CENTER *for* RETIREMENT RESEARCH *at* BOSTON COLLEGE

CAN THE DRAWDOWN PATTERNS OF EARLIER COHORTS HELP PREDICT BOOMERS' BEHAVIOR?

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CRR WP 2021-11
September 2021

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Abstract

Past generations drew down their wealth slowly in retirement, leaving much of their savings untouched. However, this pattern may not hold as the Baby Boomer generation retires, because they are less likely to have a defined benefit (DB) plan and will need to tap the assets in their defined contribution (DC) plans to support their consumption. This paper uses data from the *Health and Retirement Study* to estimate the relationship between access to DB plans and the speed at which past generations drew down their wealth.

The paper found that:

- Having access to a DB plan was associated with slower drawdown of retirement wealth.
- The larger the share of retirees' resources in an annuity-like form – either DB plans, Social Security benefits, or commercial annuities – the slower they drew down their wealth.

The policy implications of the findings are:

- Forecasts for the Baby Boomer generation based on the drawdown of past generations likely underestimate their drawdown speed.
- Baby Boomers reliant on DC plans could run a greater risk of outliving their savings than earlier generations.

Introduction

Now that the Baby Boomers are retiring, their economic security depends on their ability to allocate their financial resources to cover both everyday spending and large, unexpected expenses throughout their retirement years. Managing their savings prudently is challenging: retirees who draw down their wealth too fast could be left without any resources in old age, while retirees who draw down too slowly could suffer from self-imposed austerity.

Research has found that past generations drew down their wealth slowly in retirement, leaving much of their savings untouched throughout old age (Poterba, Venti, and Wise 2011). This pattern may not hold for new retirees, however, who are more likely to rely on a defined contribution (DC) plan than a defined benefit (DB) plan. Retirees with a DB had less need to draw down financial assets in their retirement accounts to cover their spending and could reserve these assets for late-life medical expenses or bequests.

This project uses data from the restricted *Health and Retirement Study* (HRS) to examine the extent to which the slow drawdown of past generations was associated with substantial DB pension access. Indeed, the results show that retirees with $200,000 of starting wealth (roughly the sample median) and covered by a DB plan reduce their financial assets by $28,000 less by age 70 than their peers without a DB pension, suggesting that a connection does exist. Any predictions of the drawdown speed for Baby Boomers that are based on the slow drawdown by older generations will likely underestimate the pace at which retirees draw down their assets.

The rest of the paper is organized in five parts. The first section describes existing research on drawdown by past retirees and models how its pace could be related to DB plan access. The second section describes the HRS data used in this project and our measures of drawdown. The third section describes the methodology used to test for an association between DB plans and drawdown speed. The fourth section presents the results showing that DB plan access is associated with slower drawdown in past generations. The final section concludes that forecasts based on past patterns are likely to underestimate the drawdown speed for Baby Boomers.

Background

Past research has found that retirees barely draw down their financial assets during retirement (Poterba, Venti, and Wise 2011; De Nardi, French, and Jones 2016). In fact, the evidence indicates that many retirees' assets continue to grow well into retirement. This slow (or negative) drawdown is puzzling, since one of the main purposes of retirement savings in the lifecycle model is to provide consumption throughout old age.

Numerous explanations have been proposed for this "retirement savings puzzle." First, retirees may hold onto wealth to leave a bequest when they die.[1] Second, retirees may keep money aside for large, unpredictable medical expenses in old age, including long-term services and supports.[2] Third, retirees may retain their assets to insure against longevity risk – the risk that they live much longer than expected. Wealth reserved for these three factors would be largely untouched throughout retirement, explaining the observed slow drawdown in past generations.[3]

However, past research by necessity focused on older generations that had substantial DB coverage; the relevance of estimates of drawdown based on these cohorts for future cohorts with much less DB coverage is uncertain. Baby Boomers saw a massive shift in how they have financed retirement relative to earlier cohorts as employers transitioned from DB to DC plans (Poterba, Venti, and Wise 2009). As shown in Figure 1, most households with heads born between 1920 and 1940 had access to a DB plan. However, this share had dropped rapidly by the time the earliest Baby Boomers retired, and the youngest Baby Boomers, born in 1965, have almost no access to DB plans.[4]

The three explanations for slow drawdown have different implications for what might happen to drawdown speed as the form of savings shifts from DB to DC assets. The reason is that DB plans protect against longevity risk but cannot be bequeathed or provide liquidity in case of large health shocks. In contrast, DC plans have the opposite properties. Thus, whether the shift to DC plans will slow or speed drawdown depends on the weight of these motives in explaining the slow drawdown of past, predominantly DB-covered, generations.

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[1] See, for example, Kopczuk and Lupton (2007).
[2] Palumbo (1999); De Nardi, French, and Jones (2010); Kopecky and Koreshkova (2014); Munnell, Wettstein, and Hou (2020).
[3] Wealth saved for bequests, medical expenses, and longevity are not necessarily separate, as the three motives are complementary (Dynan, Skinner, and Zeldes 2002; Lockwood 2018). For example, precautionary savings for longevity risk can be left as a bequest if the retiree dies early, or used for unexpected medical expenses that imply a shorter expected lifespan.
[4] Currently, DB pensions are uncommon outside the public sector (Munnell, Haverstick, and Soto 2007).

Conceptual Model of Drawdown

To understand the different impacts, consider a simple model of drawdown in retirement. In the base model, individuals have no bequest motives and no uncertainty about time of death; these elements will be added later to analyze their effect on the hypothesized change in drawdown speed as DBs are replaced by DCs.

In this model, retirement is broken into two time periods: early and late retirement. Individuals start the first period with the assets and benefits they had accumulated during their working life. In each period, the retiree receives annuity-like benefits $b = b_{SS} + b_{DB}$, comprised of Social Security benefits, b_{SS}, and any benefits from a DB plan, b_{DB}. The retiree also has financial assets $a = a_F + a_{DC}$, comprised of assets outside a retirement plan, a_F, and any assets in a DC plan, a_{DC}. The shift from DB to DC plans is represented by a decrease in benefits b, as b_{DB} falls to zero, and an increase in a, as DC plans appear.

The retiree decides how much of their assets to draw down in early retirement, d, leaving $a - d$ assets for late retirement.[5] Consumption in early retirement is $d + b$, while consumption in late retirement is $a - d + b$. The retiree has preferences over consumption given by $u(c) = \log(c)$, and chooses drawdown to maximize total utility:

$$\max_d \log(d + b) + \log(a - d + b)$$

Optimally, drawdown is chosen to smooth consumption between early and late retirement. This level of drawdown is $d = a/2$, and the drawdown as a share of assets is simply:

$$\frac{d}{a} = \frac{1}{2} \qquad (1)$$

Thus, in this model with no bequest motives or longevity risk, drawdown does not depend on access to DB or DC plans. Specifically, the shift from DB to DC plans, which increases total assets a while decreasing total annuity-like benefits b, would not change drawdown speed, since the retiree consumes half of total assets in each period regardless of benefit or absolute asset levels.

Bequest Motives

This simple model can be extended to include a bequest motive to illustrate how such motives slow drawdown (precautionary savings for late-life medical risk would have the same

[5] We assume away interest or discounting for simplicity.

effect on drawdown speed as bequests and are therefore not modeled separately). Assume the retiree aims to leave a bequest B (of fixed size for simplicity). Now, the retiree must leave some savings untouched by the end of late retirement, and their choice of drawdown is determined by:

$$\max_d \log(d+b) + \log(a-d+b-B)$$

The retiree still aims to smooth their consumption, and so they reduce their consumption by the bequest amount. The optimal drawdown speed is:

$$\frac{d}{a} = \frac{1}{2} - \frac{B}{2a} \tag{2}$$

Drawdown now depends on the amount of a retiree's assets, as a retiree with more assets must retain a relatively smaller share for the bequest. The shift from DB to DC plans then *speeds up* drawdown, by increasing the retiree's assets without changing their bequest motive.

Longevity Risk

The simple model can also be extended to show how longevity risk also slows drawdown speeds, particularly after the shift to DC plans. Longevity risk is captured in the model by introducing mortality uncertainty, where the retiree only lives to late retirement with probability $p < 1$. Their choice of drawdown is determined by:

$$\max_d \log(d+b) + p\log(a-d+b)$$

Now, the retiree no longer wants to equalize consumption between early and late retirement. The fraction of consumption that happens in late retirement is proportional to the survival probability:

$$\frac{a-d+b}{d+b} = p$$

Annuity-like benefits – both Social Security and DB income – will provide a relatively larger share of consumption in late retirement, since the retiree wants to consume less overall. The drawdown speed is given by:

$$\frac{d}{a} = \frac{1}{1+p} + \frac{1-p}{1+p}\frac{b}{a} \tag{3}$$

Equation (3) shows that retirees draw down faster the more they hold annuity-like benefits b and the less they hold financial assets a. The shift from DB to DC plans decreases benefits while increasing assets, which would lead to a *slower* drawdown as retirees reserve more assets for late retirement.

Learning About Future Drawdown Speed from Earlier Generations

Between the competing effects of bequests, medical risks, and longevity risks, how the shift from DB to DC plans affects drawdown speeds is ambiguous.[6] The answer depends on the relative importance of bequests and precautionary savings for medical protection versus longevity risk in explaining drawdown speed. Drawdown speed is expected to increase as DBs are replaced by DCs if bequests or precautionary savings for medical expenses are the main drivers of slow drawdown; drawdown speed would decrease if slow drawdown is mostly due to self-insurance against longevity risk.

This analysis answers the question of how retirees' drawdown speeds differ depending on whether they had access to a DB plan. The effect of DB plans should operate through the larger flow of annuity-like income, so this paper also studies how drawdown differs based on the share of all the resources that provide such income, namely Social Security benefits, DB plans, and commercial annuities.

This paper focuses only on the drawdown of financial wealth and excludes wealth from owner-occupied homes, because using home equity for consumption is difficult. Few homeowners take out a reverse mortgage or downsize at retirement. Research finds that home equity is primarily used for bequests and large medical expenses (Davidoff 2010; Nakajima and Telyukova 2020).

Data

This project relies on data from the *Health and Retirement Study* (HRS), covering the Children of the Depression cohort (born 1924-1930) through the Early Boomers (born 1948-1953), to analyze cohort drawdown patterns in retirement. The HRS is a longitudinal survey of U.S. households with at least one adult age 50 or older. Every two years (one "wave"), respondents are surveyed about their labor market activity, income, health insurance status,

[6] If some share of retirees wants a faster pace of consumption than their DB distributions (i.e., a higher discount rate than the DB plan's), their consumption would be faster with the DC than the DB. Behavioral biases, such as present bias, could also lead to slower drawdown for retirees with DC plans compared to retires with DB plans. The behavioral aspects of drawdown speeds are beyond the scope of this project.

wealth, and saving activity, as well as their demographics, family structure, health, and retirement expectations.

In the analysis, financial wealth includes all financial assets, 401(k)s and IRAs, and the net value of non-home real estate, net any non-mortgage debt.[7] This paper measures drawdown as the change in log financial wealth between retirement and a target age.[8] The log of financial wealth ensures that drawdown is measured relative to a household's overall wealth, as households with less wealth may only make smaller withdrawals. To assess drawdown, the analysis uses one of three intervals: from retirement to ages 70, 75, or 80. The sample for each step is restricted to households with positive financial wealth at retirement, at age 70, and at the final age of the studied interval.

Summary statistics for the age 70 analysis sample are shown in Table 1. Due to the requirement that households have positive financial wealth at retirement, the sample excludes the poorest 9 percent of households. Furthermore, the restriction that households are observed with positive wealth at age 70 removes households that had little wealth and drew it all down in a few years, as well as those who attrit from the sample between retirement and age 70 and those who have not yet reached age 70, leaving 46 percent of the starting sample for these analyses.[9] Most of this loss is driven by attrition and non-attainment of the requisite age by later birth cohorts.

The summary statistics also show that most households in this sample are older than the Baby Boomers, with only 10 percent headed by a member of the Early Baby Boomer cohort. In this older sample, most households (73 percent) have access to a DB plan from at least one household member. This share slightly exceeds the levels seen in Figure 1, due to the sample excluding the poorest households.

Identifying the Required Minimum Distribution

After age 70, households with assets in tax-deferred 401(k)s and IRAs must withdraw at least the Required Minimum Distribution (RMD), a constraint which is absent for other sources

[7] Specifically, this measure of wealth includes the total value of stocks, bonds, retirement accounts, CDs, bank accounts, businesses, vehicles, and non-housing real estate, net any debts including credit card balances, loans excluding mortgages, and medical debt.
[8] Retirement is defined as self-reported retirement. A household may report different retirement years when asked the same question across waves. In that case, the analysis uses the most common answer.
[9] Attrition from the HRS is predominantly due to death. Analyses of drawdown to age 75 (80) include 29 (9) percent of the starting sample.

of financial wealth.[10] Thus, ignoring the RMD might confound the effect of employers shifting from DB to DC plans with the increasing share of financial assets covered by DC plans and hence subject to RMDs.

The paper has two ways of identifying whether each household had to take the RMD. First, households self-report whether they took an RMD in the HRS. Second, the RMD is directly estimated for each household and compared to their withdrawals from retirement accounts. The RMD rules require a minimum share of assets withdrawn, as determined by the account holder's age, and these withdrawals, as a percentage of assets, vary by year. Using the age of the financial respondent and the survey year, the RMD is estimated by applying these rules to the level of assets remaining in 401(k)-type accounts. If a household either reported taking an RMD, or withdrew an amount within 5 percent of the estimated RMD, the analysis counts them as having taken an RMD. Overall, 55 percent of households with positive wealth at retirement and at age 75 are constrained by the RMD at least once.

Annuity-Like Resources

The next step is to measure what share of a retiree's resources provide annuity-like income streams. A retiree's total resources in retirement include financial wealth, housing, DB pensions, Social Security benefits, and commercial annuities.[11] Of these resources, the last three provide a fixed, life-contingent income stream. The analysis calculates the present discounted value of the three annuity-like income streams – DB pensions, Social Security benefits, and commercial annuities – using mortality tables from the U.S. Social Security Administration, based on gender and age. Future Social Security benefits are calculated with a cost-of-living adjustment matching the intermediate long-run projected inflation in the 2020 Social Security Trustees Report, 2.24 percent. Income streams are discounted at an interest rate of 5 percent. The share of resources providing an annuity-like stream is the sum of the present discounted values of the household's total DB pensions, Social Security benefits, and commercial annuities,

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[10] Existing evidence shows the RMDs are binding for a substantial share of retirees. See Brown, Poterba, and Richardson (2017) and Mortenson, Schramm, and Whitten (2019). The start of RMDs was recently increased to age 72; however, this change will not impact the analysis as it affects those turning 70½ in 2019, after the last HRS wave used in this study (2018).

[11] We do not include the value of Medicare or other health insurance subsidies in total resources. See Bosworth, Burtless, and Alalouf (2015) for a discussion of alternative definitions of annuitized wealth.

divided by their total resources – the present values of the annuities plus the value of the financial and housing assets. All dollar values are measured at the time of retirement.

Methods

Drawdown and DB Plan Access

The following OLS regression is used to estimate within-cohort differences in the speed of drawdown for all households, whether they are covered by a DB pension or not:

$$\log(A_h^{70}) - \log(A_h^{RET}) = \alpha + \beta DB_h + C_h + \boldsymbol{\gamma X_h} + \varepsilon_h. \quad (1)$$

A_h^{70} and A_h^{RET} are the net value of financial assets at age 70 and at retirement respectively for household h. The HRS surveys respondents every two years, so assets at age 71 are used for A_h^{70} if the head of household was 70 in the off year, when it was not surveyed. If a household is not observed at 71 or 70, then age 69 is used instead. Accounting for this definition, the sample for regression (1) is restricted to households who live to age 70 and report positive wealth at age 70 and at retirement.

DB_h indicates whether h has a DB plan, and its coefficient β is the coefficient of interest. A positive value means that households with DB plans drew down their wealth more slowly than those without. C_h is a cohort fixed effect, and $\boldsymbol{X_h}$ is a vector of h's characteristics at retirement including marital status, race, years since retirement, gender, education, number of children, long-term care insurance, homeownership, and the log of residential housing value.[12] The demographic controls (gender, race, and cohort) are, among other things, proxies for mortality expectations, both in terms of life expectancy and mortality uncertainty. Retirees with shorter life expectancies likely draw down their wealth faster, while retirees with more uncertainty have more longevity risk and therefore a stronger precautionary savings motive.[13] Years since retirement matter because those who retire earlier have more years of drawdown by the target age.

[12] Housing value is included as a control because housing comprises a large share of assets for the typical household, as well as making up a large share of bequests and a source of liquid funds in case of long-term care shocks. Non-homeowners are assigned the median household value for homeowners. This choice only affects the coefficient for the homeownership indicator, which will correspond to the difference between renting and being a homeowner with the median housing value.

[13] See Wettstein et al. (2021).

Drawdown and Annuitized Wealth

The analysis next estimates the effect of annuitized income on drawdown speeds using the regression:

$$\log(A_h^{70}) - \log(A_h^{RET}) = \alpha + \beta share_h + C_h + \boldsymbol{\gamma X_h} + \varepsilon_h. \quad (2)$$

$share_h$ is the share of a retiree's total resources that provide an annuity-like income stream. The controls C_h and $\boldsymbol{X_h}$ are the same as in regression (1). The coefficient of interest is β, which captures the relationship between a larger share of resources annuitized and the speed of drawdown. When the effect of DB plans operates through higher annuitized wealth, the sign of the coefficient here will match the coefficient on DB_h in regression (1).

Drawdown at Older Ages

The second step of the analysis explores drawdown patterns in older ages. In the HRS data, the Children of the Depression cohort (born 1924-1930), the original HRS cohort (1931-1941), and the War Baby cohort (1942-1947) can be observed until their mid-70s for this purpose.

Since this second step includes ages above 70, the RMD rules provide a minimum drawdown from individual retirement accounts. Therefore, the regressions in this step add controls for whether the household ever had to take the RMD.[14] These controls address, in reduced form, the floor on drawdown given by RMDs.

The analysis examines drawdown at older ages, accounting for RMDs, using the following OLS regression:

$$\log(A_h^{a}) - \log(A_h^{RET}) = \alpha + \beta_1 DB_h + \beta_2 RMD_h + \beta_3 (DB_h * RMD_h) + C_h + \boldsymbol{\gamma X_h} + \varepsilon_h \quad (3)$$

A_h^a is household h's assets at age a, alternatively 75 and 80, and RMD_h is an indicator equal to one whenever household h took the RMD in some year between retirement and year a. As in regression (1), C_h is a cohort fixed effect, and $\boldsymbol{X_h}$ is a vector of h's characteristics at retirement including marital status, race, years since retirement, gender, education, number of children, long-term care insurance, homeownership, and the log of residential housing value. The sample for regression (3) is restricted to households that report positive wealth at retirement and age a.[15]

[14] The controls also include an interaction with the parameter of interest, DB_h. The interaction accounts for the higher likelihood of hitting the RMD floor if DB plans are associated with slower drawdown.

[15] If the household is either 75 or 80 on the HRS's off-year, then the assets are instead from the neighboring year, when the household was surveyed.

The analysis also estimates the effect of annuitized income on drawdown speeds at these later ages, using the regression:

$$\log(A_h^a) - \log(A_h^{RET}) = \alpha + \beta_1 share_h + \beta_2 RMD_h + \beta_3 (share_h * RMD_h) + C_h + \boldsymbol{\gamma X_h} + \varepsilon_h. \quad (4)$$

The sample and the controls C_h and $\boldsymbol{X_h}$ remain the same as in regression (3).[16]

Results

Table 2 shows the relationship between having a DB plan and drawdown speed. At all three target ages, having a DB plan is associated with slower drawdown. By age 70, a household with a DB plan drew down 13 log points less of their starting wealth than households without a DB plan. For a household that entered retirement with a DB plan and $200,000 in savings, approximately the median in our sample, this slower drawdown corresponds to having $28,000 more wealth remaining at age 70 than a household with the same initial wealth but no DB plan.[17] By age 75 and by age 80, the household with a DB plan has drawn down 36 log points less of their initial wealth, corresponding to $86,000 more wealth. However, the results at age 80 are not statistically significant, likely due to the small sample for this analysis.

These results show that having a DB plan was associated with slower drawdown in past generations. The magnitude of the slower drawdown is large, considering the median household in these older generations withdrew only 12 log points of their starting wealth by age 70. Using their drawdown speed as a prediction for the drawdown speed of Baby Boomers could significantly underestimate drawdown (to the extent that these descriptive results are interpreted causally). Given that almost three-quarters of the older sample had access to a DB plan, our rough estimate for the drawdown speed for more recent retirees without DB plans is 21 log points, or 24 percent, of wealth by age 70. At this rate, they would deplete their assets by age 85, about the life expectancy for someone who reaches retirement age. This pace would leave them no precautionary savings for either medical risk or longevity risk even though roughly half would survive past this age.

The results on the relationship between the annuitized share of wealth (in Table 3) and drawdown also supports the slower drawdown by DB households. Column 1 shows the impact

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[16] The RMD controls include the interaction with $share_h$, which is the variable of interest in this regression.
[17] This and future dollar values are calculated after converting log points to percentages, since the relatively large coefficients imply that log points themselves are a poor approximation to percent changes.

on drawdown to age 70, from regression (2), and Columns 2 and 3 show the impact on drawdown to ages 75 and 80 respectively, from regression (4). All specifications find a positive and statistically significant relationship between the share of resources annuitized and slower drawdown. A household with 10 percent more of their resources annuitized drew down 19 log points less of its initial wealth by age 70, 31 log points less by age 75, and 33 log points less by age 80.[18] For a DB household with $200,000 in savings at retirement, these results correspond to $42,000 more wealth by age 70 than a similar household without a DB plan, $72,000 more by age 75, and $79,000 more by age 80.

The results on annuitized wealth support the hypothesis that shifting employer-provided pensions from DB plans to DC plans will increase the speed at which retirees draw down their wealth, as measured as a percentage of their asset levels. Returning to the theoretical reasons outlined in the background section, the effects of the bequest motive and precautionary savings for medical expenses – both of which predicted faster drawdown for households without DB plans – appear to outweigh the effects of precautionary savings for longevity insurance and present bias, which predicted slower drawdown.[19]

Some of the controls indicate other expected reasons for slow drawdown. In particular, homeowners draw down slower than non-homeowners, consistent with homeowners not needing to pay for rent.[20] In addition, college-educated households tend to draw down more slowly, consistent with longer expected lifespans.[21]

The results, overall, indicate that bequests and precautionary medical savings outweigh longevity insurance motives in the explanation of slow drawdown. Regarding the relative importance of bequests and precautionary medical savings, however, our results do not provide strong evidence to illuminate either of these channels.

Having long-term care insurance (LTCI), which reduces the risk of large medical expenses on long-term care and support services, is not statistically associated with a change in drawdown speed. However, people who buy LTCI may be sicker on average, confounding this

[18] This example assumes a "money's worth" of annuities of one for each dollar put in. Transaction costs make the money's worth of commercial annuities lower than one (Mitchell et al. 1999; Wettstein et al. 2021).
[19] All the results on both the presence of a DB and the share of annuitized wealth are generally consistent when regressions are run separately for each HRS cohort. Signs of coefficients are all positive when statistically significant, although some significance is lost due to small sample sizes. See Appendix A.
[20] On the intensive margin, the fact that homeowners with more housing wealth draw down slower than those with less housing wealth is consistent with wealthier households in general drawing down more slowly.
[21] Wettstein et al. (2021) show that life expectancy at age 65 increases with education.

estimate. We have attempted to account for this selection in supplementary results (see Appendix B) using instrumental variables. However, the instruments are slightly weak (with a first-stage F-statistic of 9.7), and the insignificant estimate of the effect of LTCI on drawdown in the second stage is imprecisely estimated.

For bequests, Hurd (1987) argued that the number of children would predict bequest motives but did not find that this variable predicted drawdown speed. In contrast, our results find that having children is associated with faster, rather than slower, drawdown.[22] Further study is needed to determine which channels – bequests, medical risk, longevity risk, or behavioral biases – drive the slower drawdown associated with DB pension access.

Conclusion

Past generations drew down their financial wealth slowly, likely reserving it for bequests and precautionary savings, rather than spending it to finance their own consumption. However, forecasting drawdown for the currently retiring Boomers must account for changes across generations, namely the shift from defined benefit to defined contribution plans.

This analysis shows that past generations' access to a DB pension was associated with slower drawdown of their financial assets. Further, the more of a retiree's resources that were in the form of annuities (including DBs, Social Security, and commercial annuities), the slower they drew down their other assets. Forecasts for the Baby Boomer generation based on the drawdown of past generations likely underestimate their drawdown speed. The results suggest that Baby Boomers without DB plans may be drawing down their assets faster, leaving them with more risk that they will outlive their savings.

[22] Having children may affect drawdown behavior in numerous ways besides through its effect on the bequest motive.

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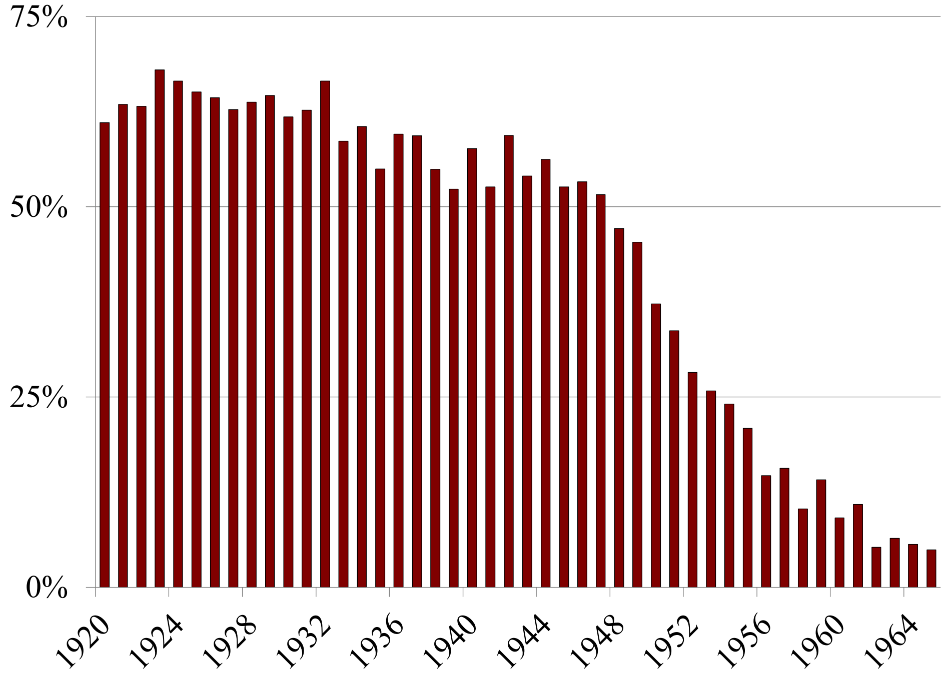
Figure 1. *Share of Households with a Defined Benefit Plan, by Year of Birth*



Source: Authors' calculations from the University of Michigan, *Health and Retirement Study* (HRS) (1992-2018).

Table 1. *Summary Statistics*

	Mean	SD	Minimum	Median	Maximum	N
Assets at retirement	623,520	1,866,096	14.582	220,569	74,885,440	3,425
Assets at 70	601,192	1,598,972	1	189,866	41,112,668	3,425
Assets at 70 – asset at ret.	-22,328	1,897,305	-72,373,160	-10,154	39,175,536	3,425
Assets at 75 – asset at ret.	-108,581	2,280,644	-74,525,752	-20,277	33,666,072	2,243
Assets at 80 – asset at ret.	-124,354	1,210,020	-15,024,791	-28,578	10,667,322	708
(Log) assets at retirement	12.037	1.867	2.680	12.304	18.131	3,425
(Log) assets at 70	11.772	2.118	0	12.154	17.532	3,425
(Log) asset 70 – (log) asset ret.	-0.265	1.458	-8.616	-0.152	7.607	3,425
(Log) asset 75 – (log) asset ret.	-0.418	1.583	-10.975	-0.261	6.856	2,120
(Log) asset 80 – (log) asset ret.	-0.600	1.648	-11.836	-0.399	4.710	647
Have DB plan	0.733	0.442	0	1	1	3,425
Married	0.699	0.459	0	1	1	3,425
White	0.849	0.358	0	1	1	3,425
Black	0.071	0.256	0	0	1	3,425
Hispanic	0.055	0.228	0	0	1	3,425
Other (race)	0.025	0.157	0	0	1	3,425
Homeowner	0.891	0.312	0	1	1	3,425
Male	0.628	0.483	0	1	1	3,425
Less than high school	0.135	0.342	0	0	1	3,425
High school graduate	0.331	0.471	0	0	1	3,425
Some college	0.243	0.429	0	0	1	3,425
College graduate or higher	0.291	0.454	0	0	1	3,425
CODA	0.039	0.193	0	0	1	3,425
HRS	0.462	0.499	0	0	1	3,425
War Baby	0.395	0.489	0	0	1	3,425
Early Baby Boomer	0.104	0.306	0	0	1	3,425

Source: Authors' estimates from the HRS (1992-2018).

Table 2. *Relationship Between Drawdown Speeds and Defined Benefit Plan Access*

	(1)	(2)	(3)
	Log (assets at 70) - log (assets at retirement)	Log (assets at 75) - log (assets at retirement)	Log (assets at 80) - log (assets at retirement)
Have DB	0.132**	0.355***	0.357
	(0.0575)	(0.117)	(0.230)
Retirement age	0.0172**	0.00592	-0.0503**
	(0.00686)	(0.0102)	(0.0222)
Black	-0.127	0.351**	0.395
	(0.0984)	(0.144)	(0.291)
Hispanic	-0.00148	0.00578	0.372
	(0.110)	(0.163)	(0.334)
Other (race)	-0.0685	0.150	-0.504
	(0.158)	(0.228)	(0.491)
Male	0.00574	0.158**	-0.124
	(0.0550)	(0.0780)	(0.151)
Homeowner	0.359***	0.138	0.330
	(0.0837)	(0.119)	(0.215)
Some college	0.0106	-0.0504	-0.382**
	(0.0632)	(0.0884)	(0.168)
College	0.155**	0.00625	0.399**
	(0.0632)	(0.0856)	(0.158)
Married	-0.00992	-0.132	0.206
	(0.0641)	(0.0906)	(0.176)
Housing value (log)	0.117***	0.120***	0.0848
	(0.0258)	(0.0365)	(0.0688)
Have children	-0.244**	-0.277*	-0.272
	(0.0985)	(0.145)	(0.303)
Have LTCI	-0.0707	-0.0538	-0.0946
	(0.0508)	(0.0687)	(0.128)
Constant	-2.664***	-2.466***	1.394
	(0.556)	(0.810)	(1.492)
Cohort controls	Yes	Yes	Yes
RMD controls	-	Yes	Yes
Observations	3,425	2,120	647
R-squared	0.030	0.051	0.098

Notes*:* Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: Authors' estimates from the HRS (1992-2018).

Table 3. *Relationship Between Drawdown Speeds and Share of Resources Annuitized*

	(1)	(2)	(3)
	Log (assets at 70) - log (assets at retirement)	Log (assets at 75) - log (assets at retirement)	Log (assets at 80) - log (assets at retirement)
Annuitized wealth share	1.897***	3.078***	3.323***
	(0.121)	(0.239)	(0.472)
Retirement age	0.0340***	0.0231**	-0.0240
	(0.00670)	(0.00967)	(0.0211)
Black	-0.330***	0.0715	0.0788
	(0.0960)	(0.137)	(0.279)
Hispanic	-0.0821	-0.175	0.0420
	(0.106)	(0.154)	(0.317)
Other (race)	-0.0358	0.102	-0.410
	(0.153)	(0.216)	(0.464)
Male	0.0287	0.189**	-0.0305
	(0.0531)	(0.0735)	(0.143)
Homeowner	0.796***	0.741***	0.866***
	(0.0852)	(0.119)	(0.212)
Some college	0.0623	0.0258	-0.265*
	(0.0611)	(0.0837)	(0.160)
College	0.279***	0.104	0.383**
	(0.0615)	(0.0810)	(0.149)
Married	-0.0601	-0.250***	0.134
	(0.0619)	(0.0857)	(0.167)
Housing value (log)	0.284***	0.320***	0.259***
	(0.0269)	(0.0365)	(0.0682)
Have children	-0.303***	-0.394***	-0.391
	(0.0953)	(0.137)	(0.287)
Have LTCI	-0.0493	0.0119	-0.000983
	(0.0490)	(0.0649)	(0.121)
Constant	-7.175***	-8.175***	-5.469***
	(0.612)	(0.849)	(1.738)
Cohort controls	Yes	Yes	Yes
RMD controls	-	Yes	Yes
Observations	3,425	2,120	647
R-squared	0.093	0.151	0.191

Notes*:* Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' estimates from the HRS (1992-2018).

Appendix A. Cohort-Specific Regression

Table A1. *Relationship Between DB Plan Access and Drawdown at 70, by Cohort*

	(1)	(2)	(3)	(4)
	Child of Depression Era	HRS	War Baby	Early Baby Boomer
Have DB	0.113	0.196***	0.131	-0.113
	(0.250)	(0.0721)	(0.124)	(0.195)
Retirement age	-0.0603	0.0137	0.0327**	-0.0287
	(0.0571)	(0.00906)	(0.0135)	(0.0242)
Black	-0.560	-0.262**	-0.0414	0.0547
	(0.525)	(0.126)	(0.206)	(0.312)
Hispanic	0.113	0.0660	0.0455	-0.487
	(0.537)	(0.142)	(0.230)	(0.350)
Other (race)	-1.836	-0.255	0.300	-0.0604
	(1.177)	(0.198)	(0.365)	(0.429)
Male	-0.393	0.114	-0.0657	-0.110
	(0.429)	(0.0695)	(0.113)	(0.188)
Homeowner	0.618	0.400***	0.143	0.895***
	(0.419)	(0.100)	(0.188)	(0.290)
Some college	-0.207	-0.0222	-0.0537	0.172
	(0.349)	(0.0787)	(0.133)	(0.236)
College degree	-0.0534	0.187**	0.177	-0.0347
	(0.242)	(0.0792)	(0.135)	(0.243)
Married	-0.0326	-0.129	0.118	0.0210
	(0.472)	(0.0795)	(0.136)	(0.217)
Housing value (log)	0.208*	0.116***	0.136**	0.0382
	(0.111)	(0.0325)	(0.0539)	(0.101)
Have children	0.259	-0.101	-0.438**	-0.194
	(0.509)	(0.128)	(0.211)	(0.290)
Have LTCI	-0.203	0.00200	-0.131	-0.214
	(0.209)	(0.0624)	(0.110)	(0.182)
Constant	1.153	-2.928***	-3.820***	0.819
	(4.165)	(0.682)	(1.050)	(2.008)
Observations	176	2,212	797	240
R-squared	0.073	0.031	0.037	0.070

Notes*:* Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' estimates from the HRS (1992-2018).

Table A2. *Relationship Between DB Plan Access and Drawdown at 75, by Cohort*

	(1)	(2)	(3)
	Child of Depression Era	HRS	War Baby
Have DB	0.415	0.346***	0.566
	(0.528)	(0.121)	(0.430)
Retirement age	-0.0284	-0.00381	0.0509*
	(0.0645)	(0.0111)	(0.0303)
Black	-0.349	0.314**	0.523
	(0.594)	(0.154)	(0.455)
Hispanic	-0.404	0.258	-0.463
	(0.635)	(0.181)	(0.476)
Other (race)	-0.669	0.0523	1.151
	(1.189)	(0.229)	(0.925)
Male	-0.807*	0.171**	0.171
	(0.468)	(0.0839)	(0.238)
Homeowner	0.450	0.317**	-0.583
	(0.524)	(0.127)	(0.392)
Some college	-0.327	0.0142	-0.305
	(0.376)	(0.0950)	(0.281)
College plus	0.183	0.0925	-0.308
	(0.266)	(0.0946)	(0.268)
Married	0.500	-0.157	-0.0161
	(0.551)	(0.0982)	(0.275)
Housing value (log)	0.292*	0.152***	-0.00585
	(0.148)	(0.0401)	(0.113)
Have children	-0.659	-0.217	-0.453
	(0.507)	(0.159)	(0.469)
Have LTCI	0.0198	-0.0207	-0.180
	(0.220)	(0.0748)	(0.219)
Constant	-1.840	-2.606***	-3.309
	(4.626)	(0.849)	(2.314)
RMD controls	Yes	Yes	Yes
Observations	142	1,718	260
R-squared	0.135	0.052	0.097

Notes*:* Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' estimates from the HRS (1992-2018).

Table A3. *Relationship Between DB Plan Access and Drawdown at 80, by Cohort*

	(1)	(2)
	Child of Depression Era	HRS
Have DB	3.588***	0.318
	(1.210)	(0.237)
Retirement age	-0.171*	-0.0435*
	(0.0903)	(0.0229)
Black	0.0686	0.374
	(1.070)	(0.306)
Hispanic	-1.663	0.456
	(1.188)	(0.349)
Other (race)		-0.533
		(0.495)
Male	-1.057	-0.0808
	(0.718)	(0.156)
Homeowner	1.622**	0.194
	(0.635)	(0.229)
Some college	-1.139	-0.405**
	(0.766)	(0.175)
College degree	0.733**	0.348**
	(0.364)	(0.174)
Married	-1.242	0.251
	(1.063)	(0.181)
Housing value (log)	0.334	0.0668
	(0.218)	(0.0731)
Have children	-0.650	-0.288
	(1.414)	(0.314)
Have LTCI	0.158	-0.126
	(0.328)	(0.138)
Constant	3.716	0.735
	(6.568)	(1.687)
RMD controls	Yes	Yes
Observations	72	575
R-squared	0.409	0.092

Notes*:* Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' estimates from the HRS (1992-2018).

Table A4. *Relationship Between Annuitized Wealth Share and Drawdown at 70, by Cohort*

	(1)	(2)	(3)	(4)
	Child of Depression Era	HRS	War Baby	Early Baby Boomer
Annuitized wealth share	2.008***	1.994***	2.007***	0.972**
	(0.496)	(0.154)	(0.262)	(0.411)
Retirement age	0.0115	0.0319***	0.0452***	-0.0113
	(0.0569)	(0.00886)	(0.0131)	(0.0248)
Black	-0.835*	-0.482***	-0.238	-0.0453
	(0.503)	(0.123)	(0.201)	(0.312)
Hispanic	0.0379	-0.144	0.0148	-0.377
	(0.501)	(0.137)	(0.222)	(0.344)
Other (race)	-1.826	-0.259	0.321	0.0794
	(1.118)	(0.191)	(0.352)	(0.410)
Male	-0.268	0.121*	-0.0362	-0.0793
	(0.410)	(0.0670)	(0.110)	(0.184)
Homeowner	1.055**	0.858***	0.589***	1.084***
	(0.414)	(0.102)	(0.190)	(0.298)
Some college	-0.0633	0.0489	0.00352	0.202
	(0.334)	(0.0760)	(0.129)	(0.234)
College degree	0.0673	0.286***	0.330**	0.0586
	(0.232)	(0.0763)	(0.132)	(0.244)
Married	-0.0832	-0.163**	0.0340	0.0208
	(0.451)	(0.0764)	(0.132)	(0.214)
Housing value (log)	0.270**	0.290***	0.316***	0.129
	(0.107)	(0.0340)	(0.0558)	(0.107)
Have children	0.0200	-0.175	-0.442**	-0.279
	(0.487)	(0.123)	(0.204)	(0.289)
Have LTCI	-0.0970	0.0602	-0.142	-0.233
	(0.200)	(0.0603)	(0.106)	(0.180)
Constant	-5.731	-7.584***	-8.293***	-2.129
	(4.286)	(0.755)	(1.172)	(2.334)
Observations	176	2,212	797	240
R-squared	0.157	0.097	0.103	0.091

Notes*:* Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' estimates from the HRS (1992-2018).

Table A5. *Relationship Between Annuitized Wealth Share and Drawdown at 75, by Cohort*

	(1)	(2)	(3)
	Child of Depression Era	HRS	War Baby
Annuitized wealth share	1.639	2.780***	4.111***
	(0.991)	(0.259)	(0.761)
Retirement age	0.0111	0.0167	0.0474*
	(0.0663)	(0.0106)	(0.0277)
Black	-0.390	0.0525	0.157
	(0.583)	(0.148)	(0.429)
Hispanic	-0.719	0.00788	-0.445
	(0.597)	(0.172)	(0.444)
Other (race)	-0.763	-0.00217	0.929
	(1.138)	(0.218)	(0.864)
Male	-0.634	0.168**	0.275
	(0.467)	(0.0795)	(0.222)
Homeowner	0.578	0.856***	0.410
	(0.518)	(0.127)	(0.395)
Some college	-0.136	0.0956	-0.252
	(0.373)	(0.0903)	(0.262)
College degree	0.227	0.173*	-0.143
	(0.263)	(0.0897)	(0.252)
Married	0.518	-0.213**	-0.367
	(0.529)	(0.0929)	(0.263)
Housing value (log)	0.332**	0.344***	0.310***
	(0.144)	(0.0405)	(0.108)
Have children	-0.678	-0.341**	-0.508
	(0.497)	(0.151)	(0.443)
Have LTCI	0.0610	0.0554	-0.123
	(0.220)	(0.0711)	(0.204)
Constant	-5.994	-8.140***	-9.852***
	(4.991)	(0.905)	(2.405)
RMD controls	Yes	Yes	Yes
Observations	142	1,718	260
R-squared	0.163	0.146	0.213

Notes*:* Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' estimates from the HRS (1992-2018).

Table A6. *Relationship Between Annuitized Wealth Share and Drawdown at 80, by Cohort*

	(1)	(2)
	Child of Depression Era	HRS
Annuitized wealth	5.771***	3.155***
	(1.906)	(0.493)
Retirement age	-0.106	-0.0194
	(0.0945)	(0.0218)
Black	-0.538	0.0667
	(1.106)	(0.292)
Hispanic	-1.724	0.135
	(1.181)	(0.331)
Other (race)		-0.415
		(0.468)
Male	-1.265*	0.00973
	(0.719)	(0.148)
Homeowner	1.858***	0.763***
	(0.637)	(0.227)
Some college	-0.784	-0.297*
	(0.735)	(0.167)
College degree	0.755**	0.308*
	(0.364)	(0.163)
Married	-0.727	0.158
	(1.043)	(0.171)
Housing value (log)	0.195	0.259***
	(0.197)	(0.0730)
Have children	-0.702	-0.393
	(1.403)	(0.297)
Have LTCI	0.0245	-0.0281
	(0.335)	(0.131)
Constant	-0.102	-5.379***
	(7.024)	(1.769)
RMD controls	Yes	Yes
Observations	72	575
R-squared	0.415	0.187

Notes*:* Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' estimates from the HRS (1992-2018).

Appendix B. Long-Term Care Insurance

To further explore the precautionary savings hypothesis (at least with respect to LTSS), the analysis compared households with and without LTCI. Of course, households with LTCI differ in observable and unobservable ways from uninsured households. To account for potential unobservable differences between covered and uncovered households, the variation in state incentives for LTCI serves as an instrument for coverage (Goda 2011; Coe, Goda, and Van Houtven 2015). This analysis used restricted HRS data on the state of residence of retirees, merged with data on state LTCI incentives from Coe, Goda, and Van Houtven (2015).

In order to use the LTCI instrument, we adjust the sample and regression to match the sample in Goda (2011). Specifically, this sample is all households whose heads are between ages 59 and 70, and who have positive financial wealth in the observation year and the year prior. Following Goda (2011), households are excluded when they are self-employed. Self-employed workers have an alternative tax treatment at the federal level. This sample includes many households before retirement, and many households younger than the main sample.

The analysis estimates the effect of LTCI on drawdown using the following IV regression with two-stage least squares:

$$\log(A_h^a) - \log(A_h^{a-2}) = \alpha + \beta LTCI_{ha} + C_h + \boldsymbol{\gamma X_h} + \varepsilon_{ha} \quad (5)$$

where $LTCI_h$ is an indicator taking the value of one if household h has LTCI at a. $LTCI_h$ is instrumented by $Incentive_s$, an indicator taking the value of one if household h's state s offered tax incentives for LTCI in year a. Standard errors are clustered at the state level. A_h^a is household h's financial wealth at age a, and $\boldsymbol{X_h}$ is a vector of h's characteristics at retirement including marital status, race, gender, education, and homeownership. As the sample contains many working households, the dependent variable – the wave-to-wave change in assets – reflects wealth accumulation rather than drawdown for the non-retired observations.

As shown in Table B1, the instrument was weak when applied to our work, on the adjusted sample matching Goda (2011), with a first-stage F-statistic of only 9.7. The results of the regression of interest, both with the IV specification and with OLS, are shown in Table B2. The OLS regression results (Column 2) mirror the main analysis in finding no association between having LTCI and change in assets. The IV estimate (Column 1) also finds no association, though this is due to significant noise. Moreover, the second stage estimated effect of LTCI on accumulation speed has wide confidence intervals. While endogeneity is likely an issue in interpreting the LTCI coefficients in OLS, our results do not precisely estimate the corrected coefficient.

Table B1. *First Stage – Relationship Between State Incentives and Long-Term Care Insurance*

	Respondent has LTCI
State has LTCI incentive	0.028***
	(0.009)
Some college	0.035***
	(0.011)
College	0.085***
	(0.015)
Male	-0.024**
	(0.011)
Married	0.017*
	(0.010)
Respondent age	0.005***
	(0.001)
Black	-0.009
	(0.014)
Hispanic	-0.037**
	(0.016)
Other (race)	-0.014
	(0.026)
Respondent income (2018 dollars)	2.21e-07***
	(7.98e-08)
Number of children	-0.009***
	(0.002)
Retired	0.028***
	(0.011)
Respondent health: very good	0.009
	(0.014)
Respondent health: good	0.000
	(0.014)
Respondent health: fair	0.003
	(0.014)
Respondent health: poor	-0.017
	(0.016)
Constant	-0.198***
	(0.055)
Observations	20,871
Controls	Yes
State + year FE	Yes

Notes*:* Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' estimates from the HRS (1992-2018).

Table B2. *Relationship Between Long-Term Care Insurance and Drawdown Speeds*

	IV	OLS
	Change in wealth (logs)	Change in wealth (logs)
Respondent has LTCI	-0.377	0.002
	(0.854)	(0.027)
Some college	-0.004	-0.018
	(0.030)	(0.017)
College	0.026	-0.006
	(0.072)	(0.014)
Male	0.014	0.023
	(0.020)	(0.015)
Married	0.055**	0.049**
	(0.025)	(0.019)
Respondent age	-0.002	-0.004**
	(0.004)	(0.002)
Black	0.009	0.012
	(0.030)	(0.032)
Hispanic	-0.029	-0.015
	(0.051)	(0.033)
Other (race)	-0.037	-0.031
	(0.039)	(0.042)
Respondent income (2018 dollars)	3.06e-07	2.22e-07**
	(2.35e-07)	(9.82e-08)
Number of children	-0.008	-0.004
	(0.008)	(0.004)
Retired	-0.128***	-0.139***
	(0.028)	(0.016)
Respondent health: very good	0.025	0.021
	(0.022)	(0.019)
Respondent health: good	-0.013	-0.013
	(0.025)	(0.024)
Respondent health: fair	-0.032	-0.033
	(0.031)	(0.030)
Respondent health: poor	-0.058	-0.051
	(0.066)	(0.067)
Constant	0.327*	0.395***
	(0.175)	(0.099)
Observations	20,871	20,871
R-squared	0.005	0.019
Controls	Yes	Yes
State + year fixed effects	Yes	Yes

Notes*:* Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' estimates from the HRS (1992-2018).

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