ONLINE APPENDIX

A UNLISTED SECURITIES AND ATTRITION

One of the main limitations of this paper is the missing prices for many securities, which not only makes the computation of risk and returns less accurate, but also lowers the number of reconstructed portfolios. There are three reasons why a security had no price: either the asset had a missing price in the DFIH database, which either means the asset was traded on the *Coulisse*, whose database is still under construction, or the asset was not very liquid and was not traded on any sampled day during the period; or the label in the probate records was too equivocal to allow a clear identification of the actual security; or the asset was indeed unlisted. While it is possible to identify which assets were traded on the *Coulisse*, disentangling actual unlisted securities and equivocal labels is impossible. Hence, "unlisted" securities here refer to securities with no entry in the DFIH database, *i.e.* either securities not listed on the exchange or unidentified listed assets.

As I choose to only consider the portfolios whose reconstructed value is at least 50% of the total value of the actual portfolio, the number of portfolios in the analysis drops from 1,718 to 1,329, *i.e.* 389 portfolios are discarded because their reconstructed value is less than half of the original portfolio. In terms of value, the 1,718 reconstructed portfolios are worth 343,286,715 francs, while the 1,329 selected portfolios are worth 283,048,260 francs, *i.e.* 82.5% of the value of the 1,718 reconstructed portfolios.

Figure 1 shows the number of portfolios discarded (*i.e.* with less than 50% of their total value being reconstructed) by decile of net estate in the total population of reconstruction portfolios. As expected, this number increases with wealth.

Figure 2 shows the average discarded value by decile of net estate. The evolution is obviously very steep at the top of the wealth distribution.

One of the main results of this paper is that wealthier investors tend to generate greater Sharpe ratios on their portfolios than less wealthy investors. By definition, we cannot evaluate how robust this result is to the absence of unlisted securities in the portfolio, but there is some reason to believe that results should be robust. There is a total of

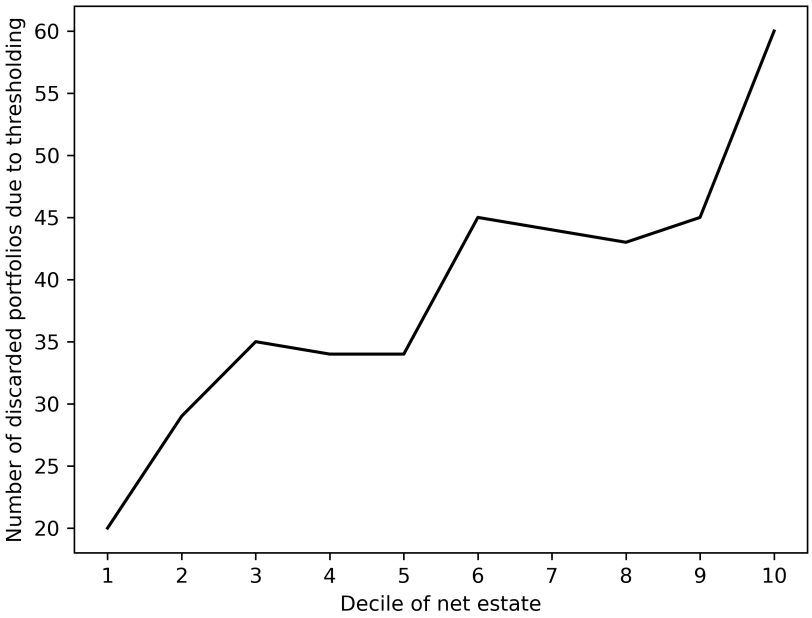

FIGURE 1: NUMBER OF DISCARDED PORTFOLIOS BY DECILE OF NET ESTATE

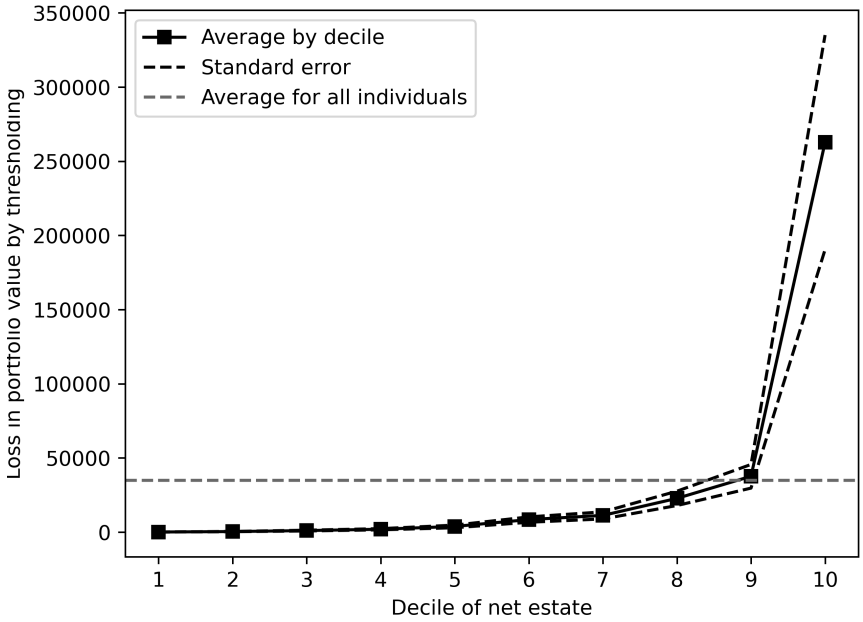

FIGURE 2: DISCARDED VALUE BY DECILE OF INITIAL BEQUEST

5,128 unique financial assets in the database, 2,099 of which are matched with a DFIH, while the remaining 3,029 have no corresponding entry. In terms of value, the missing 3,029 assets represent 31% of the total value of the table. For the equivocal listed names, a reasonable assumption would be to say they are uniformly drawn from the

listed assets, and thus would not distort the results. For the unlisted assets, **?** show that one of the main drivers of the increasing relationship between wealth and returns is the fact that wealthier investors own a significant share of their wealth in private equity, where they are able to capture higher returns.

Figure 3 shows the average percentage represented by unlisted securities in the total wealth by decile of wealth. The spike for the fourth decile coincides with the sample of Parisians who owned shops, and as such owned a large fraction of their estate in unlisted assets. For the upper deciles, the relationship seems to be almost linearly increasing, which suggests that the wealthiest investors tended to invest more in less liquid private equity. Conversely, the bottom of the wealth distribution owned little unlisted securities, as they were probably not rich enough to hold risky private equity investments or *fonds de commerce* (shops).

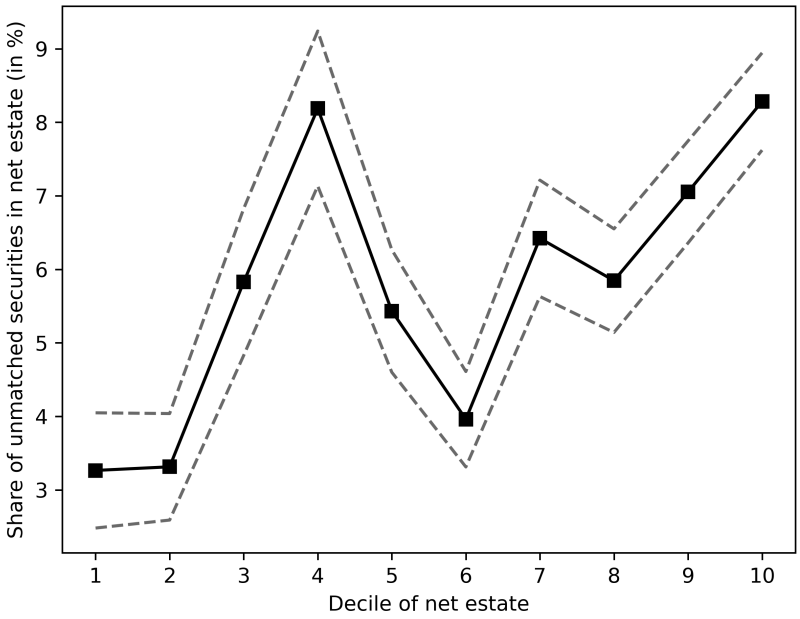

FIGURE 3: AVERAGE PERCENTAGE OF UNLISTED SECURITIES IN NET ESTATE PER DECILE

Table 1 shows that most of the unlisted securities were in France, which includes all the shops and unlisted companies owned by the 1912 decedents, but could also suggest a home bias. Table 2 shows a high percentage of "Other" due to the aforementioned issue of many "unlisted" securities being actually assets with an equivocal label. Private investments in mining unlisted companies seems relatively strong. Given that

the wealthiest investors held a relatively greater fraction of their wealth in mining companies, this partially explains why the reconstruction rate falls for the top deciles.

TABLE 1: SHARE (IN %) OF EACH REGION IN THE VALUE OF UNMATCHED SECURITIES BY DECILE OF WEALTH

	Value	Percentage
Africa	4,671,479.0	3.6
Asia	1,299,195.0	1.0
Empire	1,768,377.0	1.4
Europe	25,191,457.0	19.6
France	75,488,740.0	58.8
Northern America	7,020,679.0	5.5
Russia	2,205,053.0	1.7
Southern America	10,678,475.0	8.3
Total	128,323,455.0	99.9

Notes: This table shows the total value (in francs) of unlisted securities for each region (left column) and the percentage each region represents in the total value of unlisted securities (right column).

TABLE 2: SHARE (IN %) OF EACH SECTOR IN THE VALUE OF UNMATCHED SECURITIES BY DECILE OF WEALTH

	Value	Percentage
Agriculture	3,297,208.0	2.6
Financials	9,145,026.0	7.1
Industrials	8,875,770.0	6.9
Mining	15,105,583.0	11.8
Other	55,267,953.0	43.1
Retail	16,699,865.0	13.0
Transport	18,169,711.0	14.2
Utilities	1,762,338.0	1.4
Total	128,323,454.0	100.1

Notes: This table shows the total value (in francs) of unlisted securities for each sector (left column) and the percentage each sector represents in the total value of unlisted securities (right column).

A natural question is whether investors in the top decile owned large shares in private, unlisted companies, and whether this explains the attrition at the top of the wealth distribution. In particular, did the wealthiest decedents have large investments in companies they owned or managed? Identifying these private businesses is really not straightforward. I choose to restrict this analysis to the companies which are named after the decedent, and which I assume are family firms owned or managed by the decedent's family. This is most likely not fully accurate, as some decedents could

have invested in companies with the same name by pure coincidence. I perform some manual checks to verify to the best of my abilities that the decedent was actually either an owner or a manager of the company. For example, Stanislas Rouart (1833-1912) was indeed a famous industrialist and art collector who owned shares in the so-called "Société des Frères Rouart". Table 3 shows some statistics about these individuals. Most of the decedents who owned shares in a company named after them were among the wealthiest in the dataset, and a significant fraction of their wealth was invested in these businesses.

TABLE 3: SHARES IN PRIVATE BUSINESS

Deciles	N	Average Shares Value	Average Net Estate	Pct of Wealth	Pct of Financial Wealth
2	1	42,282	22,334	1.89	1.00
4	4	70,080	89,594	0.74	0.76
5	3	113,102	173,112	0.85	0.84
6	10	84,448	334,568	0.25	0.50
7	5	138,808	564,519	0.37	0.64
8	11	246,260	957,593	0.33	0.55
9	14	667,781	5,698,282	0.18	0.41

Notes: This table displays some statistics about the 1912 decedents who owned shares in a company named after them. Percentages should be between 0 and 1, but some individuals had debts and therefore, this percentage is higher than 1. Four of these decedents would have belonged to the 4th decile of net estate in the table of reconstructed portfolios. The 'Pct of Wealth' is computed as the total value of shares owned in private companies named after the decedent divided by the net estate at death. 'Pct of Financial Wealth' is computed as this total value divided by the total value of financial assets owned by the decedent.

B ON TAX EVASION

Even though there is some evidence to believe that the probate records accurately reflect the actual portfolios owned by the 1912 decedents, some assets were more easily hidden than others. Artworks or jewelry for instance, could be used to discretely process intergenerational transfers. On this point, **?** shows that one of the motives to hold artworks is their ability to hide wealth. Nonetheless, the probate records include paintings, statutes, books, cars, jewels and animals (cattle and livestocks), which were

very mobile assets, and for some, such as jewels, easy to hide.[1] Their presence in the records suggests that even assets which could easily be hidden seemed to have been scrupulously declared. Moreover, artworks were mostly owned by the wealthiest. Hence, even though some assets may have successfully be hidden, this would not modify the place of individuals in the distribution of wealth, as the wealthiest would simply be wealthier.

A more challenging point is the presence of to-the-bearer securities, *i.e.* certificates that were not registered, and thus could have been more easily hidden from the tax authorities. The wealthiest would probably have benefited more from this feature, as they owned relatively more shares, while the bottom deciles mostly owned French rente, which was registered and not to-the-bearer. Given the relative underperformance of French rente versus equity, undeclared to-the-bearer securities would most likely not challenge the results.

C DIVERSIFICATION

Figure 4 shows the evolution of the diversification metrics with inherited wealth for the reconstructed portfolios, and suggests that the pattern displayed in Figure **??** still holds true for this subsample of portfolios, with the wealth metric used being the inherited wealth instead of the net estate value.

[1] Paintings were notably owned by the wealthiest. The most valuable painting in the table nears 1 million francs.

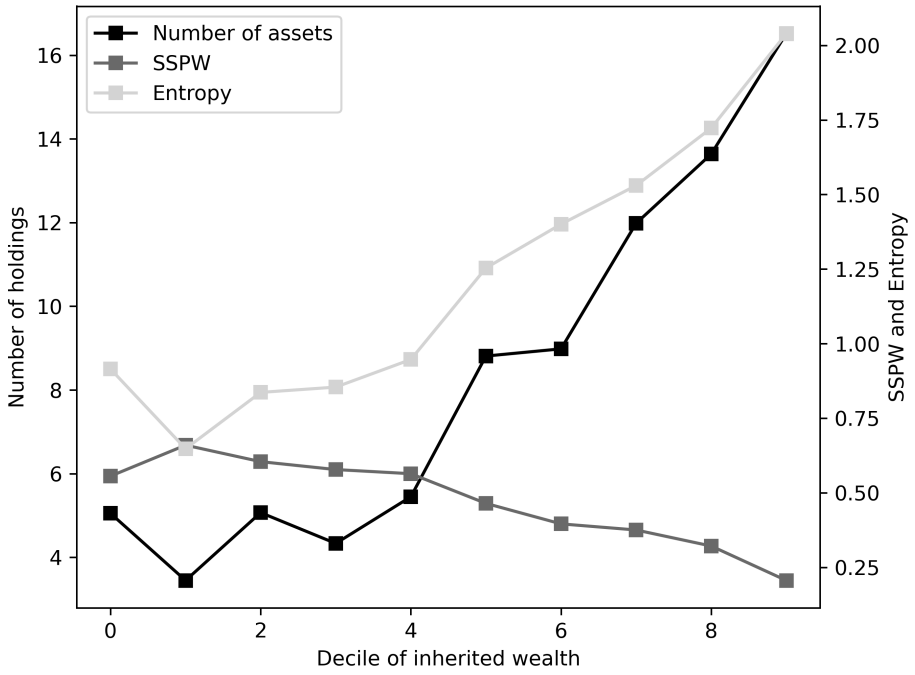

FIGURE 4: DIVERSIFICATION METRICS, AVERAGE BY WEALTH DECILE FOR RECONSTRUCTED PORTFOLIOS

Notes: This figure shows the average value of each diversification variable by decile of inherited wealth for the reconstructed portfolios. The number of assets (black line) is plotted against the left axis, while the SSPW (dark grey) and the entropy (light grey) are both plotted against the right axis.

D LIQUIDITY AND FRENCH-FAMA FACTORS

The three-factors model developed by **?** models the excess returns on a portfolio as a linear combination of market excess returns, the relative performance of small market capitalizations versus large ones, and the relative performance of high-book-to-market stocks. The third factor cannot be computed from the DFIH table, but the database contains enough information about the market capitalizations of listed stocks to compute the "small-minus-big" (SMB) factor.

I extract the market caps of all the listed stocks and consider the market capitalizations as of December 1912. I compute the difference in returns of the 40 smallest stocks by market capitalization versus the largest 40 stocks. Figure 5 shows the average difference in returns per year of the smallest 40 stocks versus the largest 40 stocks. During the 1908-1912 period, smaller stocks underperformed larger ones.

FIGURE 5: AVERAGE RETURNS OF THE SMALLEST 40 STOCKS VERSUS THE LARGEST 40 STOCKS

I then compute the SMB factor by regressing:

$$r_{i,t} = \alpha_i + \beta_i r_{M,t} + f_i SMB_t + \varepsilon_{i,t}$$

where $r_{i,t}$ is the excess return on portfolio i at time t, r_M the market excess return, SMB_t the spread in returns on the 40 smallest versus the 40 largest stocks by market cap. To compute the market returns, I only use here the index built from the French 40 largest stocks by market cap in the DFIH database. The results by decile of initial bequests are plotted in Figure 6. There is not much evidence of the SMB to substantially vary across the wealth distribution, even though the bottom deciles seem to have been overexposed to the underperformance of smaller stocks.

However, adding the SMB factor improves the R^2 of the regressions, as suggested by comparing Figure 7 and Figure 8, the former showing the R^2 of the regression without SMB factor, the latter including the SMB factor.

Given the average positive Sharpe ratio over the period and the poor relative performance of small stocks, the residuals of the regression including the SMB factor have in average a positive sign. The drop in R^2 when including the SMB factor at the top of

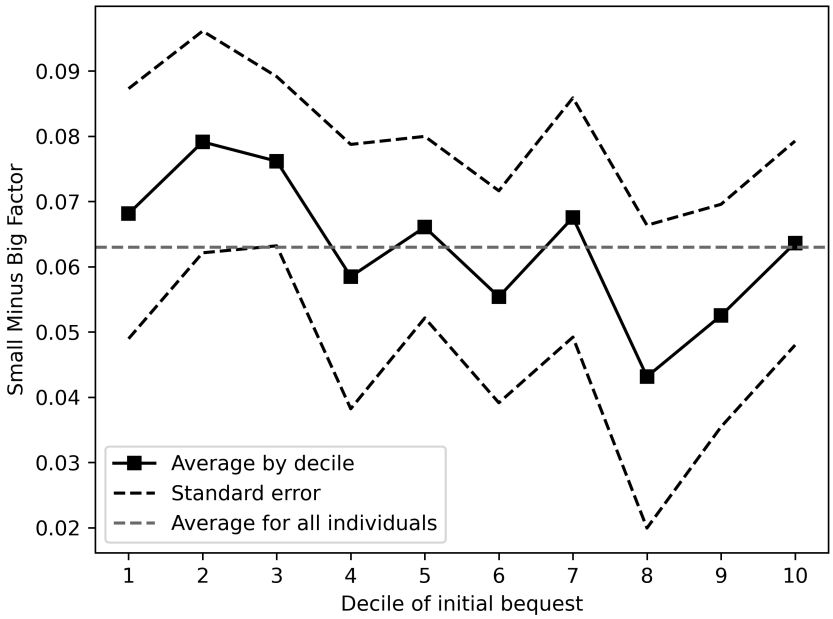

FIGURE 6: DISTRIBUTION OF SMB FACTORS BY DECILES OF INITIAL BEQUEST

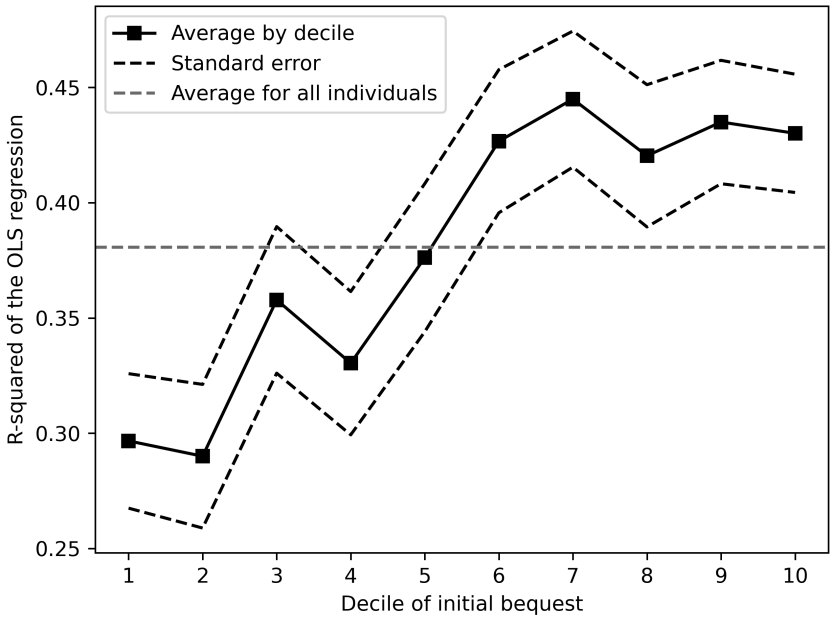

FIGURE 7: AVERAGE R^2 OF REGRESSING PORTFOLIO EXCESS RETURNS ON MARKET EXCESS RETURNS ONLY (NO SMB FACTOR)

the distribution suggests that the wealthiest were able to generate some returns that cannot be explained by the usual French-Fama decomposition. A possible explanation could be that the wealthiest investors were compensated by some liquidity premium

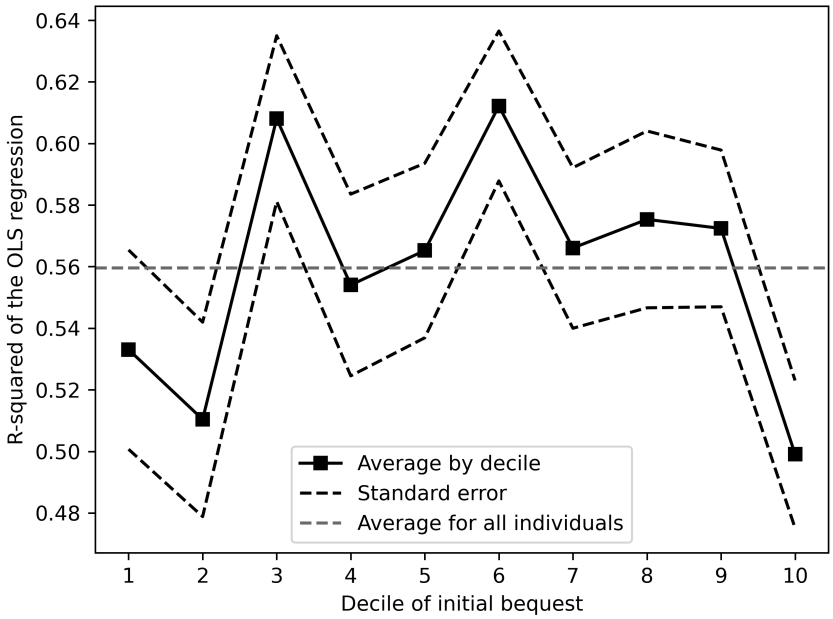

FIGURE 8: AVERAGE R^2 OF REGRESSING PORTFOLIO EXCESS RETURNS ON MARKET EXCESS RETURNS AND SMB FACTOR

for the risk of bearing less liquid securities in their portfolio. To measure liquidity for each stock, I simply take the average number of days per year for which there is a price, and divide by 25. Recall that the prices are sampled from the archives every 15 days, hence a maximum of 25 prices per year. The liquidity of a portfolio is simply the weighted average of the liquidity factors. Figure 9 shows the average liquidity per decile of initial bequests, and suggests that the top deciles owned less liquid assets. The average is about 81%, meaning that investors owned assets for which there was a price 81% of the time in the sampled days. The liquidity profile of the wealthiest is also heavily upward biased by the fact that unlisted securities, which are less liquid by definition, are removed from the portfolios.

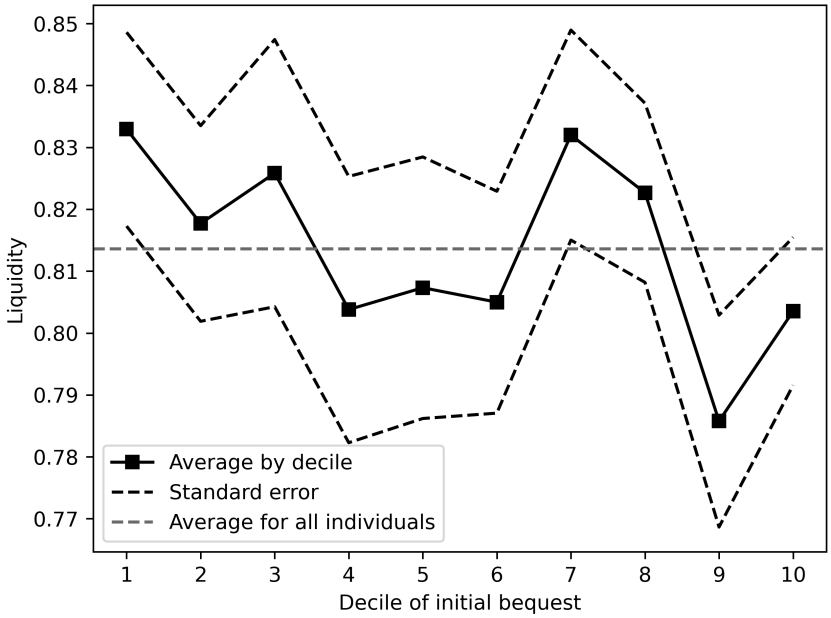

FIGURE 9: AVERAGE LIQUIDITY FACTOR BY DECILES OF INITIAL BEQUESTS