

# Intergenerational Correlation in Returns, Wealth Inequality and the Estate Tax

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## Abstract

We provide evidence that returns on assets held by American households' are influenced by individual fixed effects, and there exists intergenerational correlation in returns (ICR). Empirically, a 10-percentile increase in the rank of returns on the father's portfolio is associated with an approximately 3-percentile increase in that of each child. Next, we use an intertemporal model to show that the ICR amplifies intergenerational linkages via earnings ability and bequests. Quantitatively, our model predicts that the ICR would generate a 5 percentage point increase in the wealth share of the top 5% and a 27% increase in their wealth-to-earnings ratio, whereas the corresponding increases due to the intergenerational correlation of earnings are merely 1 percentage point and 2%, respectively. Thus, the ICR has important aggregate implications for the estate tax policy.

**Keywords:** wealth inequality, intergenerational correlation in returns, estate tax

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# 1 Introduction

A branch of the recent literature on wealth inequality emphasizes the importance of heterogeneous returns on wealth.<sup>1</sup> In particular, [Cao and Luo \(2017\)](#) show that heterogeneous returns on wealth contribute to the increase in wealth inequality in the US, using data from the Panel Study of Income Dynamics (PSID). [Xavier \(2021\)](#) illustrates similar insights, using data from the Survey of Consumer Finance (SCF). Taking into account heterogeneity in both returns and earnings, the dynamic model by [Benhabib et al. \(2019\)](#) shows that wealthier households accumulate assets at a faster pace than average households, magnifying inequality over time.<sup>2</sup> Similarly, [Bach et al. \(2020\)](#) find that heterogeneity in returns on wealth of Swedish households explains the increase in wealth inequality in Sweden. Furthermore, [Fagereng et al. \(2020\)](#) provide evidence that returns on wealth of Norwegian households are positively correlated across generations, implying that intergenerational linkages via returns can amplify wealth inequality. Nevertheless, the quantitative importance of intergenerational correlation in returns (ICR) has not been examined.

Our study fills the gap in the literature by providing direct evidence for ICR in US data, and investigates its aggregate implications for wealth inequality and estate taxation in a dynamic model. We employ US household-level data from the PSID in 1984–2019 to find that returns are significantly driven by individual fixed effects, and estimate the rank correlation between returns on the father’s wealth and those of his children to be 0.28. This estimate implies that a 10-percentile increase in the father’s rank is approximately associated with a 3-percentile increase in the child’s rank on average. Moreover, estimated returns are significantly more persistent in the lowest and highest quintiles than the middle of the wealth distribution, suggesting a polarization in the ICR.

Next, we develop a dynamic macroeconomic model featuring the ICR, taking into account other intergenerational linkages via earnings and bequests, as in the litera-

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<sup>1</sup>See [Smith et al. \(2023\)](#) for the summary of this branch of literature.

<sup>2</sup>In [Benhabib et al. \(2019\)](#), despite their attempt to explain wealth inequality in the US, returns on wealth in the calibrated model are not obtained from US data, but calibrated to match properties of observed returns on wealth of Norwegian households in [Fagereng et al. \(2016\)](#).

ture. In our model, a key driver of heterogeneity in returns on wealth is heterogeneity in lifetime investment ability, as the observed ICR reflects that children of high-ability parents are more likely to exhibit high investment ability themselves. Intuitively, investment ability encompasses a broad set of skills that influence returns, including financial sophistication (Lusardi et al., 2017; Kacperczyk et al., 2019), entrepreneurial productivity (Quadrini, 2000; Cagetti and De Nardi, 2006; Cagetti and De Nardi, 2009), and other factors. Additionally, our model captures intergenerational correlation in earnings through the transmission of labor productivity from parents to children. Also, we incorporate a *warm glow* bequest motive following De Nardi (2004), treating bequests as luxury goods, which lead to higher saving rates as lifetime income rises. We calibrate our model to the US economy with a 20% marginal estate tax rate, following Benhabib et al. (2011). Our baseline model is able to closely replicate the distributions of wealth, earnings, and returns on wealth in the PSID.

Intuitively, the ICR amplifies wealth inequality primarily because children with high investment ability are more likely to receive larger bequests from parents who also possess high ability and thus earn higher returns. To illustrate this point, our counterfactual experiment shows that shutting down the ICR leads to a significant decrease in wealth inequality; the coefficient of variation of wealth distribution declines by 0.7, and the wealth Gini decreases by 0.3. The wealth concentration at the top decreases, with the wealth share of the top 1% declining by 5 percentage points. In another experiment, removing intergenerational correlation in earnings also leads to a decline in wealth inequality but its quantitative impact is significantly smaller than that of the ICR. Specifically, the corresponding declines in the coefficient of variation of wealth distribution, the wealth Gini and the wealth share of the top 1% are only 0.1, 1% and 1 percentage point, respectively.

Finally, we examine the quantitative impact of estate tax policies. Specifically, we conduct four types of tax reforms by varying the marginal estate tax rate: without adjusting other taxes; adjusting the labor income tax to balance the government budget; adjusting capital income tax to balance the government budget; and using a lump-sum tax to balance the government budget. We find that reducing the marginal estate tax rate increases aggregate wealth and inequality, whereas raising the tax rate

decreases them, consistent with [De Nardi and Yang \(2016\)](#). Quantitatively, changes in inequality, aggregate wealth, and welfare are amplified by the ICR, and thus the quantitative impact of changes in the marginal estate tax is larger than that in [De Nardi and Yang \(2016\)](#). Intuitively, high-ability agents are more responsive to changes in inheritance, and so a larger share of bequests are foregone under estate taxation in the presence of ICR than in the absence of ICR. Hence, abstracting from ICR leads to an underestimation of the effectiveness of estate taxation in curbing wealth inequality.

Our study belongs to the growing literature emphasizing the role of intergenerational linkages in explaining the wealth distribution. This literature has long examined the implications of bequests and intergenerational labor productivity transmission for wealth inequality. On the one hand, bequests often behave like luxury goods, leading to heterogeneous saving rates across households, a formation of large estates and a highly skewed wealth distribution. On the other hand, earnings abilities are positively correlated across generations; high-income parents are more likely to have high-income children, and when combined with bequests, this persistence further amplifies wealth inequality. Furthermore, [De Nardi \(2004\)](#) and [De Nardi and Yang \(2014\)](#) find that the bequest motive has a significant effect, while the impact of labor productivity correlation is relatively small.<sup>3</sup>

Our modeling strategy is closely related to [Benhabib et al. \(2019\)](#), whose model also features heterogeneity in bequests, earnings and returns on wealth. Nevertheless, the magnitude of ICR in their quantitative model is not directly estimated from US data; it is calibrated to match the wealth distribution and intergenerational wealth mobility in Norwegian data. Moreover, their calibrated ICR is 0.10, much smaller than our 0.28. Furthermore, our measure of returns is comprehensive, reflecting aggregate returns on a diversified portfolio of business, stocks, real estate, and other assets. Hence, heterogeneity of returns in our study is not solely caused by entrepreneurial productivity, unlike studies that emphasize entrepreneurship. These studies propose that entrepreneurial productivity is partially transmitted from parents to children, causing returns to correlate across generations (See [Cagetti and De Nardi, 2006](#), [Cagetti and De Nardi, 2009](#),

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<sup>3</sup>A survey by [De Nardi and Fella \(2017\)](#) provides a detailed discussion of the relationship between saving behaviors and bequests.

İmrohorođlu and Zhao, 2022, and Guvenen et al., 2023, for example).

The rest of the paper is organized as follows. The next section provides the empirical evidence for investment ability as the key determinant of returns for US households, and their ICR. Section 3 describes our dynamic model, of which calibrated version is discussed in Section 4. Counterfactual experiments and quantitative implications for estate taxation are in Sections 5 and 6, respectively. We conclude in Section 7.

## 2 Stylized facts

In this section, first we describe the data and the methodology for our construction of the household-level rate of returns on wealth of American households. Next, we discuss the empirical regularities obtained from our measures of rate of returns and their determinants.

### 2.1 Measuring the household-level rate of returns

We define the household-level rate of returns ( $r_t$ ) on wealth as the sum of the yield income component ( $r_t^i$ ) and the capital gain component ( $r_t^g$ ) as:

$$r_t = r_t^i + r_t^g, \tag{1}$$

such that

$$r_t^i = \frac{I_{t+1}}{W_t},$$
$$r_t^g = \sum_c \omega_{c,t} R_{c,t},$$

where  $I_{t+1}$  denotes the total asset income paid in year  $t + 1$ ,  $W_t$  denotes the total net wealth in year  $t$ ,  $\omega_{c,t}$  denotes the share of asset class  $c$  in total wealth in year  $t$ , and  $R_{c,t}$  denotes capital gains for asset class  $c$  from years  $t$  to  $t + 1$ .

Empirically, we construct a panel of household-level rate of returns for American households in the years 1984, 1989, 1994, and from 1999 to 2019, using information from three databases, namely the PSID, the Financial Accounts of the US, and Shiller (2015). Our sample years are constrained by the PSID, which collects data on household-level wealth, asset compositions and debt compositions in 1984, 1989, 1994, and biennially

starting from 1999. Starting with the 1968 wave, the PSID has also collected data on households' income from certain assets in the previous year.<sup>4</sup>

Additionally, the PSID provides an identification variable linking the parents' household with their child's. Consequently, this database has sufficient information for the calculation of values of household-level  $I_{t+1}$ ,  $W_t$  and  $\omega_{c,t}$  for both parents' and child's households. Specifically, we proceed in the following steps. First, we calculate  $I_{t+1}$  as the sum of income paid in year  $t + 1$  from businesses, dividends, interest, rent, royalties, and trust funds.

Next, we obtain the net wealth  $W_t$  as the sum of net values of all assets, namely (1) real estate; (2) business; (3) stocks; (4) checking or savings accounts, money market funds, certificates of deposit, government savings bonds, or treasury bills; (5) vehicles; (6) private annuities or individual retirement accounts (IRAs); (7) other assets; (8) minus other debts. Thus, our measure of wealth is the net value and similar to that in [Cao and Luo \(2017\)](#) whose measure of wealth includes net worth of farms. To the contrary, we exclude all households of which members are farmers or ranchers, because the PSID does not count capital income from farms after the 1993 wave.

Third, to calculate the asset share  $\omega_{c,t}$ , we assume that capital gains or losses result from valuation of only businesses, real estates, and stocks. To this end, we exclude households with negative net worth in these three types of assets. Additionally, there are stock holdings in private annuities and IRAs. To account for these stock holdings, we assign 90%, 10%, and 50% shares, to private annuities and IRAs portfolios classified as "Mostly stocks," "Mostly interest earning," and "Split," respectively.<sup>5</sup>

Fourth, to calculate capital gains  $R_{c,t}$ , we rely on the Financial Accounts of the US and price indexes in [Shiller \(2015\)](#), due to the lack of capital gains data in the PSID. Similar to [Campanale \(2007\)](#) and [Xavier \(2021\)](#), we assume that capital gains within

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<sup>4</sup>The PSID sample includes the Survey Research Center (SRC), Survey of Economic Opportunity (SEO), and Latino family sub-samples. The SRC is representative of the US population at the time and is itself a random sample. The SEO oversamples the poor, and the Latino family sub-sample collects information on Latino groups. To make results more representative and free of weighting problems, we follow [Haider \(2001\)](#) and use only the SRC sub-sample.

<sup>5</sup>Increasing the share of stock holdings in the first category to 70% or 80% has minimal impacts on our main results.

each asset class in the same year are homogeneous across households. Specifically, we use “Nonfinancial Noncorporate Business; Proprietors’ Equity in Noncorporate Business, Level (NNBPEBA027N)” series in the Financial Accounts of the US to calculate noncorporate business capital gains. As for corporate business capital gains, we use “Households and Nonprofit Organizations; Corporate Equities; Asset, Level (HNO-CEAA027N) series”. Price indexes for real estate and stocks are from Shiller (2015).<sup>6</sup>

Fifth, we deflate all series with the 2015 consumer price index to obtain real rate of returns and made attempts to avoid extreme values. Specifically, we drop households whose net wealth is below \$1,000 before summing each component in Eq. (1) into  $r_t$ , truncate observations with  $r_t$  in the top 1.0% and the bottom 1.0% of the distribution, and keep only households whose representative individuals are aged between 25 and 75 in our data set. In this regard, representative individuals are not necessarily household heads. Instead, they are first determined by whether their father is identified in the PSID-SRC; otherwise, the household head is selected. As a result, 19.62% of representative individuals are spouses, and their presence helps expand the sample size for studying ICR.

Finally, we retain households that have at least three observations for our panel empirical analysis. In the end, there are 30,623 observations in the main sample, which forms the basis of empirical results.

## 2.2 Descriptive statistics

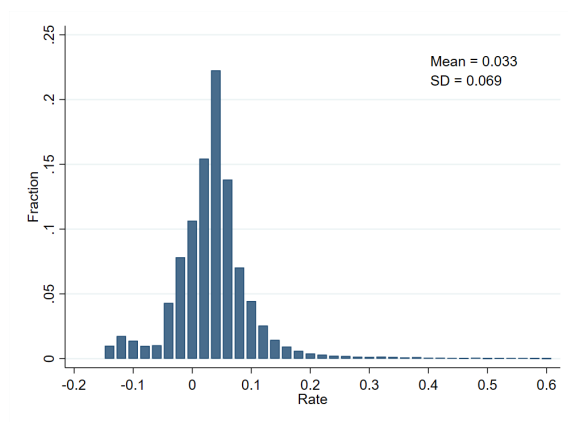
Figure 1 displays the distribution of returns and its two components. Evidently, the rate of returns is quite heterogeneous with a mean of 0.033 and a standard deviation of 0.069. Approximately 18% of households experience negative returns, 11% have zero returns, while the 90th percentile household’s rate of return is as high as 0.093. There are 38% and 15% of households with zero yield income and zero capital gain, respectively. Most negative values of returns come from the capital gain (loss) component; 22% of households suffer capital losses and less than 1% of households have negative yield incomes. The yield income component, however, contributes to extremely high returns; the 99th percentile of the yield income component reaches 0.301, that of the

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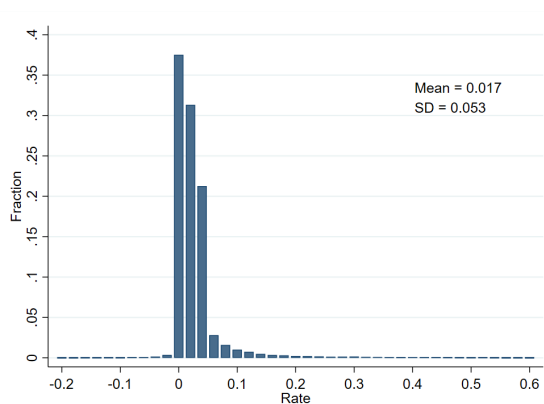
<sup>6</sup>These series are available online at Shiller Data: <https://shillerdata.com/>

capital gain component is only 0.122.

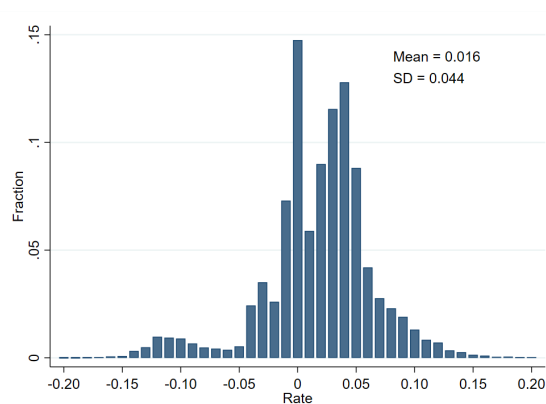
Figure 1: Distributions of returns on wealth of US households



(a) Rate of returns on wealth



(b) Yield income component



(c) Capital gain component

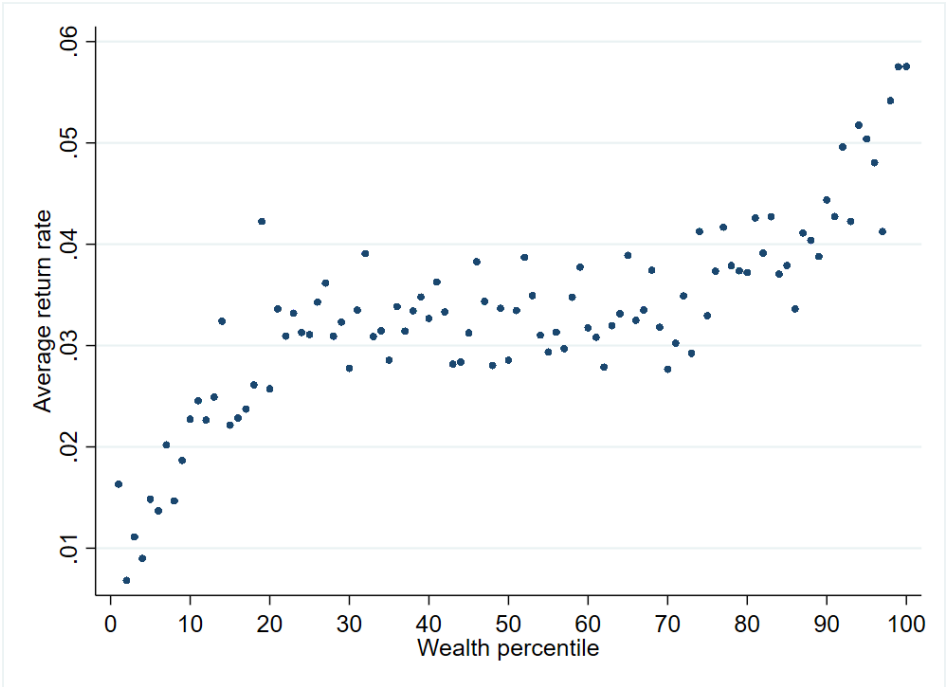
To highlight the wealth distribution, we display the average rate of returns of all households within each wealth percentile in Figure 2. This figure clearly exhibits two properties. First, wealthy households achieve higher returns than relatively poor households. To be precise, households in the top 10 percentiles in our sample experience an average rate of returns of 0.050, 3.3 times higher than that those in the bottom 10 percentiles, whose average rate of returns is around 0.015. This property is in fact consistent with the findings in [Bach et al. \(2020\)](#), [Fagereng et al. \(2020\)](#), and [Xavier \(2021\)](#).

Second, Figure 2 indicates no significant differences in the rate of returns from the 20th to the 80th percentiles of the wealth distribution. This property implies an extremely weak correlation between wealth and returns in the middle of the wealth dis-

tribution, as in [Xavier \(2021\)](#). However, our measure of returns is more appropriate for studying ICR than that in [Xavier \(2021\)](#), because the PSID tracks identical households over time, unlike the SCF.

When we abstract from heterogeneity in wealth, the average rate of returns over all households also displays time series variation. This average was highest at 0.081 from 2003 to 2004, and lowest at -0.068 from 2007 to 2008, during the onset of the Great Recession. Additional statistics for various subgroups of households are provided in [Table A1](#) in the appendix.<sup>7</sup>

Figure 2: The distribution of returns by wealth percentiles



Besides the cross-sectional variation above, the rate of returns also exhibits fluctuations over time. Figure ?? displays the weighed average rate of returns over all households over sampled years, where the weight is households’ wealth share. The fluctuations of returns appear cyclical except for the sharp drop from 2005 to 2007, due to major declines in values of real estates. This drop in the average return preceded the fall in stock prices in 2008, when the PSID did not sample data. In 2009, the average return was on an upward trajectory, following a gradual recovery in values of stocks.

<sup>7</sup>The average capital gains over time for each asset class are 2.90% for noncorporate businesses, 6.76% for corporate equity, 1.57% for real estate and 5.01% for stocks.

Figure 3: Average returns in sampled years.



Note: The average

return is weighted by households' wealth share.

## 2.3 Investment ability

This subsection uncovers characteristics of households that achieve higher returns and accumulate more wealth than the average. For this purpose, we index each household with  $j$  and let  $r_{j,t}$  denote the household-year specific rate of returns. Next, we construct a vector  $X_{j,t}$  of which elements are following household-year specific characteristics of its head: logarithm of wealth in the base year, the square of the logarithm of wealth, age, the square of age, an indicator for labor force participation, and a marital status indicator, which is one if being married or cohabiting, and zero otherwise. The Appendix A provides summary statistics of households' characteristics.

Following Fagereng et al. (2020), we take fixed effects into account and run the following panel regression:

$$r_{j,t} = X_{j,t}\psi + f_j + \lambda_t + e_{j,t}, \quad (2)$$

where  $f_j$  and  $\lambda_t$  capture individual and year fixed effects, respectively, and  $e_{j,t}$  denotes the residual.

Our main variable of interests is the individual fixed effect. In principle, this term captures persistent or lifetime characteristics that influence returns, such as prefer-

ences for portfolio choices, financial sophistication, and entrepreneurial productivity. Henceforth, we refer to these characteristics collectively as the *investment ability*. Our regression results in Table 1 indicates that the investment ability is an important determinant of returns.

In column (1), the presence of the individual fixed effect makes both types of fixed effects jointly statistically significant at 1% level. Consistent with time series variation in Figure ??, year fixed effects is also statistically significant. Other important determinants of returns are the logarithm of wealth and its square. Their estimated coefficients are 0.01471 and -0.00077, respectively, and both are statistically significant at 1% level. These coefficients imply that increasing wealth initially improves returns, but beyond a certain threshold it begins to decline, indicating a non-monotonic relationship.

A plausible explanation is that an accumulation of wealth permits relatively poor households to improve their portfolio choices. In contrast, wealthy households hold a large portion of wealth in risky assets, particularly businesses, which exhibit decreasing returns to scale and declining marginal products of capital despite increases in capital income. This result also has direct implication for our modeling strategy. Since other variables beyond the wealth variables and fixed effects are not strongly significant, then modeling the rate of return as a function of wealth, investment ability, and stochastic factors is a reasonable approach.

Additionally, we report results of alternative regressions in columns (2)–(4) to highlight the importance of investment ability or the individual fixed effects. In particular, column (2) reports the regression results without investment ability; columns (3) and (4) exclude the square of log wealth; and column (4) also excludes investment ability. These results suggest the following. First, both individual and year fixed effects are statistically significant ( $p < 0.0001$ ) in any specification, and including them improves the adjusted  $R^2$ . Second, investment ability should be included in the regression, because it improves the overall fit of the model and its p-value is significant. Third, once investment ability is included, it is better to also include the square of log wealth. Finally, adding investment ability reduces the effect of wealth on return rates, similar to Fagereng et al. (2020).

Quantitatively, moving from the 10th percentile to the 90th percentile is associated

with a 1.37 percentage point decrease in returns. For the purpose of comparison, Figure 2 provides the baseline for unconditional wealth effects; moving from the 10th percentile to the 90th percentile of wealth in this figure is associated with a 2.16 percentage point increase in returns. Hence, investment ability reduces the positive wealth effect in this case by 0.79 percentage points.

Table 1: Correlation between wealth and return rates

|                              | (1)                    | (2)                    | (3)                    | (4)                    |
|------------------------------|------------------------|------------------------|------------------------|------------------------|
| Log wealth                   | 1.4710***<br>(0.4020)  | 0.1037<br>(0.2313)     | -0.2403***<br>(0.0616) | 0.5341***<br>(0.0310)  |
| (Log wealth) <sup>2</sup>    | -0.0770***<br>(0.0182) | 0.0188*<br>(0.0101)    |                        |                        |
| Age                          | 0.1538<br>(0.1318)     | -0.0875***<br>(0.0249) | 0.1579<br>(0.1318)     | -0.0886***<br>(0.0250) |
| Age <sup>2</sup>             | -0.0002<br>(0.0003)    | 0.0007***<br>(0.0003)  | -0.0003<br>(0.0003)    | 0.0008***<br>(0.0003)  |
| Labor force                  | 0.2358*<br>(0.1269)    | 0.4628***<br>(0.1260)  | 0.2546**<br>(0.1268)   | 0.4563***<br>(0.1262)  |
| Married                      | 0.1127<br>(0.1925)     | -0.0349<br>(0.1063)    | 0.1334<br>(0.1923)     | -0.0485<br>(0.1057)    |
| Year effects                 | Yes                    | Yes                    | Yes                    | Yes                    |
| Individual FE                | Yes                    | No                     | Yes                    | No                     |
| Observations                 | 30,623                 | 30,623                 | 30,623                 | 30,623                 |
| Adjusted R <sup>2</sup>      | 0.3483                 | 0.2183                 | 0.3474                 | 0.2182                 |
| $p$ -value: year effects = 0 | < 0.0001               | < 0.0001               | < 0.0001               | < 0.0001               |
| $p$ -value: FE = 0           | < 0.0001               |                        | < 0.0001               |                        |

Note: The regression reported in the table is adjusted, with the dependent variable defined as the rate of return multiplied by 100. This adjustment enhances the table's readability, as the scales of wealth coefficients are less than 0.02 if not presented in percentage terms. Standard errors (in parentheses) are clustered by household head.

\* $p \leq 0.10$ , \*\* $p \leq 0.05$ , \*\*\* $p \leq 0.01$

Having uncovered the important role of the investment ability of the household's head, we examine its intergenerational transmission and ICR in the next subsection.

## 2.4 ICR and investment ability

From the main sample, we obtain 1,728 father-child pairs. We do not investigate mother-child pairs because approximately 73% of families are married, and both parents belong to the same household. For this reason, we focus on father-child rather than mother-child correlations in returns and investment ability. Our approach is similar to [Charles and Hurst \(2003\)](#) who calculate father-child wealth correlations using the PSID.

We are especially interested in the relative position of each generation in the wealth distribution. Hence, the appropriate measure of intergenerational correlation is the rank correlation instead of unconditional correlation. In particular, the ICR is estimated as the coefficient  $\rho_r$  from the following regression:

$$\bar{r}_j = \rho_r \bar{r}_j^{fa} + u_j, \quad (3)$$

where  $\bar{r}_j$  and  $\bar{r}_j^{fa}$  are the rank percentiles of the average return over time for the child's and the father's households, respectively, and  $u_j$  is the residual.

Likewise, the intergenerational correlation in investment ability, which is obtained from the previous subsection, is estimated as the coefficient  $\rho_f$  from the following regression:

$$\bar{f}_j = \rho_f \bar{f}_j^{fa} + v_j \quad (4)$$

where  $\bar{f}_j$  and  $\bar{f}_j^{fa}$  are the rank percentiles of investment ability of the child's and the father's households, respectively, and  $v_j$  is the residual.

Table 2 reports the estimation results. The correlation in average returns is approximately 0.17, indicating that, on average, a 10 percentile increase in the father's rank is associated with a 1.7 percentile rise in the child's rank. The correlation for investment ability is stronger, with a value of around 0.28. These correlations are similar to those estimated by [Fagereng et al. \(2020\)](#), who found ICR of 0.16 and a fixed effect correlation of 0.22. The correlations in average yield income and capital gain components are 0.18 and 0.09, respectively, and the correlations in the corresponding fixed effects are 0.31 and 0.26. These results suggest that the intergenerational correlation in the yield income component is stronger than that in the capital gain component.

Table 2: Regression results for intergenerational correlations

|                     | Average rates         | Investment ability    |
|---------------------|-----------------------|-----------------------|
| Father’s percentile | 0.1681***<br>(0.0236) | 0.2838***<br>(0.0226) |
| Observations        | 1,728                 | 1,728                 |
| R <sup>2</sup>      | 0.0285                | 0.0849                |

Note: The intergenerational correlations in columns (1) and (2) refer to the average returns and investment ability, respectively. Robust standard errors are in parentheses. \* $p \leq 0.10$ , \*\* $p \leq 0.05$ , \*\*\* $p \leq 0.01$

The influence of parents on their children’s portfolio decisions (Chiteji and Stafford, 1999, Barnea et al., 2010, Lindquist et al., 2015, Black et al., 2017, Fagereng et al., 2021, and Knüpfer et al., 2023) is a potentially important explanation for the ICR. These studies also suggest that both pre-birth factors, such as genetic influences, and post-birth factors, such as communication, imitation among family members, and involvement in family businesses, significantly shape the child’s portfolio decisions. In other words, the average of returns are subject to stochastic components, such as luck and other idiosyncratic factors influencing wealth, and these stochastic components might have caused underestimation of the ICR compared to the intergenerational correlation in investment ability.

Next, we report the intergenerational transition matrix of the average return and investment ability in Table 3. Hypothetically, perfect intergenerational mobility would correspond to a symmetric probability 20% in all elements of the matrix. This is not the case, and the diagonal elements of the matrix is much higher than 20% for the lowest and highest quintiles, reflecting a polarization in economic outcome over generations.

Specifically, when the father’s average return is in the bottom quintile, his child’s average return faces a 26% probability of remaining in the same quintile. Alternatively, having a father whose average return is in the top quintile gives a 28% probability of remaining in the same quintile. As for the investment ability, when the father is in the bottom quintile, his children have a 37% probability of remaining in the same quintile. Similarly, the likelihood of staying in the top quintile, given that the father is in the

Table 3: Intergenerational transition matrix

| Panel A: Average rate of returns |                     |        |        |        |        |
|----------------------------------|---------------------|--------|--------|--------|--------|
| Fathers:<br>quintiles            | Children: quintiles |        |        |        |        |
|                                  | 1                   | 2      | 3      | 4      | 5      |
| 1                                | 26.34%              | 26.08% | 18.01% | 16.67% | 12.90% |
| 2                                | 22.63%              | 21.10% | 21.71% | 18.35% | 16.21% |
| 3                                | 16.87%              | 19.88% | 21.69% | 21.39% | 20.18% |
| 4                                | 18.26%              | 16.01% | 19.38% | 23.88% | 22.47% |
| 5                                | 15.54%              | 16.72% | 19.35% | 19.94% | 28.45% |

| Panel B: Investment ability |                |        |        |        |        |
|-----------------------------|----------------|--------|--------|--------|--------|
| Father<br>quintiles:        | Son: quintiles |        |        |        |        |
|                             | 1              | 2      | 3      | 4      | 5      |
| 1                           | 37.35%         | 20.09% | 16.78% | 13.95% | 11.82% |
| 2                           | 21.26%         | 25.00% | 17.24% | 20.69% | 15.80% |
| 3                           | 16.46%         | 19.62% | 23.73% | 22.47% | 17.72% |
| 4                           | 10.38%         | 20.44% | 22.01% | 19.50% | 27.67% |
| 5                           | 8.98%          | 14.55% | 21.36% | 25.39% | 29.72% |

Note: The number  $\pi_{fc}$  represents the probability of being in  $c$ th quintile given that one's father is in  $f$ th quintile.

highest quintile, is 30%.

Overall, our empirical results constitute strong evidence for weak intergenerational mobility in the investment ability and returns on wealth of American households. This evidence motivates the main assumptions in our model in the next section.

### 3 The Model

This section describes our dynamic macroeconomic model. Besides the ICR, its other features are intergenerational linkages in earnings correlation and bequests. Each agent in the economy has a finite and deterministic lifespan of  $T$  years. Time is discrete, and each period is one year. Agents enter the economy at  $t = 1$  and leave the economy after  $t = T$ . When they leave the economy, their offspring enter the economy and

inherit the bequests they left.

### 3.1 Preferences

Each agents derive the period utility from consumption  $c$ :

$$u(c) = \frac{c^{1-\sigma}}{1-\sigma}$$

where  $\sigma$  denotes the coefficient of relative risk aversion. In the final period ( $t = T$ ), agents also derive utility from the bequest ( $b$ ) left to their descendants. There is a *warm glow* bequest motive as in [De Nardi and Yang \(2016\)](#), and the bequest utility function  $v(b)$  is:

$$v(b) = \chi \frac{(b + b_0)^{1-\sigma}}{1-\sigma}$$

where  $\chi$  captures the strength of bequest motive, and  $b_0$  captures the extent to which bequests are luxury goods. When  $b_0 > 0$ , the marginal utility from small bequests is bounded, leading poorer agents to leave minimal or no bequests. In contrast, the marginal utility of a large estate diminishes at a slower rate compared to that of consumption, encouraging wealthier agents to save more for bequests.

### 3.2 Earnings and capital income

Agents have two independent sources of income: earnings and capital income. The exogenous earnings process is characterized by  $y_t = z\epsilon_t\xi_t$ , where  $z$  is the lifetime labor productivity,  $\epsilon_t$  is the age-deterministic component, and  $\xi_t$  represents the stochastic component. The lifetime labor productivity  $z$  is imperfectly inherited from parents:

$$\log(z) = \rho_z \log(z^{pa}) + v_z$$

where  $\rho_z$  denotes the intergenerational correlation of labor productivity and  $v_z \sim N(0, \sigma_{v_z}^2)$ . The superscript  $pa$  represents the corresponding variables of parents. The transmission of lifetime labor productivity ( $\rho_z > 0$ ) increases the likelihood that parents with high labor productivity will have children with similarly high labor productivity. Similar as [Storesletten et al. \(2004\)](#), the stochastic component  $\xi_t$  is modeled as

$$\log(\xi_t) = \mu_t + \iota_t$$

$$\mu_t = \rho_\mu \mu_{t-1} + \eta_t$$

The stochastic component includes a persistent shock ( $\mu_t$ ) and a transitory shock ( $\iota_t$ ). Persistent shock follows an AR(1) process with persistence  $\rho_\mu$  and variance  $\sigma_\eta^2$ . The transitory shock  $\iota_t$  is distributed as  $N(0, \sigma_\iota^2)$ .

Agents get capital income from investment activities, and the rate of return ( $r$ ) is determined by:

$$r = \alpha_r + f + g(a) + v_r$$

where  $\alpha_r$  is a constant term,  $f$  is the lifetime investment ability,  $g(a)$  is a function of wealth at the beginning of the current period,  $a$ , and  $v_r \sim N(0, \sigma_r^2)$  is an idiosyncratic shock independent of any other state variable. Lifetime investment ability summarizes a comprehensive skill capturing financial sophistication (Lusardi et al., 2017 and Kacperczyk et al., 2019), entrepreneurial productivity (Cagetti and De Nardi, 2006 and Cagetti and De Nardi, 2009), and other related factors. Greater investment ability enables agents to achieve higher returns on wealth and partially transmitted from parents, following the intergenerational transition matrix  $\Pi(f|f^{pa})$ . This structure implies that parents with high investment abilities are more likely to have children with high investment abilities. The term  $g(a)$  captures all direct and indirect sources of wealth effects on returns, and  $v_r$  refers to the luck factor in investment.

In the model, achieving high capital income requires both high return rates and substantial wealth accumulation, thus intergenerational transfers are particularly important for agents with high investment ability to earn substantial capital income, especially during their younger years. Also, children and parents are linked by both labor productivity and investment ability, and these two links are independent of each other. This setting allows for studying the economic effects of these two intergenerational correlations separately.

### 3.3 Tax system

The government taxes labor income ( $\tau_y$ ), capital income ( $\tau_r$ ), and estates ( $\tau_b$ ). Following Cagetti and De Nardi (2009) and De Nardi and Yang (2016), we assume that the government only taxes estates on the portion exceeding a given threshold ( $x_b$ ) at a rate of  $\tau_b$ . If estates are no more than  $x_b$ , the tax rate is zero. This setting reflects the structure of the actual estate tax system in the US (De Nardi and Yang, 2016).

Intuitively, a higher estate tax rate reduces intergenerational transfers, which in turn prevents agents, especially those with high investment ability, from earning substantial capital income and accumulating wealth.

### 3.4 Households' Problem

The time discount factor is denoted by  $\beta$ . In each period, agents make decisions regarding consumption and savings ( $a'$ ), which become bequests only in the final period. Each agent's gross income consists of after-tax labor earnings,  $(1 - \tau_y)y = (1 - \tau_y)z\epsilon\xi$ , and capital income,  $(1 - \tau_r)r(f, a, v_r)a$ . The value function,  $V(\cdot)$ , is:

$$V(t, z, \xi, f, v_r, a) = \max_{c, a'} u(c) + \begin{cases} \beta E(V(t+1, z, \xi', f, v_r', a')), & \text{if } t < T \\ v(a'), & \text{if } t = T \end{cases}$$

The budget constraint is given by:

$$\begin{aligned} a' &= (1 - \tau_y)y + (1 + (1 - \tau_r)r(f, a, v_r))a - c, \\ a' &\geq 0, \quad c > 0 \\ b &= \begin{cases} a', & \text{if } a' \leq x_b \\ (1 - \tau_b)(a' - x_b) + x_b, & \text{otherwise} \end{cases} \end{aligned} \quad (5)$$

The budget constraint is affected by taxation in two ways. First, savings in the final period are considered before-tax bequests, and offspring inherit the bequests net of estate tax. Second, an agent's gross income consists of after-tax labor earnings,  $y(1 - \tau_y) = z\epsilon\xi(1 - \tau_y)$ , and after-tax capital income,  $r(f, a, v_r)(1 - \tau_r)a$ .

### 3.5 Stationary distribution

Let  $x \equiv (z, \xi, f, v_r, a)$  denote a subset of state variables for an agent in the economy. The stationary distribution of agents in period  $t$  is  $\phi_t(x)$ . In the stationary state, aggregate consumption ( $C$ ), labor ( $L$ ), and capital ( $K$ ) can be expressed as follows:

$$C = \sum \phi_t(x)c, \quad L = \sum \phi_t(x)z\epsilon\xi, \quad K = \sum \phi_t(x)a \quad (6)$$

The government purchase  $G$  is equal to government tax revenue:

$$G = \sum \phi_t(x) [\tau_r r(f, a, v_r) a + \tau_y z \epsilon \xi] + \sum \phi_T(x) \tau_b (a' - x_b) 1_{\{a' > x_b\}} \quad (7)$$

The depreciation rate is  $\delta$ , and GDP is given by:

$$Y = C + \delta K + G \quad (8)$$

In addition, the total initial wealth of agents is equal to the aggregate bequests left by agents with  $t = T$ :

$$\sum \phi_1(x) a = \sum \phi_T(x) b \quad (9)$$

All model and experiment results refer to values in the stationary state.

### 3.6 Algorithm

The steps of the solution algorithm are as follows:

1. For each type of agent, solve for  $V(t, z, \xi, f, v_r, a)$  as well as the consumption and savings decisions recursively, starting from the final period  $T$  and going back to the first period.
2. Guess the population distribution of the youngest agents ( $t = 1$ ). More specifically, their distributions of labor productivity, labor shocks, investment ability, and return shocks are computed according to the corresponding (intergenerational) transition matrices. Their wealth distributions are guessed.
3. Generate the population distributions for the remaining agents ( $t = 2 \dots T$ ) based on the consumption and savings decisions, the earnings-shock transition matrix, and the return-shock transition matrix.
4. We obtain the bequest distribution of the oldest agents ( $t = T$ ). Since children's initial wealth, labor productivity, and investment ability are inherited from their parents, we obtain a new distribution for the youngest agents. If the new distribution is consistent with the guessed population distribution in Step 2, then we are done. If not, we update our guess of the population distribution of the youngest agents and come back to Step 2, until the dynamics converge.

## 4 Calibration

This section discusses the parametrization for the calibration and the quantitative assessment of the calibrated model.

### 4.1 Parametrization

*Demographics and preferences* Agents enter the economy at age 25 ( $t = 1$ ) and leave after age 64 ( $t = T = 40$ ). The risk aversion coefficient ( $\sigma$ ) is set to 1.5. We calibrate the time discount factor ( $\beta = 0.994$ ) to match a wealth-to-earnings ratio of 3.2 (Hong and Ríos-Rull, 2012). The bequest motive ( $\chi$ ) and bequest luxury ( $b_0$ ) parameters are calibrated to match a bequest-to-wealth ratio of 1.2% (De Nardi and Yang, 2016) and the 95th percentile of the bequest distribution, normalized by average earnings, which is 6.2 (Hendricks, 2001; Hurd and Smith, 2002). De Nardi and Yang (2016) report a bequest-wealth ratio of 0.9% and up to 1.2% if including inter-vivos transfers and college expenses. Here, we pick the upper bound so the bequest in the model can be interpreted as total intergenerational transfers. The bequest distribution target is used for single decedents, as De Nardi (2004) argues that estates bequeathed to a surviving spouse will be partially consumed, with only the remainder left to the couple’s children. The bequest motive  $\chi$  is 127, and bequest luxury  $b_0$  is 79. The depreciation rate  $\delta$  is set as 0.07 based on the calculation of Gomme and Rupert (2007).

*Earnings process* The age-specific productivity component ( $\epsilon$ ) is calculated using the 1999–2019 PSID SRC sample. In the data, earnings are defined as the sum of the household’s labor income and unemployment compensation. We further restrict the sample to households whose heads are male, married, and aged between 25 and 64, and run the following regression:

$$y_{j,t} = \gamma + \gamma_1 age_{j,t} + \gamma_2 age_{j,t}^2 + \lambda_t + e_{j,t} \quad (10)$$

where  $y_{j,t}$  is the logarithm of the earnings of household  $i$  in year  $t$ ,  $\gamma$  is a constant,  $e_{j,t}$  is the residual, and  $\lambda_t$  capture year fixed effects, and  $age_{j,t}$  refers to the age of the household head. The coefficients  $\gamma_1$  and  $\gamma_2$  are estimated to be 0.1097 and -0.0012, and the robust standard errors of these two coefficients are 0.0039 and 0.0000. The age-deterministic component of earnings  $\epsilon_t$  is estimated based on  $\gamma_1 age_{j,t} + \gamma_2 age_{j,t}^2$ .

The intergenerational correlation of labor productivity  $\rho_z$  is set as 0.4 from [Solon \(1992\)](#) and [Zimmerman \(1992\)](#). We calibrate  $\sigma_{v_z}^2$  to match the fact that the top 5% of the labor income distribution occupies 20% of the total labor income in the data, resulting in a  $\sigma_{v_z}^2$  of 0.1640. We set a 6-state lifetime labor productivity Markov chain, and the transition matrix is approximated by using [Tauchen \(1986\)](#) method. The intergenerational transition matrix of labor productivity is shown in Table 3.

The earnings shock parameters are from [Heathcote et al. \(2010\)](#) for 2000, where  $\rho$ ,  $\sigma_{\eta}^2$ , and  $\sigma_{\epsilon}^2$  are 0.9733, 0.0212, and 0.0872, respectively. We discretize earnings shocks to a 9-state Markov Chain. The earnings shocks are composed of a persistent shock with three states and a transitory shock with three states. The persistent shock is approximated using the method of [Rouwenhorst \(1995\)](#), while the transitory shock is approximated using the method of [Tauchen \(1986\)](#).<sup>8</sup>

#### *The rate of returns on wealth*

We calibrate the parameters for rate of returns based on the main sample and the intergenerational sample. Specifically,  $\alpha_r$  is set to -0.0296 to match a mean rate of returns of 0.033, and  $\sigma_r^2$  is set to 0.0028 so that the standard deviation of return rates is equal to 0.069, as observed in the main sample. The function form of  $g(a)$  is modeled as below

$$g(a) = \psi_1 \log(a) + \psi_2 (\log(a))^2 \quad (11)$$

Coefficients  $\psi_1$  and  $\psi_2$  are obtained from equation 2.<sup>9</sup> Investment ability is categorized into five state values, corresponding to the average values in the (0, 50], (50, 65], (65, 80], (80, 90], and (90, 100] percentiles of the investment ability distribution. Table 3 presents the intergenerational transition matrix of investment ability, together with its stationary distribution and state values.

#### *Tax system*

We parametrize the tax system as follows. The tax ratio of earning income  $\tau_y = 0.228$  and capital income  $\tau_r = 0.266$  based on [Carey and Rabesona \(2004\)](#).<sup>10</sup> Following

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<sup>8</sup>As suggested by [Kopecky and Suen \(2010\)](#), the [Rouwenhorst \(1995\)](#) method is more reliable than others in approximating highly persistent processes.

<sup>9</sup>In the model, we rescale wealth to align with the data when calculating the wealth effect on return rates.

<sup>10</sup>The  $\tau_y$  and  $\tau_r$  are calculated as the average labor income tax rate and average capital income tax

Benhabib et al. (2011), the marginal estate tax rate ( $\tau_b$ ) is set at 0.20, which corresponds to the average tax rate on bequests. The estate tax exemption threshold  $x_b$  is calibrated to be 20.83, so that the bottom 98% of the bequest distribution is exempt from taxation (Gale and Slemrod, 2001 and Gale et al., 2001).

Table 4: Parametrization

| Parameters                                | Description                     | Values                 |
|---|---------------------------------|------------------------|
| <b>Preferences</b>                        |                                 |                        |
| $\sigma$                                  | Risk aversion                   | 1.50                   |
| $\beta$                                   | Time discount                   | 0.994                  |
| $\chi$                                    | Bequest motive                  | 127                    |
| $b_o$                                     | Bequest luxury                  | 79                     |
| <b>Labor income</b>                       |                                 |                        |
| $\rho_z, \sigma_{v_z}^2$                  | Earnings correlation parameters | 0.40, 0.1640           |
| $\rho_\mu, \sigma_\eta^2, \sigma_\iota^2$ | Earnings shock parameters       | 0.9733, 0.0212, 0.0872 |
| $\gamma_1, \gamma_2$                      | Age comp. of earnings           | 0.1097, -0.0012        |
| <b>Returns</b>                            |                                 |                        |
| $\alpha_r$                                | Return constant                 | -0.0296                |
| $\sigma_r^2$                              | Return idiosyncratic term       | 0.0028                 |
| $\psi_1, \psi_2$                          | Return wealth effects           | 0.0147, -0.0008        |
| <b>Tax system</b>                         |                                 |                        |
| $\tau_y$                                  | Labor income tax                | 0.228                  |
| $\tau_r$                                  | Capital income tax              | 0.266                  |
| $\tau_b, x_b$                             | Estate tax                      | 0.20, 20.83            |

## 4.2 Assessment of the calibrated model

This section demonstrates that the model effectively replicates the distributions of wealth, earnings, and return rates observed in the data, even without directly calibrating the model to match them.

According to Table 5, the wealth distribution in the data has a thick right tail, with the top 10% owning approximately 60% of the total wealth, while the bottom rate between 1980 - 2000 for the United states.

Table 5: Distributions of wealth, earnings, and return rates: Data vs. Model

| Panel A: Wealth shares by wealth distributions(%)              |       |       |       |       |       |        |       |       |
|--|-------|-------|-------|-------|-------|--------|-------|-------|
|  | Q1    | Q2    | Q3    | Q4    | Q5    | Top 10 | Top 5 | Top 1 |
| Data   | 0.62  | 2.91  | 6.94  | 15.44 | 74.09 | 58.39  | 44.64 | 23.05 |
| Benchmark  | 0.34  | 2.09  | 5.96  | 14.45 | 77.16 | 62.06  | 48.67 | 24.76 |
| Panel B: Labor income shares by labor income distributions (%) |       |       |       |       |       |        |       |       |
|  | Q1    | Q2    | Q3    | Q4    | Q5    | Top 10 | Top 5 | Top 1 |
| Data   | 6.32  | 11.76 | 16.13 | 21.77 | 44.02 | 29.33  | 19.75 | 8.56  |
| Benchmark  | 4.48  | 8.95  | 14.12 | 22.62 | 49.83 | 32.44  | 20.36 | 6.50  |
| Panel C: Average return rates by wealth distributions          |       |       |       |       |       |        |       |       |
|  | Q1    | Q2    | Q3    | Q4    | Q5    | Top 10 | Top 5 | Top 1 |
| Data   | 0.021 | 0.033 | 0.033 | 0.034 | 0.040 | 0.047  | 0.050 | 0.058 |
| Benchmark  | 0.017 | 0.031 | 0.034 | 0.038 | 0.047 | 0.052  | 0.056 | 0.062 |

Note: In Panels A and C, Quintiles 1 to 5, as well as the top distributions, all refer to wealth distribution. In Panel B, they refer to labor income distribution. Moments of wealth and rate of returns are from the main sample, and moments of labor income are based on the 1999–2019 PSID SRC sample.

20% hold less than 1%. The model closely matches the wealth distribution observed in the data. In addition, the model also generates an earnings distribution similar to that observed in the data. The earnings distribution is less skewed than the wealth distribution, with the top 1% of earners holding less than 10% of total earnings, and the top 10% accounting for around 30%. Finally, the positive relationship between wealth and return rates is also reasonably captured by the model. In the data, the average rate of returns increases from 2.1% to 5.8% when moving from the bottom 20% to the top 1% of the wealth distribution. The positive correlation is a little stronger in the model, where the rate of returns rises from 1.7% to 6.2%. Overall, the model performs very well. Given this, we proceed to use the model for counterfactual experiments, to obtain aggregate implications of the ICR.

## 5 Counterfactual experiments

In this section, we conduct counterfactual experiments to examine how the ICR affects wealth inequality and wealth-to-earnings ratios.

### 5.1 Wealth inequality

First, we conduct a counterfactual experiment in which the ICR is absent. Specifically, for each investment ability type of parents, the probability of giving birth to a specific type is equal to the distribution of that type in the stationary distribution. We refer to this experiment without variation in bequests among different investment ability types as “No ICR” economy. The stationary distribution for each investment ability type is 0.50, 0.15, 0.15, 0.10, and 0.10.

Table 6: Wealth inequality: Benchmark vs. Experiments

| Panel A: Gini index and wealth shares (%)            |       |       |       |       |       |        |        |        |        |
|--|-------|-------|-------|-------|-------|--------|--------|--------|--------|
|  | Gini  | Q1    | Q2    | Q3    | Q4    | Q5     | Top 10 | Top 5  | Top 1  |
| Benchmark  | 0.764 | 0.30  | 1.73  | 5.18  | 13.62 | 79.16  | 64.03  | 50.01  | 24.04  |
| No ICR   | 0.742 | 0.34  | 1.94  | 5.77  | 15.05 | 76.90  | 60.45  | 45.63  | 20.27  |
| No ICL   | 0.762 | 0.31  | 1.75  | 5.24  | 13.76 | 78.95  | 63.70  | 49.58  | 23.59  |
| Panel B: Coefficient of variation and average wealth |       |       |       |       |       |        |        |        |        |
|  | CV    | Q1    | Q2    | Q3    | Q4    | Q5     | Top 10 | Top 5  | Top 1  |
| Benchmark  | 3.126 | 0.049 | 0.281 | 0.839 | 2.207 | 12.824 | 20.745 | 32.405 | 77.904 |
| No ICR   | 2.652 | 0.049 | 0.282 | 0.841 | 2.191 | 11.196 | 17.603 | 26.573 | 59.034 |
| No ICL   | 3.066 | 0.050 | 0.284 | 0.850 | 2.232 | 12.810 | 20.671 | 32.180 | 76.553 |

Note: Quintile 1 to Quintile 5, as well as the Top distributions, all refer to wealth distribution. Wealth shares in the Panel A are represented as percentage values. The average wealth numbers in the Panel B are normalized by the average labor income.

According to Panel A in Table 6, eliminating the ICR reduces wealth inequality; the Gini index decreases from 0.769 to 0.746. The wealth share of the wealthiest 5% decreases from 50.01% to 45.63%, implying a 4.4 percentage point decrease. For the bottom 60%, their wealth share increases by only 1 percentage point. The corresponding increase for the bottom 20% is even less than 0.1 percentage point. Therefore, the

reduction in the Gini index is mainly attributed to the shrinking wealth shares of the rich.

Compared to the Gini index, the coefficient of variation (CV), or the ratio of the standard deviation to the mean, is more sensitive to extreme values in both the left and right tails of the distribution. It decreases from 3.126 to 2.652, a significant 15.16% drop, as shown in Panel B of Table 6. The average wealth of the top 10%, top 5%, and top 1% decreases by 15.15%, 18.00%, and 24.22%, respectively. As a result, shutting down the ICR makes it more difficult for top agent to accumulate wealth and leads to larger reductions for richer agents. Nonetheless, for those at the bottom, their average wealth remains nearly unchanged.

Next, we conduct counterfactual experiments by shutting down the intergenerational correlation in labor income, and refer to it as the No ICL economy. The results in Table 6 indicate that eliminating the intergenerational correlation in labor income reduces wealth inequality, although the effect is smaller than shutting down ICR. The average wealth of the bottom 80% experiences a slightly greater increase and the effect on wealth accumulation at the top of the distribution is weaker than shutting down ICR.

Table 7: Bequests and wealth by investment ability: Benchmark vs. Experiment

| Panel A: Average received bequests |       |       |       |       |        |
|------------------------------------|-------|-------|-------|-------|--------|
| Investment ability ( $f$ )         | 1     | 2     | 3     | 4     | 5      |
| Benchmark                          | 1.172 | 1.660 | 1.720 | 2.224 | 2.854  |
| No ICR                             | 1.337 | 1.337 | 1.337 | 1.337 | 1.337  |
| Panel B: Average wealth            |       |       |       |       |        |
| Investment ability ( $f$ )         | 1     | 2     | 3     | 4     | 5      |
| Benchmark                          | 1.321 | 2.324 | 3.002 | 4.617 | 12.836 |
| No ICR                             | 1.368 | 2.188 | 2.810 | 4.032 | 10.466 |

Note: The values of investment ability ( $f$ ) increase as the numbers rise, so agents with  $f = 5$  have higher investment ability than those with  $f = 1$ . All numbers in the table are normalized by the average labor income.

Bequests hold the key to understand why the ICR generate such effects on wealth

inequality. In the Table 7, agents with higher investment ability receive more bequests in the benchmark economy because their parents, on average, also have higher investment ability. Quantitatively, agents with the highest investment ability receive approximately 2.44 times the bequests of those with the lowest investment ability. Thus, shutting down the ICR eliminates this gap, and agents with higher investment ability are more affected than others.

Wealth accumulation in the lower distribution shows almost no increase. One reason is that low-ability investors, who primarily lie at the bottom of the distribution, are only slightly affected by parental transfers. Their low returns result in a weak mutual reinforcement between wealth and capital income, which limits their ability to earn substantial capital income and maintain high saving rates. Another reason is that the increase in received bequests is not considerable, as eliminating ICR actually reduces the average amount of received bequests. In the counterfactual economy, higher-ability investors experience significant declines in received bequests, which substantially reduces their average wealth. This leads to smaller bequests left behind, further depressing the wealth accumulation of their offspring. Ultimately, this cycle results in a decline in aggregate wealth (-10.12%) and bequests (-16.85%). This suggests that eliminating the ICR would result in an overall welfare loss for the economy.

By comparing the results of the two experiments above, it is evident that the ICR contributes more to wealth inequality than the ICL. The ICR directs more wealth to agents who can generate higher returns on wealth, thereby improving their capital income, accelerating their wealth accumulation, and contributing to wealth inequality. Nevertheless, the ICL primarily creates variation in parental transfers among groups with low average returns. As a result, its impact on capital income distribution and wealth inequality is relatively small.

Compared with existing studies, our earnings distribution and intergenerational labor income correlation are closely similar to [De Nardi and Yang \(2014\)](#). Specifically, they also introduce a *warm glow* bequest motive, and find quantitatively minor effects on the wealth distribution. Shutting down the intergenerational labor income correlation in their model reduces the top 1% wealth share by only 0.9 percentage points and increases the bottom 40% share by 0.4 percentage points. The corresponding changes

in our model are 0.45 percentage points and 0.03 percentage points, respectively.

In contrast, [De Nardi and Yang \(2016\)](#) reports a relatively larger effect, where the top 1% wealth share declines by around 4 percentage points. However, the intergenerational persistence in their study is 0.68, which is higher than our 0.40. Also, they find a large welfare effect of intergenerational labor income correlation on agents with the highest labor productivity. They report that switching the received bequests between newborn agents from the highest and lowest parental earnings backgrounds has a significant impact. To maintain their original lifetime utility, the highest earnings group requires compensation of approximately 15 times the average labor income in the economy. Nonetheless, the highest labor productivity value they set is approximately 553 times the average, which is extremely high, and their received bequests are significantly larger than those in other studies. The labor productivity grid they use is  $\{1, 3.15, 9.78, 1061\}$ . When considering all types of agents, however, the overall welfare effect is not substantial.

Of most importance, the absence of ICR in both [De Nardi and Yang \(2014\)](#) and [De Nardi and Yang \(2016\)](#) could have led to an overestimation of intergenerational correlation in labor income. Our contribution to the literature is showing that intergenerational correlation in labor income contributes less to wealth inequality than ICR. Furthermore, [Table 8](#) reports that shutting down the ICR significantly reduces the wealth-to-earnings ratios for the top groups in the wealth distribution. The wealth-to-earnings ratio for the top 1% declines from 45.053 to 29.901, a substantial 33.63% decrease. The magnitude of the reduction for the top 5% and top 10% is 22.00% and 16.99%, respectively, both of which are also significant. In other words, in the absence of ICR wealthy agents rely more on labor income and less on capital income for wealth accumulation than in the benchmark economy.

It is widely accepted that capital income inequality, driven by heterogeneous rates of return on wealth, effectively contributes to the heavy right tail of the wealth distribution (e.g. [Cao and Luo, 2017](#); [Benhabib et al., 2019](#); [Hubmer et al., 2021](#); [Xavier, 2021](#)). A small group of agents enjoy persistently high returns, earn substantial capital income and maintain high saving rates over a relatively long period. Thus, lowering the persistence of returns reduces the effect of heterogeneous returns on the distribution of

Table 8: Wealth-to-earnings ratios: Benchmark vs. Experiments

|           | Agg.  | Wealth distributions |       |       |       |       |        |        |        |
|-----------|-------|----------------------|-------|-------|-------|-------|--------|--------|--------|
|           |       | Q1                   | Q2    | Q3    | Q4    | Q5    | Top 10 | Top 5  | Top 1  |
| Benchmark | 3.240 | 0.108                | 0.402 | 0.928 | 1.825 | 7.380 | 11.072 | 17.208 | 45.053 |
| No ICR    | 2.912 | 0.109                | 0.405 | 0.933 | 1.825 | 6.396 | 9.191  | 13.423 | 29.901 |
| No ICL    | 3.245 | 0.108                | 0.403 | 0.933 | 1.840 | 7.478 | 11.293 | 17.702 | 47.266 |

Note: Numbers are the ratios of wealth to labor income in each wealth group.

wealth. An extreme case occurs when the heterogeneity of returns stems solely from a transitory idiosyncratic shock. In this scenario, over the long run, differences in returns do not persist, leading to no systematic differences in capital income and saving rates among agents reaping different returns. Eliminating the ICR reduces the persistence of returns across generations, thereby weakening the importance of heterogeneous returns and capital income for wealth inequality. Table A7 also shows that the fraction of agents with the highest investment ability decreases in the top groups.

When the intergenerational labor income correlation is eliminated, we find that the wealth-to-earnings ratios increase for top agents. This is because the reduced inheritance of high labor productivity agents results in lower wealth accumulation, shrinking their share in the top distribution. Consequently, the average labor income at the top end declines. The wealth-to-earnings ratios increase slightly at the lower end of the distribution, primarily because low- and lower-middle-productivity agents accumulate more wealth through larger inheritances. This causes high investment ability agents to contribute more to the skewed wealth distribution relative to high labor productivity agents, leading to an increased share of top agents with the highest investment ability. Of course, quantitatively, the effect of intergenerational labor income correlation on wealth-to-earnings ratios is weaker, as the distribution of capital income is only modestly affected.

## 6 Estate Taxation

In this section, we vary the marginal estate tax rate from 0.0 to 1.0, while conducting two types of experiments in our calibrated model and an alternative model without ICR. The first experiment keeps all other tax parameters unchanged, and the other balances the government budget by adjusting capital income tax.

### 6.1 No adjustments in other taxes

The first reform pattern changes the marginal estate tax rate without adjusting other taxes to balance the government budget. Since an increase in the estate tax reduces the return to leaving bequests for sufficiently wealthy agents who can leave active bequests, their bequests and saving motives decline significantly. In addition, this causes agents, especially children from wealthy families, to receive fewer transfers during their early periods. All agents suffer losses from the higher estate tax, but the rich suffer more than the poor. As a result, according to Figure 4, wealth inequality, aggregate outcomes, and welfare (measured by ex-ante consumption equivalent variation, CEV) all decrease as the estate tax increases in both the benchmark economy and the economy without ICR, which is referred to as the NCR economy.<sup>11</sup> However, the magnitude of these declines differs between the two economies.

The percentage change in the Gini index in the benchmark economy is greater than that in the NCR economy. Eliminating the estate tax increases the Gini index by 4.05% in the benchmark economy, while in the NCR economy, this number is 3.54%. Setting the marginal estate tax at 100% decreases the Gini index by 7.28% in the benchmark economy, which is larger than the corresponding value of 6.60% in the NCR economy. Similarly, compared to the NCR economy, reducing the estate tax results in greater improvements in the coefficient of variation, aggregate wealth, GDP, and welfare, while increasing the estate tax leads to larger declines in these measures in the benchmark economy. Why does the intergenerational ICR amplify the effect of estate tax reforms?

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<sup>11</sup>Following Jones and Li (2018), the CEV in each economy is calculated as

$$100\% \times \left( \left( \frac{\text{Lifetime utility}_{\text{reform}} - \text{utility from bequests}_{\text{tax}=0.2}}{\text{Lifetime utility}_{\text{tax}=0.2} - \text{utility from bequests}_{\text{tax}=0.2}} \right)^{\frac{1}{1-\sigma}} - 1 \right)$$

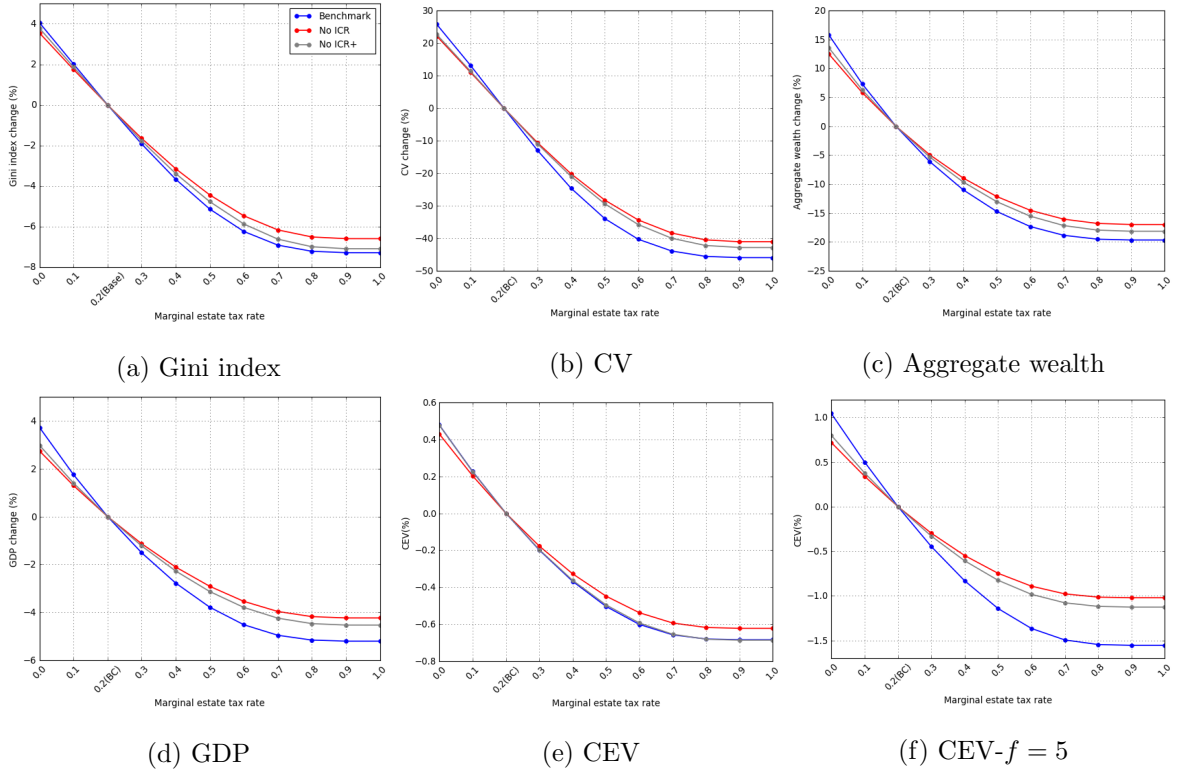


Figure 4: Effects of reforming estate taxation without adjustments to other taxes.

This is mainly due to the fact that the distribution of bequests in the benchmark economy differs from that in the NCR economy. This is first reflected in the fact that the ICR generates inequality in received bequests across agents with different types of investment ability, making estate tax reforms more effective at targeting agents with the highest investment ability in the benchmark economy than in the NCR economy. Their average inheritance declines from 2.626 to 1.340 (a drop of 1.286 units) when the estate tax increases from 20% to 100%. However, in the NCR economy, it declines from 1.517 to 0.864 (a drop of 0.653 units).<sup>12</sup> Increasing the estate tax leads to greater inheritance losses for agents with higher investment ability in the benchmark economy. When the estate tax rate is set to 100%, the CEV for agents with the highest investment ability is -1.56% in the benchmark economy and -1.02% in the NCR economy.

Second, the distribution of bequests is more unequal in the benchmark economy than in the NCR economy. As a result, the benchmark economy has a larger amount of taxable bequests, and changing the estate tax rate can therefore affect more taxable

<sup>12</sup>Setting the estate tax at 100% will not eliminate all bequests because bequests below the exemption level are not taxed.

bequests. Hence, we control for this channel by keeping taxable bequests at the benchmark level, while varying the marginal estate tax rate, and refer to this economy as NCR+ economy. After controlling for this channel, the reform effect difference shrinks notably in the Gini index and aggregate welfare. In the NCR+ economy, although the inheritance change for high-investment-ability agents remains modest, the change for high-labor-productivity agents is much larger. This calibration reinforces inheritance inequality across labor productivity levels. As a result, wealth inequality caused by highly productive agents decreases as the estate tax rate increases.

## 6.2 Adjustments in the capital income tax

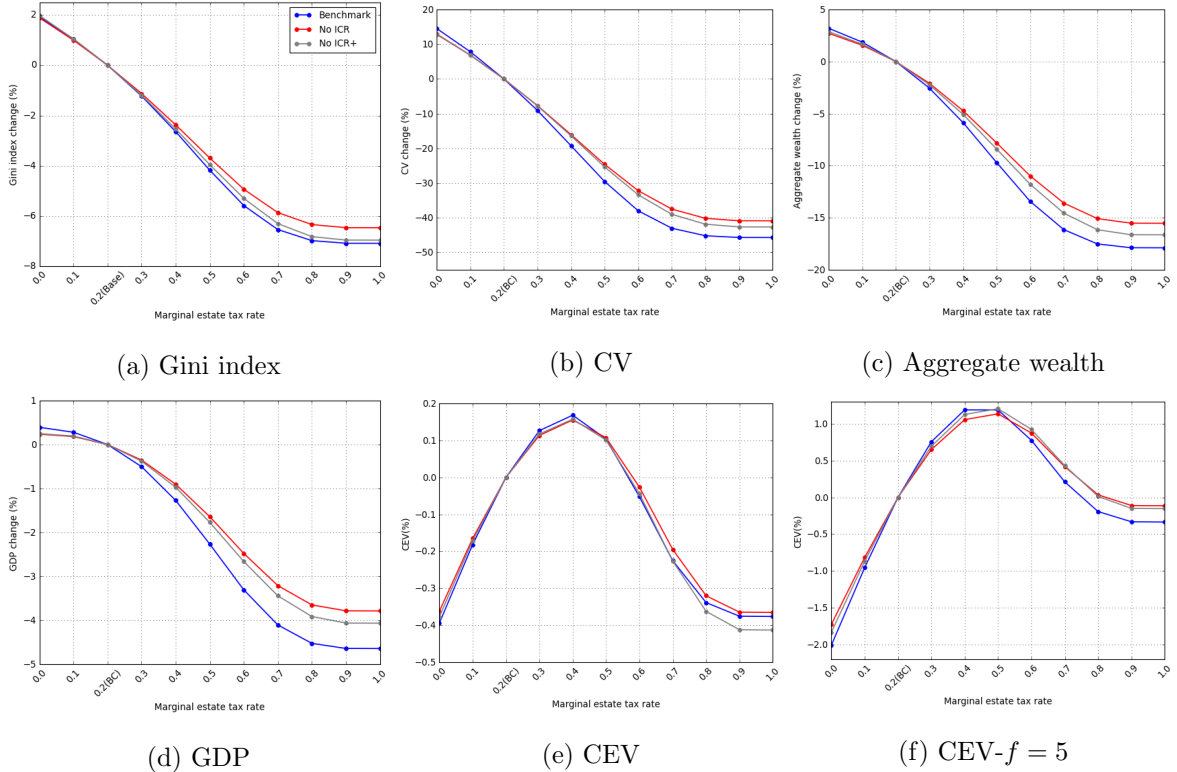


Figure 5: Effects of reforming estate taxation with adjustments to the capital income tax.

Figure 5 reports the results of estate tax reforms accompanied by adjustments to the capital income tax rate to balance the government budget. From 0.0 to 1.0, increasing the estate tax rate reduces wealth inequality and aggregate outcomes, even though the capital income tax rate is adjusted downward. Raising the estate tax rate can decrease the return to leaving bequests, while the associated reduction in the capital

income tax rate increases the return to savings. The net effect, especially for the rich, in the framework is that the former outweighs the latter, thereby reducing both wealth inequality and aggregate wealth accumulation. It is worth noting that beyond an estate tax rate of 0.5, further increases in the rate actually reduce estate tax revenue because taxable bequests are already small. As a result, the capital income tax rate will be adjusted upward, which further reduces inequality and aggregate wealth. The overall effects on welfare are similar to those in the reforms with adjustments to the labor income tax. Raising the estate tax from 0.0 to 0.4 can improve overall welfare, but increasing it further beyond 0.4 reduces welfare. However, the mechanism is different.

As shown in panel (f) in Figure 5, agents with lower investment ability are hardly affected, as they generally have neither high capital income nor significant bequests. For agents with higher ability, when the estate tax rate increases from 0.0 to 0.4, the return to leaving bequests remains high, so they maintain high savings rates. In this scenario, the associated lower capital income tax rates actually help them achieve higher capital income and smooth their consumption, thereby improving their welfare. Between 0.4 and 0.5, overall welfare declines. This is because only agents with the highest ability benefit from the associated reduction in capital income tax, while others are primarily affected by the decline in inheritance and the return to bequests caused by the higher estate tax rate. After 0.5, welfare declines for all types as both the estate tax rate and the capital income tax rate increase. Consistent with the above results, reforming the estate tax in an economy with ICR on wealth generates larger effects on inequality and aggregate outcomes than in an economy without such correlation. The effect differences between the benchmark and NCR-T economies remain significant.

An interesting finding is that the differences in effect between the benchmark and NCR economies are relatively small when the estate tax rate is reduced. As shown in Figure 5, when the rate is set to zero, the capital income tax rate rises from 0.266 to approximately 0.300 in both economies. Unlike the labor income tax, the capital income tax primarily affects agents with high investment ability. In the benchmark economy, high-ability agents receive a larger inheritance increase than in the NCR economy when the estate tax is eliminated, but the high capital income tax limits their wealth accumulation. Thus, the effect differences are less pronounced than under labor

income tax adjustments. In addition, the highest-ability agents suffer greater welfare loss in the benchmark economy due to higher capital income tax payments. As the estate tax rate rises, the effect differences between the two economies become more pronounced, primarily because lower capital income tax rates amplify the impact of inheritance on wealth accumulation.

In the Appendix, we show results from adjusting labor income tax or lump-sum tax (transfer) to balance the government budget, while engaging in the estate tax reforms. The results do not change the finding that omitting the ICR would underestimate the effects of estate tax reforms, similar to the above results from adjusting the capital income tax to balance the budget.

## 7 Conclusion

We investigate the importance of ICR for wealth inequality and estate taxation. First, we establish that the rate of returns on American households' portfolio are empirically heterogeneous and intergenerationally correlated. Specifically, a 10 percentile increase in the rank of father's returns is associated with a 2.8 percentile rise in the child's rank. Next, we integrate it into a dynamic macroeconomic model with bequests and intergenerational correlation in earnings. Our model well replicates the distributions of wealth, portfolio returns, and earnings, as observed in the data.

In the counterfactual exercise, eliminating ICR would reduce the thickness of the right tail of the wealth distribution without increasing the wealth share of poorest households. This is because reduced parental transfers for high-return-rate agents significantly hinder their capital income growth and wealth accumulation. Ultimately, this process reduces aggregate capital and bequests in the economy, resulting in low-return-rate agents receiving only slightly more parental transfers.

In contrast, eliminating the earnings correlation has a smaller impact on wealth inequality. This is because, on average, each type of worker has a low rate of return, so changes in bequests have minimal effects on their capital income and wealth accumulation. We also find that the wealth-to-earnings ratio for rich agents decreases significantly after shutting down ICR, indicating that the importance of capital income

inequality and heterogeneity in return rates for wealth distribution weakens.

Our model also predicts that ICR has important aggregate implications for the estate tax. Specifically, ICR generates more pronounced effects of the estate tax on wealth inequality, aggregate wealth, GDP, and welfare than in models without ICR. These results are robust to whether a labor income tax, a capital income tax, or a lump-sum tax is used to rebalance the government budget. The difference in reform effects arises because the intergenerational return correlation makes the bequest distribution more unequal and directs more bequests to agents with higher investment ability, who are more sensitive to the estate tax. Thus, our findings suggest that omitting the ICR on wealth may lead to an underestimation of the effects of estate tax reforms.

## References

- Bach, Laurent, Laurent E Calvet, and Paolo Sodini**, “Rich pickings? Risk, return, and skill in household wealth,” *American Economic Review*, 2020, *110* (9), 2703–2747.
- Barnea, Amir, Henrik Cronqvist, and Stephan Siegel**, “Nature or nurture: What determines investor behavior?,” *Journal of Financial Economics*, 2010, *98* (3), 583–604.
- Benhabib, Jess, Alberto Bisin, and Mi Luo**, “Wealth distribution and social mobility in the US: A quantitative approach,” *American Economic Review*, 2019, *109* (5), 1623–1647.
- , – , and **Shenghao Zhu**, “The distribution of wealth and fiscal policy in economies with finitely lived agents,” *Econometrica*, 2011, *79* (1), 123–157.
- Black, Sandra E, Paul J Devereux, Petter Lundborg, and Kaveh Majlesi**, “On the origins of risk-taking in financial markets,” *The Journal of Finance*, 2017, *72* (5), 2229–2278.
- Cagetti, Marco and Mariacristina De Nardi**, “Entrepreneurship, frictions, and wealth,” *Journal of political Economy*, 2006, *114* (5), 835–870.

- **and** –, “Estate taxation, entrepreneurship, and wealth,” *American Economic Review*, 2009, *99* (1), 85–111.
- Campanale, Claudio**, “Increasing returns to savings and wealth inequality,” *Review of Economic Dynamics*, 2007, *10* (4), 646–675.
- Cao, Dan and Wenlan Luo**, “Persistent heterogeneous returns and top end wealth inequality,” *Review of Economic Dynamics*, 2017, *26*, 301–326.
- Carey, David and Josette Rabesona**, “Tax ratios on labor and capital income and on consumption,” *Measuring the Tax Burden on Capital and Labor*, 2004, 21362.
- Charles, Kerwin Kofi and Erik Hurst**, “The correlation of wealth across generations,” *Journal of political Economy*, 2003, *111* (6), 1155–1182.
- Chiteji, Ngina S and Frank P Stafford**, “Portfolio choices of parents and their children as young adults: Asset accumulation by African-American families,” *American Economic Review*, 1999, *89* (2), 377–380.
- De Nardi, Mariacristina**, “Wealth inequality and intergenerational links,” *The Review of Economic Studies*, 2004, *71* (3), 743–768.
- **and Fang Yang**, “Bequests and heterogeneity in retirement wealth,” *European Economic Review*, 2014, *72*, 182–196.
- **and** –, “Wealth inequality, family background, and estate taxation,” *Journal of Monetary Economics*, 2016, *77*, 130–145.
- **and Giulio Fella**, “Saving and wealth inequality,” *Review of Economic Dynamics*, 2017, *26*, 280–300.
- Fagereng, Andreas, Luigi Guiso, Davide Malacrino, and Luigi Pistaferri**, “Heterogeneity in Returns to Wealth and the Measurement of Wealth Inequality,” *American Economic Review*, May 2016, *106* (5), 651–55.
- , – , – , **and** –, “Heterogeneity and persistence in returns to wealth,” *Econometrica*, 2020, *88* (1), 115–170.

- , **Magne Mogstad, and Marte Rønning**, “Why do wealthy parents have wealthy children?,” *Journal of Political Economy*, 2021, 129 (3), 703–756.
- Gale, William and Joel Slemrod**, “Rethinking the estate and gift tax: overview,” *National Bureau of Economic Research Cambridge, Mass., USA*, 2001.
- Gale, William G, James R Hines, and Joel Slemrod**, “Rethinking Estate and Gift Taxation,” *Brookings Institution Press, Washington DC*, 2001.
- Gomme, Paul and Peter Rupert**, “Theory, measurement and calibration of macroeconomic models,” *Journal of Monetary Economics*, 2007, 54 (2), 460–497.
- Guvenen, Fatih, Gueorgui Kambourov, Burhan Kuruscu, Sergio Ocampo, and Daphne Chen**, “Use it or lose it: Efficiency and redistributive effects of wealth taxation,” *The Quarterly Journal of Economics*, 2023, 138 (2), 835–894.
- Haider, Steven J**, “Earnings instability and earnings inequality of males in the United States: 1967–1991,” *Journal of Labor Economics*, 2001, 19 (4), 799–836.
- Heathcote, Jonathan, Kjetil Storesletten, and Giovanni L Violante**, “The macroeconomic implications of rising wage inequality in the United States,” *Journal of Political Economy*, 2010, 118 (4), 681–722.
- Hendricks, Lutz**, “Bequests and retirement wealth in the United States,” *Unpublished, Arizona State University* [http://www.lhendricks.org/Research/bequedata\\_paper.pdf](http://www.lhendricks.org/Research/bequedata_paper.pdf), 2001.
- Hong, Jay H and José-Víctor Ríos-Rull**, “Life insurance and household consumption,” *American Economic Review*, 2012, 102 (7), 3701–3730.
- Hubmer, Joachim, Per Krusell, and Anthony A Smith Jr**, “Sources of US wealth inequality: Past, present, and future,” *NBER Macroeconomics Annual*, 2021, 35 (1), 391–455.
- Hurd, Michael D and James P Smith**, “Expected bequests and their distribution,” *National Bureau of Economic Research Cambridge, Mass., USA*, 2002.

- İmrohoroğlu, Ayşe and Kai Zhao**, “Rising wealth inequality: Intergenerational links, entrepreneurship, and the decline in interest rate,” *Journal of Monetary Economics*, 2022, *127*, 86–104.
- Jones, John Bailey and Yue Li**, “The effects of collecting income taxes on social security benefits,” *Journal of Public Economics*, 2018, *159*, 128–145.
- Kacperczyk, Marcin, Jaromir Nosal, and Luminita Stevens**, “Investor sophistication and capital income inequality,” *Journal of Monetary Economics*, 2019, *107*, 18–31.
- Knüpfer, Samuli, Elias Rantapuska, and Matti Sarvimäki**, “Social interaction in the family: Evidence from investors’ security holdings,” *Review of Finance*, 2023, *27* (4), 1297–1327.
- Kopecky, Karen A and Richard MH Suen**, “Finite state Markov-chain approximations to highly persistent processes,” *Review of Economic Dynamics*, 2010, *13* (3), 701–714.
- Lindquist, Matthew J, Joeri Sol, and Mirjam Van Praag**, “Why do entrepreneurial parents have entrepreneurial children?,” *Journal of Labor Economics*, 2015, *33* (2), 269–296.
- Lusardi, Annamaria, Pierre-Carl Michaud, and Olivia S Mitchell**, “Optimal financial knowledge and wealth inequality,” *Journal of political Economy*, 2017, *125* (2), 431–477.
- Quadrini, Vincenzo**, “Entrepreneurship, Saving, and Social Mobility,” *Review of Economic Dynamics*, 2000, *3* (1), 1–40.
- Rouwenhorst, K Geert**, “Asset pricing implications of equilibrium business cycle models,” *Frontiers of business cycle research*, 1995, *1*, 294–330.
- Shiller, Robert J**, “Irrational Exuberance,” in “Irrational exuberance,” 3 ed., Princeton University Press, 2015.

- Smith, Matthew, Owen Zidar, and Eric Zwick**, “Top wealth in america: New estimates under heterogeneous returns,” *The Quarterly Journal of Economics*, 2023, 138 (1), 515–573.
- Solon, Gary**, “Intergenerational income mobility in the United States,” *The American Economic Review*, 1992, pp. 393–408.
- Storesletten, Kjetil, Christopher I Telmer, and Amir Yaron**, “Consumption and risk sharing over the life cycle,” *Journal of monetary Economics*, 2004, 51 (3), 609–633.
- Tauchen, George**, “Finite state markov-chain approximations to univariate and vector autoregressions,” *Economics letters*, 1986, 20 (2), 177–181.
- Xavier, Inês**, “Wealth inequality in the US: the role of heterogeneous returns,” *Available at SSRN 3915439*, 2021.
- Zimmerman, David J**, “Regression toward mediocrity in economic stature,” *The American Economic Review*, 1992, pp. 409–429.

## A Summary statistics of households' characteristics

Table A1: Summary statistics of households' characteristics

| Statistics  | Mean  | St.Dev. | P10    | Median | P90   | N      |
|-------------|-------|---------|--------|--------|-------|--------|
| Education:  |       |         |        |        |       |        |
| LTHS        | 0.024 | 0.063   | -0.021 | 0.009  | 0.080 | 3,148  |
| HSG         | 0.030 | 0.068   | -0.021 | 0.024  | 0.088 | 15,045 |
| CLG         | 0.039 | 0.071   | -0.022 | 0.033  | 0.105 | 12,430 |
| Race:       |       |         |        |        |       |        |
| White       | 0.034 | 0.070   | -0.022 | 0.028  | 0.095 | 27,823 |
| Black       | 0.018 | 0.055   | -0.015 | 0.000  | 0.059 | 2,067  |
| Others      | 0.036 | 0.078   | -0.026 | 0.027  | 0.099 | 733    |
| Age groups: |       |         |        |        |       |        |
| 25-34       | 0.030 | 0.075   | -0.015 | 0.013  | 0.090 | 6,314  |
| 35-44       | 0.034 | 0.073   | -0.021 | 0.026  | 0.093 | 7,397  |
| 45-54       | 0.032 | 0.068   | -0.030 | 0.029  | 0.097 | 6,967  |
| 55-64       | 0.033 | 0.064   | -0.023 | 0.031  | 0.093 | 6,049  |
| 64+         | 0.037 | 0.059   | -0.011 | 0.036  | 0.092 | 3,896  |

Note: Education, race, and age group categories all refer to the representative individuals. Except for the second and third rows, which represent the yield income component and capital gain component statistics, respectively, all other statistics reflect characteristics of gross returns.

## B Additional calibration results

Table A2: Intergenerational transition matrix of labor productivity

| Labor productivity values           |        |        |        |        |        |        |
|-------------------------------------|--------|--------|--------|--------|--------|--------|
| State                               | 1      | 2      | 3      | 4      | 5      | 6      |
|                                     | 0.3313 | 0.5154 | 0.8018 | 1.2473 | 1.9403 | 3.0184 |
| Intergenerational transition matrix |        |        |        |        |        |        |
| Children                            |        |        |        |        |        |        |
| Parents                             | 1      | 2      | 3      | 4      | 5      | 6      |
| 1                                   | 13.76% | 36.24% | 36.24% | 12.31% | 1.40%  | 0.05%  |
| 2                                   | 6.33%  | 26.79% | 41.24% | 21.59% | 3.81%  | 0.23%  |
| 3                                   | 2.48%  | 16.66% | 39.50% | 31.84% | 8.70%  | 0.82%  |
| 4                                   | 0.82%  | 8.70%  | 31.84% | 39.50% | 16.66% | 2.48%  |
| 5                                   | 0.23%  | 3.81%  | 21.59% | 41.24% | 26.79% | 6.33%  |
| 6                                   | 0.05%  | 1.40%  | 12.31% | 36.24% | 36.24% | 13.76% |
| Stationary distribution             |        |        |        |        |        |        |
| State                               | 1      | 2      | 3      | 4      | 5      | 6      |
|                                     | 2.34%  | 13.69% | 33.97% | 33.97% | 13.69% | 2.34%  |

Table A3: Intergenerational transition matrix of investment ability

| Investment ability values           |         |         |        |        |        |
|-------------------------------------|---------|---------|--------|--------|--------|
| State                               | 1       | 2       | 3      | 4      | 5      |
|                                     | -0.0263 | -0.0019 | 0.0114 | 0.0312 | 0.0859 |
| Intergenerational transition matrix |         |         |        |        |        |
| Children                            |         |         |        |        |        |
| Parents                             | 1       | 2       | 3      | 4      | 5      |
| 1                                   | 59.03%  | 13.62%  | 12.76% | 7.35%  | 7.24%  |
| 2                                   | 44.63%  | 17.36%  | 19.01% | 10.33% | 8.68%  |
| 3                                   | 42.02%  | 14.71%  | 14.71% | 15.97% | 12.61% |
| 4                                   | 33.77%  | 20.13%  | 21.43% | 11.04% | 13.64% |
| 5                                   | 34.32%  | 15.38%  | 15.98% | 14.79% | 19.53% |
| Stationary distribution             |         |         |        |        |        |
| State                               | 1       | 2       | 3      | 4      | 5      |
|                                     | 49.15%  | 15.20%  | 15.22% | 10.25% | 10.18% |

Table A4: Calibration results for the No ICR economy

| Parameters        | Description           | Values  |
|-------------------|-----------------------|---------|
| <b>Preference</b> |                       |         |
| $\beta$           | Time discount         | 0.9968  |
| $\chi$            | Bequest motive        | 173     |
| $b_o$             | Bequest luxury        | 99.5    |
| <b>Returns</b>    |                       |         |
| $\alpha_r$        | Return constant       | -0.0295 |
| <b>Tax system</b> |                       |         |
| $x_b$             | Estate tax exemption, | 21.17   |

Note: Values of all other variables not listed in the table are the same as in the benchmark model in Table 4.

## C Additional model results

Table A5: Average capital income by distributions: Benchmark vs. Experiment

|           | Capital income distributions |        |       |       |       |       |        |       |       |
|-----------|------------------------------|--------|-------|-------|-------|-------|--------|-------|-------|
|           | CV                           | Q1     | Q2    | Q3    | Q4    | Q5    | Top 10 | Top 5 | Top 1 |
| Benchmark | 6.520                        | -0.114 | 0.002 | 0.009 | 0.051 | 0.630 | 1.093  | 1.813 | 5.036 |
| No ICR    | 5.500                        | -0.107 | 0.002 | 0.009 | 0.050 | 0.541 | 0.921  | 1.485 | 3.811 |
| No ICL    | 6.317                        | -0.113 | 0.002 | 0.009 | 0.051 | 0.625 | 1.082  | 1.787 | 4.897 |

Note: ICR and ICL stand for intergenerational correlation in returns and that in labor income, respectively. All numbers in the table are normalized by the average pre-tax labor income.

Table A6: Bequests and wealth by labor productivity: Benchmark vs. Experiment

| Panel A: Average received bequests |       |       |       |       |       |       |
|------------------------------------|-------|-------|-------|-------|-------|-------|
| Labor productivity ( $z$ )         | 1     | 2     | 3     | 4     | 5     | 6     |
| Benchmark                          | 0.564 | 0.821 | 1.196 | 1.749 | 2.527 | 3.625 |
| No ICL                             | 1.517 | 1.517 | 1.517 | 1.517 | 1.517 | 1.517 |

| Panel B: Average wealth    |       |       |       |       |       |       |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Labor productivity ( $z$ ) | 1     | 2     | 3     | 4     | 5     | 6     |
| Benchmark                  | 1.026 | 1.522 | 2.284 | 3.491 | 5.588 | 9.355 |
| No ICL                     | 1.688 | 2.001 | 2.501 | 3.332 | 4.906 | 7.951 |

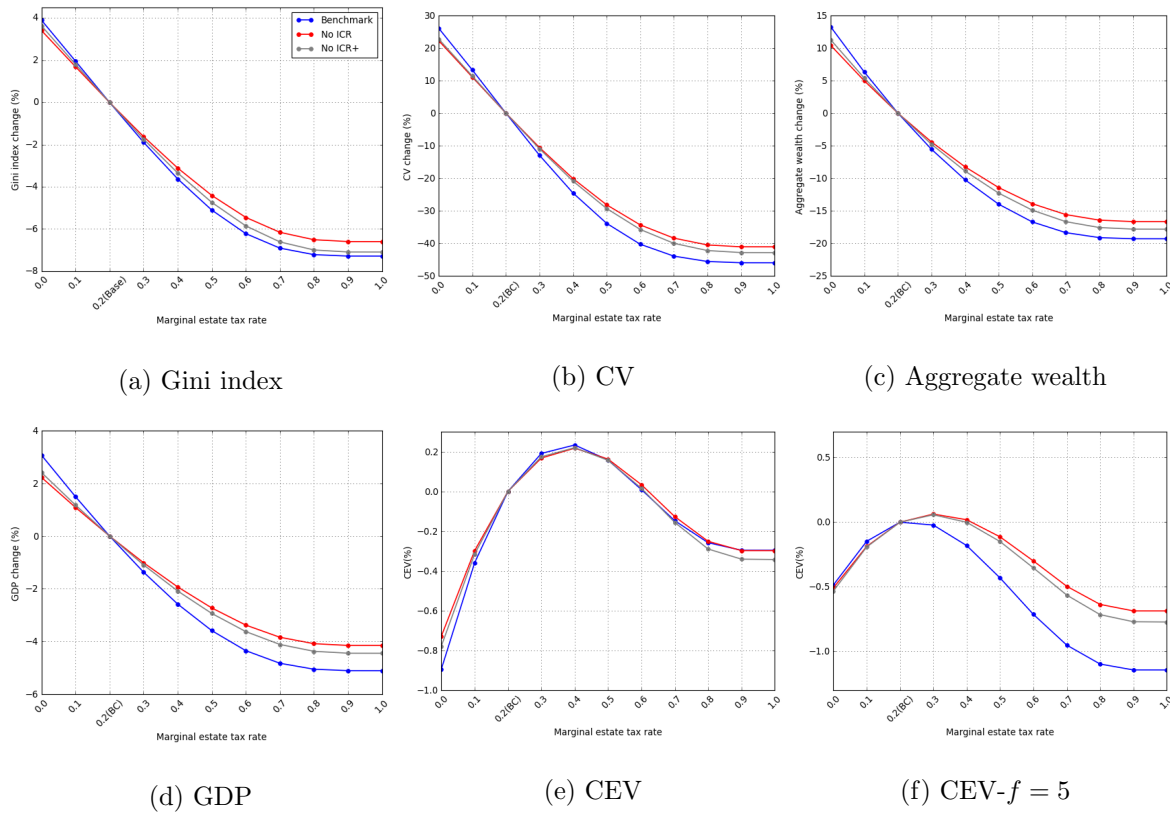
Note: ICR and ICL stand for intergenerational correlation in returns and that in labor income, respectively. The values of labor productivity ( $z$ ) increase as the numbers rise, so agents with  $z = 6$  have higher labor productivity than those with  $z = 1$ . All numbers in the table are normalized by the average pre-tax labor income.

Table A7: Highest ability fractions (%): Benchmark vs. Experiments

|           | Wealth distributions |       |       |
|-----------|----------------------|-------|-------|
|           | Top 10               | Top 5 | Top 1 |
| Benchmark | 3.303                | 4.542 | 4.839 |
| No ICR    | 3.342                | 4.706 | 6.080 |
| No ICL    | 2.946                | 3.979 | 3.847 |

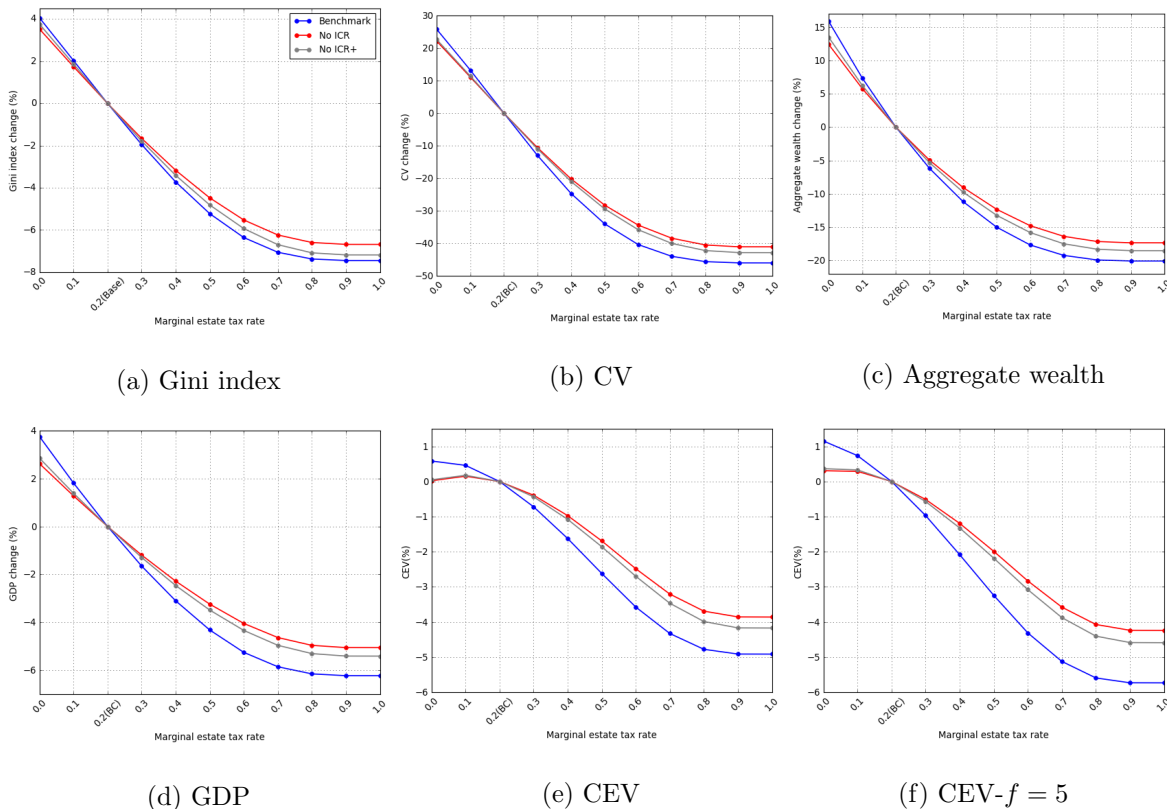
Note: ICR and ICL stand for intergenerational correlation in returns and that in labor income, respectively. The numbers in the table represent the fraction of agents with the highest investment ability in the top wealth groups

Figure A1: Effects of reforming estate taxation with adjustments in the labor income tax.



Note: In each type of economy, we keep the ratio of total tax revenue to GDP fixed across all reforms. The ratios in the benchmark, No ICR, and No ICR+ economies are 19.848%, 19.777%, and 19.798%, respectively. When the estate tax is reduced, the labor income tax is adjusted upward to balance the government budget.

Figure A2: Effects of reforming estate taxation with adjustments in the lump-sum tax.



Note: The level of government purchases is fixed at 0.273831, 0.270933, and 0.271201 units for the benchmark, NCR, and NCR+ economies, respectively. Any increase (reduction) in tax revenue generated through estate tax reforms is redistributed to all agents through a lump-sum transfer (tax).