PENN WHARTON
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Budget Model

Summary: Penn Wharton Budget Model (PWBM) projects that Senator Warren's proposed wealth tax, if implemented in 2021, would raise between $2.3 trillion (including macroeconomic effects) and $2.7 trillion (not including macroeconomic effects) in additional revenue in the 10-year window 2021 - 2030 while reducing GDP in 2050 by about 1 to 2 percent, depending on how the money is spent.

Key Points

- Senator Elizabeth Warren has proposed a wealth tax equal to 2 percent of net worth above $50 million and 6 percent of net worth above $1 billion, which her campaign estimates would raise $3.75 trillion over 10 years.

- PWBM estimates that the proposal would raise about $2.7 trillion over fiscal years 2021-2030, not including macroeconomic effects. Including macroeconomic effects, PWBM estimates that the proposal would raise about $2.3 trillion over the same period.

- PWBM projects that the proposal would reduce GDP by 0.9 percent in 2050 under the standard budget scoring convention that additional revenues reduce the deficit. If the revenues were instead spent on public investments, PWBM projects GDP in 2050 would fall between 1.1 and 2.1 percent, depending on the productivity of the investment. Average hourly wages in the economy in 2050, including wages earned by households not directly subject to the wealth tax, would fall between 0.8 and 2.3 percent due to the reduction in private capital formation.

Watch a video interview explaining some of the key findings in this analysis here.

Senator Elizabeth Warren's Wealth Tax: Budgetary and Economic Effects

Introduction

In January 2019, Senator Elizabeth Warren introduced a proposal for a wealth tax on high-net worth families. A number of other candidates in the Democratic primary followed suit, also proposing progressive wealth taxes with rates ranging from 1 to 8 percent depending on the level of wealth. In this analysis, we focus on the budgetary and economic effects of Senator Warren's most recent iteration of her proposal, which imposes a 2 percent tax on net worth above $50 million and a 6 percent tax on net worth above $1 billion.[1] The Warren campaign states that this proposal would raise $3.75 trillion revenue over ten years.[2]

While a federal tax on net worth is unprecedented in the United States[3] and its constitutionality is currently the subject of debate among legal scholars, wealth taxes are not new internationally. In 1990, twelve of the thirty-six member countries in the Organisation for Economic Co-operation and Development (OECD) imposed wealth taxes. However, by 2019, only four OECD countries imposed wealth taxes: Norway, Belgium, Spain and Switzerland.[4] An OECD review concluded that administrative difficulties, modest revenues, and failure to adequately address wealth inequality are among the main reasons why most member countries have abandoned wealth taxes.[5] Evidence from these countries' experiences with wealth taxation combined with additional U.S.-specific tax-related expertise, allow us to model taxpayer behavior and estimate the revenue-generating capabilities of a wealth tax for the United States. Ultimately, however, the amount of revenue raised will depend on policymakers' specific choices about design and enforcement.

When it comes to modeling the economic effects of tax increases, PWBM's standard approach is to apply the new revenue toward reducing federal budget deficits, consistent with long-standing scoring conventions when a new tax is not formally tied to spending programs with specific details. However, when policymakers couple revenue increases with increased spending, our model allows adjustments from this standard approach. In this brief, we present an economic analysis of Senator Warren's wealth tax proposal under our standard approach as well as under alternative spending scenarios, in which new revenue is put towards productivity-neutral and productivity-boosting programs. We also present our results under various assumptions about effects on productivity and about enforcement.

Projected Federal Tax Revenue

Table 1 presents the year-by-year revenue estimates during the budget window. (The Technical Appendix presented at the end of this document discusses methods and assumptions in more detail.) On a conventional scoring basis, PWBM estimates that Senator Warren's proposed wealth tax would raise about $2.7 trillion over fiscal years 2021-2030. This projection includes the effect of forgone revenues due to tax avoidance, which includes both legal responses by taxpayers to reduce their tax exposure as well as illegal evasion.[6] When accounting for dynamic economic feedback effects, PWBM projects that the proposal would raise $2.3 trillion over the same budget window, as less economic activity would reduce federal tax bases.

For comparison, we also project the conventional revenue estimates under two extreme assumptions: without any tax avoidance and with extreme tax avoidance. Without any avoidance (legal or illegal), sometimes also called a "static score," we project that the policy would raise $4.8 trillion between fiscal years 2021-2030. With "extreme avoidance" (see the Technical Appendix below for details), that revenue estimate falls to $1.4 trillion. To be clear, PWBM's best estimate on a conventional basis is a total revenue raise of $2.7 trillion over fiscal years 2021-2030.

Table 1. Conventional and Dynamic Revenue Estimates, Fiscal Years 2021-2030

Billions of Dollars, Change from Current-Law Baseline

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Estimate type	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Budget window
Conventional	204	260	254	249	245	259	279	299	324	351	2,724
Without avoidance	*294*	*396*	*417*	*439*	*464*	*491*	*520*	*552*	*586*	*622*	*4,781*
Extreme avoidance	*136*	*162*	*146*	*132*	*120*	*124*	*132*	*142*	*153*	*165*	*1,412*
Dynamic	195	242	228	216	206	214	226	240	255	274	2,294

Note: Conventional estimate refers to PWBM's projection of revenue allowing for some microeconomic avoidance based on empirical estimates discussed in the Technical Appendix. The dynamic revenue estimate allows for macroeconomic feedback effects under the assumption that additional revenue is used to reduce the deficit. Similar values for dynamic estimates are projected during this period using the different spending assumptions discussed below.

Projected Economic Effects: Using New Revenue to Reduce Federal Budget Deficits

Table 2 presents the economic effects from using the new revenue to reduce federal budget deficits. A reduction in federal deficits translates into increased national saving and greater capital accumulation. However, wealthy households that face a tax on their savings choose to accumulate less capital. The net effect is a decline in the total capital stock, of 2.5 percent in 2050. Furthermore, this decline in capital makes workers less productive, which is reflected by a decline in wages of 0.8 percent in 2050. National output, as measured by the nation's Gross Domestic Product (GDP), declines by 0.9 percent in 2050.

Table 2. Economic Effects of a Wealth Tax: Revenues Used to Reduce Deficits

Percent Change from Baseline

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Year	GDP	Capital stock	Average hourly wage	Hours worked	Total factor productivity
2030	-0.7%	-1.6%	-0.5%	0.1%	0.0%
2040	-0.9%	-2.2%	-0.7%	0.2%	0.0%
2050	-0.9%	-2.5%	-0.8%	0.2%	0.0%

Note: Consistent with empirical evidence, the projections above assume that the U.S. economy is 40 percent open and 60 percent closed. Specifically, 40 percent of new government debt is purchased by foreigners.

Projected Economic Effects: Using New Revenue to Finance New Non-Productive Spending

Table 3 presents the projected economic effects from using the new revenue to finance outlays on a productivity-neutral program. Specifically, we model a scenario where the federal government increases outlays by about $2.7 trillion over ten years, which is the amount of revenue raised on a conventional scoring basis. For this experiment, we assume that new spending does not raise the productivity of workers.

Table 3. Economic Effects of a Wealth Tax: Revenues Spent with No Productivity Boost

Percent Change from Baseline

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Year	GDP	Capital stock	Average hourly wage	Hours worked	Total factor productivity
2030	-0.6%	-1.8%	-0.6%	0.4%	0.0%
2040	-1.1%	-3.4%	-1.2%	0.5%	0.0%
2050	-2.1%	-6.5%	-2.3%	0.4%	0.0%

Note: Consistent with empirical evidence, the projections above assume that the U.S. economy is 40 percent open and 60 percent closed. Specifically, 40 percent of new government debt is purchased by foreigners.

Notice that a wealth tax that is used to fund a productivity-neutral government program lowers capital, wages, and GDP by more than with deficit reduction. The capital stock now declines by 6.5 percent in 2050. Lower capital leads to a greater decline in wages, which fall by 2.3 percent in 2050, and a greater decline in GDP, which falls by 2.1 percent in 2050.

Projected Economic Effects: Using New Revenue to Finance New Productive Spending

Table 4 presents the economic effects from using the new wealth tax revenue to finance outlays on productivity-boosting public programs with a return equal to about 12 cents per year per dollar of new public capital.[7] We assume this spending is deployed at rates applied by the Congressional Budget Office (2016) to evaluate programs with a mix of investment in physical capital; education and training; and research and development.[8] Unlike the above scenarios, Table 4 reports a corresponding increase in the economy's total factor productivity, which reflects the increase in productivity from both capital and labor supplies.

Table 4. Economic Effects of a Wealth Tax: Revenues Spent with Productivity Boost

Percent Change from Baseline

DOWNLOAD DATA

Year	GDP	Capital stock	Average hourly wage	Hours worked	Total factor productivity
2030	-0.5%	-1.9%	-0.5%	0.3%	0.1%
2040	-0.6%	-3.2%	-0.7%	0.4%	0.5%
2050	-1.0%	-5.6%	-1.1%	0.5%	0.8%

Note: Consistent with empirical evidence, the projections above assume that the U.S. economy is 40 percent open and 60 percent closed. Specifically, 40 percent of new government debt is purchased by foreigners. [UPDATED December 12, 2019 at 4:55 PM EST to correct a clerical error.]

Using the wealth tax revenues to fund investment on a productivity-boosting government program mitigates the drop in GDP compared to a policy in which the wealth tax revenues fund a productivity-neutral government program. Generally, public capital complements private capital and labor, increasing their relative productivities. The capital stock declines by 5.6 percent in 2050, but the remaining private capital stock is almost 0.8% more productive. Similarly, total hours worked increases by 0.5% in 2050, and each hour worked is also 0.8% more productive. As a result, GDP now drops by about 1.0 percent in 2050, substantially less than the 2.1 percent reported for the scenario with productivity-neutral spending.

As an extension of this scenario, we examined how productive public investment would have to be in order to almost fully offset the negative effects of the wealth tax itself on GDP by 2040. We estimate that each new dollar of federal spending would have to produce 15 cents of new output per year once the investment is installed in order to bring the GDP effect in 2040 to about the break-even point. (Table 5 in the following section allows users to select a "high TFP boost" assumption that approximates this scenario.) This return is approximately three times higher than the output per dollar of federal investment spending estimated by the Congressional Budget Office (2016).[9]

For some components of public investment, such as early childhood education, previous studies have estimated returns between 7 and 10 cents per dollar invested per year, although some studies have produced even higher returns closer to 13 cents.[10] Of course, policies that shift more of the spending toward early childhood education will take longer to produce returns than a spending package with more physical infrastructure investments, and much of the benefit of education programs accrues beyond the 2040 or even 2050 projection windows. Public investment that expands access to healthcare could increase the productivity of the otherwise uncovered population and the healthcare sector, although healthcare program design could also have offsetting effects on hours worked and household saving. PWBM will continue to model specific "policy packages" as more details become available over time.

Projected Economic Effects: Further Alternative Assumptions

In addition to the main results featured above, PWBM has also estimated the macroeconomic effects of a wealth tax under a broader range of assumptions about tax avoidance and the impact of spending on total factor productivity. In Table 5, users can select different combinations of assumptions, with a definition for each assumption provided in a note under Table 5.

Table 5. Economic Effects of a Wealth Tax: Alternative Assumptions and Scenarios

Percent Change from Baseline

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Implementation

With avoidance ▼

Use of funds

Deficit reduction ▼

Implementation: With avoidance

Use of funds: Deficit reduction

Year	GDP	Capital stock	Average hourly wage	Hours worked	Total factor productivity
2030	-0.7%	-1.6%	-0.5%	0.1%	0.0%
2040	-0.9%	-2.2%	-0.7%	0.2%	0.0%
2050	-0.9%	-2.5%	-0.8%	0.2%	0.0%

Implementation: With avoidance

Use of funds: Spend revenue, no TFP boost

Year	GDP	Capital stock	Average hourly wage	Hours worked	Total factor productivity
2030	-0.6%	-1.8%	-0.6%	0.4%	0.0%
2040	-1.1%	-3.4%	-1.2%	0.5%	0.0%
2050	-2.1%	-6.5%	-2.3%	0.4%	0.0%

Implementation: With avoidance

Use of funds: Spend revenue, medium TFP boost

Year	GDP	Capital stock	Average hourly wage	Hours worked	Total factor productivity
2030	-0.5%	-1.9%	-0.5%	0.3%	0.1%
2040	-0.6%	-3.2%	-0.7%	0.4%	0.5%
2050	-1.0%	-5.6%	-1.1%	0.5%	0.8%

Implementation: With avoidance

Use of funds: Spend revenue, high TFP boost

Year	GDP	Capital stock	Average hourly wage	Hours worked	Total factor productivity
2030	-0.4%	-1.9%	-0.4%	0.3%	0.3%
2040	-0.1%	-3.0%	-0.2%	0.4%	0.9%
2050	0.2%	-4.7%	0.0%	0.5%	1.7%

Implementation: Without avoidance

Use of funds: Deficit reduction

Year	GDP	Capital stock	Average hourly wage	Hours worked	Total factor productivity
2030	-1.0%	-2.2%	-0.7%	0.1%	0.0%
2040	-1.2%	-3.1%	-1.0%	0.2%	0.0%
2050	-1.4%	-3.6%	-1.1%	0.2%	0.0%

Implementation: Without avoidance

Use of funds: Spend revenue, no TFP boost

Year	GDP	Capital stock	Average hourly wage	Hours worked	Total factor productivity
2030	-0.9%	-2.9%	-1.0%	0.5%	0.0%
2040	-1.8%	-5.5%	-2.0%	0.7%	0.0%
2050	-3.5%	-10.3%	-3.7%	0.5%	0.0%

Implementation: Without avoidance

Use of funds: Spend revenue, medium TFP boost

Year	GDP	Capital stock	Average hourly wage	Hours worked	Total factor productivity
2030	-0.8%	-3.0%	-0.8%	0.5%	0.2%
2040	-0.9%	-5.2%	-1.1%	0.6%	0.8%
2050	-1.6%	-9.0%	-1.8%	0.6%	1.3%

Implementation: Without avoidance

Use of funds: Spend revenue, high TFP boost

Year	GDP	Capital stock	Average hourly wage	Hours worked	Total factor productivity
2030	-0.7%	-3.0%	-0.6%	0.4%	0.4%
2040	-0.1%	-4.8%	-0.2%	0.6%	1.5%
2050	0.0%	-7.5%	0.0%	0.7%	2.6%

Note: For Implementation, the "with avoidance" scenario corresponds to the tax avoidance method and assumptions used in Table 1 to produce our conventional budget estimate. (See the Technical Appendix for additional details.) "Without avoidance" corresponds to the assumption with no tax avoidance, also presented in Table 1. For Use of Funds, "deficit reduction" corresponds to the deficit reduction scenario presented in the text. The assumption "no TFP boost" corresponds to our productivity-neutral level of spending scenario presented earlier in the text. The assumption "medium TFP boost" corresponds to our productivity-boosting spending scenario presented earlier in the text, with an annual return equal to about 12 cents per dollar of new public investment. The "high TFP boost" scenario approximates the 2040 break-even GDP scenario presented above, with an annual return of 15 cents per dollar of new public investment. Both TFP scenarios assume spending rates following the Congressional Budget Office (2016).[11] Consistent with empirical evidence, the projections above assume that the U.S. economy is 40 percent open and 60 percent closed. Specifically, 40 percent of new government debt is purchased by foreigners. [UPDATED December 12, 2019 at 4:55 PM EST to correct a clerical error.]

Notice that the combinations in Table 5 that assume less avoidance reduce GDP and wages by relatively more over time. This is because less avoidance implies more revenue and higher effective tax rates, causing more change in economic activity.[12]

Conclusion

A wealth tax is a novel tax concept for the United States at the federal level, and not surprisingly, academic research on wealth taxes is still in the early stages. An investment in early childhood education might lead to additional labor-market dynamics that boost the economy beyond adding to the productivity of future workers by, for example, increasing female labor-force participation rates over time. At the same time, a considerable amount of wealth inequality in the United States has historically been driven by entrepreneurship, a factor that has received very little attention in tax models and analysis.[13] The level of risk-taking that drives new innovation, however, could be materially impacted by wealth taxes over time, another factor that deserves future study. While PWBM's existing model considers a very rich set of variables and factors, we will continue to build even richer models that expand our future capabilities.

Technical Appendix on Methods and Assumptions

In this appendix, we detail PWBM's wealth tax model and assumptions used to arrive at the conventional revenue estimate.

A. Data source and tax base

PWBM's wealth tax model uses data from the Survey of Consumer Finances (SCF), a high-quality survey of American households' assets and liability holdings. The SCF oversamples high net worth households to ensure adequate detail on the top of the wealth distribution. The SCF is conducted every three years, so the most recently available survey is from 2016. The survey excludes the 400 richest Americans for confidentiality reasons, making it necessary to augment the survey with net worth data from the Forbes 400 in order to reflect total wealth in the economy.[14]

We define taxable wealth to be the sum of all financial and nonfinancial assets representing a legal claim on future flows of income, minus liabilities used to finance these assets. This definition includes consumer durables but excludes, for example, the present value of expected payments from defined-benefit pensions.

PWBM's reading of the empirical literature on the level and growth of wealth inequality suggests that the augmented SCF represents the best publicly available microdata source for modeling a progressive wealth tax. There are three main ways to estimate the distribution of wealth: survey data;[15] the capitalization method, where wealth stocks are imputed by "capitalizing" (i.e. dividing by an assumed rate of return) income flows observed on tax returns;[16] and the estate tax multiplier method, where household wealth is reverse-engineered using information from estate tax returns and mortality data.[17] Smith et al. (2019) present new and improved estimates of wealth inequality using a capitalization approach that accounts for heterogeneity in rates of return.[18] The authors compare their results to those from other sources, demonstrating that the level and growth of inequality in the SCF reasonably tracks their estimates. This result suggests the augmented SCF is well-suited to accurately measure the total net worth at the top of the distribution.

B. Projections of the evolution of wealth

Under the baseline (before a policy change), PWBM assumes a nominal rate of growth in net worth of 6 percent, approximately the historical average over the previous three decades. We "age" forward the 2016 SCF in accordance with actual growth in total household net worth from the Financial Accounts based on the current distribution of wealth.

Under wealth tax scenarios, PWBM adjusts the rate of growth in net worth to account for the mechanical slowdown in the accumulation of wealth. This process reflects the de-facto reduction in the wealth base over time due to the tax on the stock of wealth. For illustrative purposes, consider a simple model of wealth accumulation:

$$W_{t+1} = W_t(1+r) - \tau W_t - (1-s)(rW_t - \tau W_t)$$

where W is the stock of wealth, r is the rate of return, τ is the wealth tax rate, and $(1-s)$ is the share of after-tax income consumed. The net rate of growth in wealth is given by:

$$\frac{W_{t+1}}{W_t} - 1 = s(r-\tau)$$

For our conventional budgetary estimates, PWBM assumes that taxpayers keep s fixed across policy scenarios. As τ rises and r remains unchanged, the growth rate of the wealth stock falls mechanically. This process is implemented in the model at the household level, whereby agents subject to the wealth tax have their net worth growth rate reduced by their effective wealth tax rate, scaled by savings rate. Making this adjustment is especially important at higher wealth tax rates, where the alternative assumption -- that s changes to keep $\frac{W_{t+1}}{W_t} - 1$ fixed -- requires taxpayers to significantly reduce consumption in order to pay the wealth tax.

C. Modeling assumptions about avoidance

There is a growing empirical literature that attempts to estimate the elasticity of taxable wealth. Empirical estimates of this parameter draw on historical experiences with wealth taxation in Sweden,[19] Denmark,[20] the Netherlands,[21] Switzerland,[22] Spain,[23] and Colombia.[24] The literature generally uses either a bunching estimator or a difference-in-difference approach. The range of estimates is substantial: semi-elasticities range from -0.09 (Seim, 2017)[25] to 43 (Brülhart et al., 2019).[26] This variation stems from methodological approach (bunching estimates tend to produce lower elasticities) and differences in institutional setting (policy design and enforcement vary dramatically between countries). To our knowledge, these papers comprise the entire empirical literature on elasticities of taxable wealth in the context of a wealth tax. Table A1 summarizes each estimate with information on the estimation method, the implied semi-elasticity, the time horizon over which it's estimated, its weight based on whether the sample is limited to the top of the wealth distribution, and clarifying details on how each semi-elasticity was calculated.

Table A1. Summary of Avoidance Elasticities

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Paper	Semi-elasticity	Weight	Method	Timeframe
Seim (2017)[27]	-0.17[28]	1	Bunching	NA
Jakobsen et al. (2018)[29]	-0.22[30]	1	Bunching	NA
Londoño-Vélez and Ávila Mahecha (2018)[31]	-2.0	1	Bunching	NA
Zoutman (2018)[32]	-11.6[33]	1/2	Diff-in-diff	2 years
Jakobsen et al. (2018)	-20.8[34]	1	Diff-in-diff	8 years
Duran-Cabré et. al. (2019)[35]	-29.1	1	Diff-in-diff	4 years
Brülhart et. al. (2019)[36]	-40.5[37]	1/2	Diff-in-diff	6 years
Average	**-13**			

Our assessment of this research implies a semi-elasticity of taxable wealth of -13, meaning that a percentage point increase in the wealth tax rate decreases taxable wealth by 13 percent. We assume that the full avoidance response is not realized until halfway through the budget window. We assume an avoidance semi-elasticity of -6.5 (50% of -13) in the first year the wealth tax is implemented, which then phases in to -13 over five years. This reflects PWBM's assessment that taxpayers would develop more sophisticated avoidance strategies with time, as well as evidence showing that avoidance responses grow for a few years before plateauing (Duran-Cabré 2019).[38]

When calculating conventional revenue estimates, PWBM is interested in isolating the portion of the taxable wealth elasticity due to avoidance. We separately account for the mechanical decumulation effect inherent in wealth taxes and PWBM's structural OLG model accounts for changes in real economic decision-making, such as labor supply and savings behavior. Therefore, when evaluating the literature for an elasticity that represents tax planning, we strip out the mechanical decumulation and real effect from each estimated elasticity.[39]

To arrive at this preferred elasticity, we take a weighted average of the implied semi-elasticities from each paper. The weighting system is simple: because of the proposal's high exemption threshold, studies that limit the estimation sample to the top end of the distribution of net worth are given twice the importance of studies that include taxpayers from lower points on the distribution. Using a simple average would imply an avoidance elasticity of -15 rather than our preferred elasticity of -13.

Of course, any attempt to predict taxpayer responses to tax changes involves judgment. The elasticity compiled here reflects PWBM's reading of the literature and understanding of revenue estimation conventions. The Warren campaign stresses that significant enforcement efforts will be enacted as part of the policy, including a ramp-up in IRS audit rates and the implementation of new information reporting standards. Without specific legislative language, however, we cannot evaluate the efficacy of potential Treasury regulations related to enforcement. We instead turn to the international record with wealth taxes as they have actually existed in practice, as well our understanding of current tax planning behavior among the wealthy, to assess a scenario with wealth tax avoidance.[40] For completeness, we present two alternative estimates. First, we present results from the scenario under which all avoidance opportunities are eliminated and the tax is perfectly enforced--a "static" revenue estimate. Second, we model a scenario with extreme avoidance, which would reflect a wealth tax implementation similar to the Spanish experience where the tax base contains significant uncovered amounts (e.g. an exemption for closely-held businesses) and offers opportunities for abuse through an inadequate transfer tax system.

D. Comparison with the Warren campaign's estimates

The Warren campaign has released its own revenue estimate for each iteration of its wealth tax plans, prepared by Emmanuel Saez and Gabriel Zucman.[41] According to her campaign website, Senator Warren predicts the wealth tax would raise $3.75 trillion over ten years.[42] In this subsection, we briefly compare our model and assumptions to theirs.

The Warren estimate relies on an unweighted average of SCF records and microdata from the Distributional National Accounts (DINAs).[43] Among various estimates of the distribution of wealth, the DINA's estimate of the share of wealth held by the top 0.1 percent is the highest (Smith et al., 2019).[44] In the context of a progressive wealth tax like Senator Warren's proposal, a higher top wealth share will increase the tax base and thus revenue raised. On the other hand, the DINAs estimate a smaller total amount of household wealth relative to the SCF and Financial Accounts. The difference is in part due to accounting standards: the DINAs are designed to accord with the System of National Accounts (SNA), which excludes consumer durables and includes the present value of funded defined-benefit pension plans. The DINAs also report mid-year estimates of wealth rather than end-year, mechanically reducing the tax base in years with positive growth. The net effect of these countervailing forces on the size of the tax base is ambiguous.

When projecting wealth into the future, the Warren estimate assumes a 5.5 nominal rate of growth in total net worth. PWBM projects a growth rate of 6 percent, meaning that this assumption increases estimated revenue raised relative to the Warren estimate.

The final difference between PWBM's approach and the Warren estimate is the assumption about avoidance elasticity and its application. The Warren estimate assumes a semi-elasticity of taxable wealth of -8, which is a simple average of estimates from four separate studies.[45] PWBM's assumed semi-elasticity is -13, which implies more avoidance and thus less revenue. In addition, as Max Ghenis notes, the Warren estimate appears to apply the elasticity to a rate of 2 percent for all taxpayers -- even those who face the higher rate above $1 billion in net worth. We calculate household-specific avoidance responses as a function on the specific marginal wealth tax rate faced by each agent in the model. The effect is a larger aggregate avoidance response--and less revenue raised--relative to the Warren estimate.

Watch a video interview explaining some of the key findings in this analysis here.

John Ricco, Zheli He and Jon Huntley produced this analysis under the direction of Efraim Berkovich, Richard Prisinzano and Kent Smetters, with research assistance from Victoria Osorio and Xiaoyue Sun. Kody Carmody and Diane Lim contributed to the report. Prepared for the PWBM website by Mariko Paulson. Calculations are based on PWBM's model that is developed and maintained by PWBM staff.

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1. In the initial version of the Senator's plan, the top rate was 3 percent rather than 6 percent. ↩
2. From their analysis, it is unclear exactly which ten-year period the $3.75 trillion estimate covers, as some of the earlier wealth tax revenue analysis assumed revenue started in 2019. However, it appears that their $3.75 trillion estimate covers the same ten-year time period as our analysis. ↩
3. Most local governments in the U.S. rely on property taxes for revenue, which is a form of wealth tax. ↩
4. Norway levies a 0.85 percent combined (federal and municipal) tax rate on wealth above 1.48 million krone (roughly $162,000). Spain applies progressively increasing tax rates on wealth, from 0.2 percent on wealth above €700,000 (roughly $774,000) up to 2.5 percent on wealth above €10.7 million (roughly $11.78 million). Rates in Switzerland vary by region, ranging between 0.3 to 1 percent of an individual's net worth. Belgium enacted a wealth tax in 2018 of 0.15 percent on securities accounts of individuals with holdings over €500,000 (roughly $553,000). ↩
5. OECD (2018), *The Role and Design of Net Wealth Taxes in the OECD*, OECD Tax Policy Studies, No. 26, OECD Publishing, Paris. doi: 10.1787/9789264290303-en ↩
6. It is often challenging to distinguish between legal avoidance and illegal evasion in the data, and the distinction is often left to tax courts to administer. The Technical Appendix at the end of this document provides a survey of our assumptions and methods. ↩
7. This scenario uses the medium return scenario presented in our previous work on infrastructure spending. That analysis used a marginal product on public closer to 10 percent given its mix of investments. ↩

8. Congressional Budget Office (2016). *The Macroeconomic and Budgetary Effects of Federal Investment*. Retrieved from https://www.cbo.gov/publication/51628. Broadly speaking, public spending is allocated across three categories: education and training; physical capital; and research and development. About half of the spending is designated for physical capital, another one-third is designated for education, and the remaining funds are spent on research and development. Deployment of physical capital is subject to spending and time-to-build assumptions in Congressional Budget Office (2016). Research and development and education spending--particularly preschool education--generate returns years after the actual spending. In Congressional Budget Office (2016), about 20 percent of infrastructure spending analyzed takes between 10 and 20 years from the date at which the money was spent before it begins realizing returns. ↩

9. Congressional Budget Office (2016). *The Macroeconomic and Budgetary Effects of Federal Investment*. Retrieved from https://www.cbo.gov/publication/51628. ↩

10. See, for example, Heckman, James J., Seong Hyeok Moon, Rodrigo Pinto, Peter A. Savelyev, and Adam Yavitz. "The rate of return to the HighScope Perry Preschool Program." Journal of Public Economics 94, no. 1-2 (2010): 114-128. They estimate a return between 7 and 10 cents per dollar invested, although they cite previous papers with smaller and larger returns. ↩

11. Congressional Budget Office (2016). *The Macroeconomic and Budgetary Effects of Federal Investment*. Retrieved from https://www.cbo.gov/publication/51628. ↩

12. In the hypothetical case of perfect avoidance, the wealth tax would raise no money and have no impact on the economy, assuming that avoidance could be accomplished with no real effects in capital allocation. ↩

13. See, however, Rothschild, Casey, and Florian Scheuer. "Redistributive Taxation in the Roy Model." *The Quarterly Journal of Economics* 128, no. 2 (2013): 623-668. ↩

14. Any reference to the SCF in this brief refers to the SCF appended with Forbes 400 data. ↩

15. Shakow, David J., and Reed Shuldiner. "A Comprehensive Wealth Tax." *SSRN Electronic Journal*, 1999. https://doi.org/10.2139/ssrn.169728. The authors use the SCF to evaluate a wealth tax that would replace the individual and corporate tax systems. ↩

16. Saez, E., & Zucman, G. (2016). *Wealth Inequality in the United States since 1913: Evidence from Capitalized Income Tax Data*. The Quarterly Journal of Economics, 131(2), 519–578. doi: 10.1093/qje/qjw004 ↩

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28. This value is an average of the 0.09 and 0.27 values presented as the range of elasticities. As per the calculations presented in footnote 69 of Duran-Cabre et al. (2019), we convert the net-of-tax-rate elasticity to a semi-elasticity. ↩

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30. Calculated as the average of (0.3% / 2.2%) and (0.3% / 1%), where 2.2% and 1% are the tax rates at the kinkpoint used in the bunching analysis. ↩

31. Londoño-Vélez, J., & Ávila Mahecha, J. (2019). Can Wealth Taxation Work in Developing Countries? Quasi-Experimental Evidence from Colombia. Job Market Paper. Presented at the 2019 National Tax Association meetings. Retrieved from https://eml.berkeley.edu/~saez/course/londono-wealth2018.pdf. ↩

32. Zoutman, F. T. (2019). The Elasticity of Taxable Wealth: Evidence from the Netherlands. Forthcoming at *Scandinavian Journal of Economics*. Presented at the 2019 National Tax Association meetings. Retrieved from https://www.dropbox.com/s/kajv50ct9sp26g9/zoutman2018effect0111.pdf?dl=0. ↩

33. This paper does not decompose the elasticity into avoidance, real responses, and mechanical decumulation effects. Therefore, we use the shortest-run estimate presented in the paper to limit the likelihood of the latter effects. ↩

34. Calculated as -24.9% / (2.2% - 1%). ↩

35. Duran-Cabré, J. M., Esteller-Moré, A., & Mas-Montserrat, M. (2019). Behavioural Responses to the (Re)Introduction of Wealth Taxes. Evidence From Spain. *IEB Working Paper Series*, No. 2019/04. doi: 10.2139/ssrn.3393016 ↩

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37. Calculated as -43% * (1 - 5.7%), where 5.7% is the estimated combined mechanical and savings response. ↩

38. Duran-Cabré, J. M., Esteller-Moré, A., & Mas-Montserrat, M. (2019). Behavioural Responses to the (Re)Introduction of Wealth Taxes. Evidence From Spain. *IEB Working Paper Series*, No. 2019/04. doi: 10.2139/ssrn.3393016 ↩

39. Note that this adjustment is not necessary for bunching studies, where the observed effect is almost certainly due to underreporting rather than real responses, as noted by Jakobsen et al. (2018). ↩

40. Shakow and Shuldiner (1999) discuss some of the issues with avoidance and administration of a wealth tax. ↩

41. The code used to produce the revenue estimate for an earlier version of Senator Warren's plan is made publicly available by Saez and Zucman. ↩

42. Exactly which ten-year period is unclear. Estimates of the previous version of the plan used a budget window of 2019-2028. However, it appears that their $3.75 trillion estimate covers the same ten-year time period as our analysis. ↩

43. The net worth of each SCF record is scaled down by a factor such that total SCF wealth equals total DINA wealth. ↩

44. Smith, M., Zidar, O. & Zwick, E. (2019). *Top Wealth in the United States: New Estimates and Implications for Taxing the Rich*. Available here. ↩

45. See here for the summary table. It is unclear where the values of 0.5 and 0.5 regarding the Seim (2017) and Jakobsen et al. (2018) come from. PWBM interprets those studies as implying semi-elasticities of 0.17 and 0.22, respectively. Given the small absolute value of these numbers, however, the impact on the overall average calculation is negligible. In addition, they refer to a 2016 version of the Brülhart et al. (2019) paper which has a smaller estimated elasticity than the most recent version. ↩