wealth, ages 12-17	0.0330	0.0321	0.0355*	0.0341
	(0.0214)	(0.0215)	(0.0214)	(0.0215)
Observations	91,475	91,475	91,475	91,475
Dep. Var. Mean	1.0447	1.0447	1.0447	1.0447
Municipality FE	X	X	X	X
Birth Cohort FE	X	X	X	X
Municipality FE x Housing Wealth at Birth	X	X	X	X
Municipality FE x Net Wealth at Birth	X	X	X	X
Child Characteristics	X	X	X	X
Parental Controls at Birth	X	X	X	X

The table presents IV estimates of the transmission of housing wealth changes that control for endogenous mechanisms. Column 1 presents our baseline estimates. Column 2 controls for fixed effects for highest level of education (years) over ages 29-33. Column 3 controls for average real earnings for ages 29-33. Column 4 controls for both education and earnings. All columns include controls for each parent's real income at birth, age fixed effects at birth, years of education at birth fixed effects, and an indicator for the parents being married and/or cohabiting at birth. Child characteristics include fixed effects for child gender and birth parity. All monetary variables are in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index ($\approx$ \$14,800). Standard errors clustered at the municipality level in parentheses: significant at *10%, **5%, and ***1%.

Table 10: Effects by Number of Children: Reduced Form

	(1) Total Wealth	(2) Housing Wealth	(3) Non-housing Wealth
Change in housing wealth, ages 0-5	0.5607***	0.2678***	0.2929**
	(0.1567)	(0.0738)	(0.1278)
Change in housing wealth, ages 6-11	0.2086**	0.2009***	0.0078
	(0.0871)	(0.0606)	(0.0485)
Change in housing wealth, ages 12-17	0.0873	0.0434	0.0439*
	(0.0531)	(0.0356)	(0.0242)
# children	-0.1296	-0.0128	-0.1168
	(0.1204)	(0.0625)	(0.0998)
Change in housing wealth, ages 0-5	-0.1543**	-0.0468	-0.1075*
x # children	(0.0722)	(0.0289)	(0.0574)
Change in housing wealth, ages 6-11	-0.0031	-0.0284	0.0253
x # children	(0.0393)	(0.0202)	(0.0316)
Change in housing wealth, ages 12-17	-0.0256	-0.0157	-0.0100
x # children	(0.0167)	(0.0123)	(0.0076)
Municipality FE	X	X	X
Birth Cohort FE	X	X	X
Municipality FE x Housing Wealth at Birth	X	X	X
Municipality FE x Net Wealth at Birth	X	X	X
Child characteristics	X	X	X
Parental Controls at Birth	X	X	X
Observations	91,475	91,475	91,475
R^2	0.3223	0.4361	0.0733
Dep. Var. Mean	5.2596	4.2149	1.0447

The table presents reduced form estimates of equation (4). All columns include controls for each parent's real income at birth, age fixed effects at birth, years of education at birth fixed effects , and an indicator for the parents being married and/or cohabiting at birth. Child characteristics include fixed effects for child gender and birth parity. The treatment variables are changes in the simulated housing wealth for each age group, where we interact the number of children born to the focal child's mother with changes in housing wealth. All monetary variables are in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index (≈ $14,800). Standard errors clustered at the municipality level in parentheses: significant at *10%, **5%, and ***1%.

A Online Appendix

Table A.1: Sample Creation

	(1)
Births (1985-1989)	222,173
At least one parent owns a single house	97,443
With data on parental education, income, and age at birth	91,475

Data on home values at birth for the 1986 birth cohort are unavailable.

Table A.2: Housing Sample Creation

	Number of Houses
Houses owned by parents of 1985, 1987-1989 birth cohorts	125,125
With a single address	124,906
With non-negative valuations	124,566
Limited to families that own 1 house	120,908
Limited to primary residences and summer houses	101,295
With non-missing data when child is age 5	101,282
With non-missing data when child is age 6	101,280
With non-missing data when child is age 11	101,265
With non-missing data when child is age 12	101,259
With non-missing data when child is age 17	87,784
With non-missing data when child is age 18	87,777

Table A.3: Effects of Parental Housing Wealth Shocks on Child's Wealth in Adulthood, Reduced Form Estimates

Panel A: Total Wealth				
	(1)	(2)	(3)	(4)
Change in simulated housing wealth, ages 0-5	0.2400***	0.2247**	0.2128***	0.1836**
	(0.0910)	(0.0701)	(0.0693)	(0.0684)
Change in simulated housing wealth, ages 6-11	0.2722***	0.2573***	0.2631***	0.1977***
	(0.0537)	(0.0466)	(0.0464)	(0.0477)
Change in simulated housing wealth, ages 12-17	0.0718	0.0430*	0.0439**	0.0257
	(0.0491)	(0.0208)	(0.0208)	(0.0226)
Observations	91,475	91,475	91,475	91,475
Dep. Var. Mean	5.2596	5.2596	5.2596	5.2596

Panel B: Housing Wealth				
	(1)	(2)	(3)	(4)
Change in simulated housing wealth, ages 0-5	0.1588**	0.1926***	0.1832***	0.1532***
	(0.0613)	(0.0395)	(0.0397)	(0.0356)
Change in simulated housing wealth, ages 6-11	0.1829***	0.1749***	0.1796***	0.1289***
	(0.0226)	(0.0205)	(0.0206)	(0.0217)
Change in simulated housing wealth, ages 12-17	0.0407	0.0146	0.0155	0.0055
	(0.0407)	(0.0133)	(0.0135)	(0.0134)
Observations	91,475	91,475	91,475	91,475
Dep. Var. Mean	4.2149	4.2149	4.2149	4.2149

Panel C: Non-housing Wealth				
	(1)	(2)	(3)	(4)
Change in simulated housing wealth, ages 0-5	0.0813	0.0322	0.0296	0.0305
	(0.0743)	(0.0637)	(0.0628)	(0.0629)
Change in simulated housing wealth, ages 6-11	0.0893**	0.0825**	0.0835**	0.0688*
	(0.0414)	(0.0355)	(0.0353)	(0.0379)
Change in simulated housing wealth, ages 12-17	0.0312**	0.0284***	0.0285***	0.0202*
	(0.0146)	(0.0102)	(0.0100)	(0.0118)
Observations	91,475	91,475	91,475	91,475
Dep. Var. Mean	1.0447	1.0447	1.0447	1.0447
Municipality FE	X	X	X	X
Birth Cohort FE	X	X	X	X
Housing Wealth at Birth	X			
Net Wealth at Birth	X			
Municipality FE x Housing Wealth at Birth		X	X	X
Municipality FE x Net Wealth at Birth		X	X	X
Child Characteristics			X	X
Parental Controls at Birth				X

Each column in each panel comes from a separate regression. Child characteristics include fixed effects for child gender and birth parity. Parental controls include each parent's real income in the year before child's birth, age fixed effects at birth, years of education at birth fixed effects, and an indicator for the parents being married and/or cohabiting at birth. All monetary variables are in 100,000 Danish Kroner deflated to 2018 prices using the consumer price index ($\approx$ \$14,800). Standard errors clustered at the municipality level in parentheses: significant at *10%, **5%, and ***1%.