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Progressive Wealth Taxation

ABSTRACT This paper discusses the progressive taxation of household wealth. We first discuss what wealth is, how it is distributed, and how much revenue a progressive wealth tax could generate in the United States. We try to reconcile discrepancies across wealth data sources. Second, we discuss the role a wealth tax can play to increase the overall progressivity of the U.S. tax system. Third, we discuss the empirical evidence on wealth tax avoidance and evasion as well as tax enforcement policies. We summarize the key elements needed to make a U.S. wealth tax work in light of the experience of other countries. Fourth, we discuss the real economic effects of wealth taxation on inequality, the capital stock, and economic activity. Fifth, we present a simple tractable model of the taxation of billionaires' wealth that can be applied to the Forbes list of the four hundred richest Americans since 1982 to illustrate the long-run effects of concrete wealth tax proposals on top fortunes.

Income and wealth inequality have increased dramatically in the United States over the last decades (Piketty and Saez 2003; Saez and Zucman 2016; Piketty, Saez, and Zucman 2018). A long-standing concern with wealth concentration is its effect on democratic institutions and policymaking.¹

Conflict of Interest Disclosure: Emmanuel Saez holds the Chancellor's Professorship of Tax Policy and Public Finance and directs the Center for Equitable Growth at the University of California, Berkeley; Gabriel Zucman is an assistant professor of economics at the University of California, Berkeley. Beyond these affiliations, the authors did not receive financial support from any firm or person for this paper or from any firm or person with a financial or political interest in this paper. They are currently not officers, directors, or board members of any organization with an interest in this paper. No outside party had the right to review this paper before circulation. The views expressed in this paper are those of the authors and do not necessarily reflect those of the University of California, Berkeley. The authors have advised several presidential campaigns recently on the issue of a wealth tax.

1. See, for example, Mayer (2017) and Page, Seawright, and Lacombe (2018). Political contributions, for example, are extremely concentrated with 0.01 percent of the population accounting for over a quarter of all contributions (Drutman 2013).

The view that excessive wealth concentration corrodes the social contract has deep roots in America—a country founded in part in reaction against the highly unequal, aristocratic Europe of the eighteenth century. Before 1776, the northern American colonies already taxed wealth, including financial assets and other personal property, instead of land only as in England (Saez and Zucman 2019a, chapter 2).

In the first part of the twentieth century, the United States invented very progressive income and estate taxation, combined with heavy corporate taxation.² This led to a large and sustained reduction in income and wealth concentration that reversed after tax progressivity went away (Saez and Zucman 2019a). There is a renewed political demand to use progressive taxation to curb the rise of inequality and raise revenue. A wealth tax is a potentially more powerful tool than income, estate, or corporate taxes to address the issue of wealth concentration as it goes after the stock rather than the flow.

Two major U.S. presidential candidates have proposed wealth taxes in 2019. In January 2019, Elizabeth Warren proposed a progressive wealth tax on families or individuals with net worth above \$50 million with a 2 percent marginal tax rate (3 percent above \$1 billion). In September 2019, Bernie Sanders proposed a similar wealth tax starting at \$32 million with a 1 percent rate and with substantially more progressivity within the billionaire class (with marginal tax rates growing from 5 percent for billionaires up to 8 percent for decabillionaires). Such a tax would impose a much heavier burden on billionaires than all existing income, estate, and corporate taxes combined (Saez and Zucman 2019a). The key difference relative to earlier proposals or existing wealth taxes in other countries is the high exemption thresholds proposed. Less than 0.1 percent of U.S. families would be liable for the Warren or Sanders wealth tax (Saez and Zucman 2019b, 2019c). The United States has never implemented a progressive wealth tax before, but other countries have. What do economists have to say about the merits and demerits of wealth taxation and how it compares with other tax tools?

We first discuss what wealth is, how it is distributed, and how much revenue a progressive wealth tax could generate in the United States. Wealth tax revenue depends on how much wealth there is at the top (which

2. The United States was the first country—in 1917, four years after the creation of the income tax—to impose top marginal tax rates as high as 67 percent on the highest incomes. It was also the first country, starting in the 1930s, to impose high top tax rates (of 70 percent or more) on wealth at death. No European country ever imposed similarly high top inheritance tax rates (Scheve and Stasavage 2016).

in turn depends on the amount of aggregate household wealth and the distribution of wealth) and on enforcement (the fraction of their wealth the rich could hide). Aggregate household wealth has increased from about three times the annual national income around 1980 to about five times the national income in 2018. This increase has been driven by a rise in asset prices rather than capital accumulation, as the replacement-cost value of the capital stock has remained constant relative to national income. Meanwhile, wealth has become more concentrated. The share of wealth owned by the top 0.1 percent has doubled, from less than 10 percent in 1980 to almost 20 percent today. According to *Forbes*, the share of wealth owned by the four hundred richest Americans has almost quadrupled from 0.9 percent in 1982 to 3.3 percent in 2018 (Zucman 2019). We discuss recent estimates of U.S. wealth inequality, why they differ, and how to reconcile them.³ We show that the wealth tax base above the 99.9th percentile is large, about \$12 trillion in 2019 (about 60–70 percent of national income). With perfect enforcement, a 1 percent marginal tax on the top 0.1 percent would thus raise about \$120 billion (about 0.6 percent–0.7 percent of national income). A well-enforced wealth tax has also significant revenue potential.

Second, we discuss the role a wealth tax can play in the overall progressivity of the U.S. tax system. A well-enforced wealth tax would be a powerful tool to restore progressivity at the top of the U.S. income and wealth distribution. It would increase the tax rate of wealthy families who can currently escape progressive income taxation by realizing little income relative to their true economic income. Despite the rise of inequality, the U.S. tax system has become less progressive in recent decades. The three traditional progressive taxes—the individual income tax, the corporate income tax, and the estate tax—have weakened. The top marginal federal income tax rate has fallen dramatically, from 70 percent or more between 1936 and 1980 down to 37 percent in 2018. Corporate taxes (which are progressive in the sense that they tax corporate profits, a highly concentrated source of income) as a share of corporate profits have declined from about 50 percent in the 1950s and 1960s to 16 percent in 2018 (Saez and Zucman 2019a). Estate taxes on large bequests now raise little revenue due to a high exemption threshold, many deductions, and

3. In particular, we show that taking into account the rising life expectancy differential between the very rich and the rest of the population (Chetty and others 2016) goes a long way toward reconciling wealth concentration estimates obtained from estate tax data with other sources.

weak enforcement. As a result, when combining all taxes at all levels of government, the U.S. tax system now resembles a giant flat tax. All groups of the population pay rates close to the macroeconomic tax rate of 28 percent, with a mild progressivity up to the top 0.1 percent and a significant drop at the top end, with effective tax rates of 23 percent for the top four hundred richest Americans (Saez and Zucman 2019a, chapter 1).

Third, we discuss the empirical evidence on wealth tax avoidance and evasion, as well as tax enforcement policies. Several recent and well-identified empirical studies cast light on these issues. We discuss lessons learned from the experience of other countries. The specific form of wealth taxation applied in a number of European countries had three main weaknesses. First, they faced tax competition (moving from Paris to London extinguished the French wealth tax immediately) and offshore evasion (until recently there was no cross-border information sharing). Second, European wealth taxes had low exemption thresholds, creating liquidity problems for some moderately wealthy taxpayers with few liquid assets and limited cash incomes. Third, European wealth taxes, many of which had been designed in the early twentieth century, had not been modernized, perhaps reflecting ideological and political opposition to wealth taxation in recent decades. These wealth taxes relied on self-assessments rather than systematic information reporting. These three weaknesses led to reforms that gradually undermined the integrity of the wealth tax: the exemption of some asset classes such as business assets or real estate, tax limits based on reported income, or a repeal of wealth taxation altogether.

A modern wealth tax can overcome these three weaknesses. First, offshore tax evasion can be fought more effectively today than in the past, thanks to a recent breakthrough in cross-border information exchange, and wealth taxes could be applied to expatriates (for at least some years), mitigating concerns about tax competition. The United States, moreover, has a citizenship-based tax system, making it much less vulnerable than other countries to mobility threats. Second, a comprehensive wealth tax base with a high exemption threshold and no preferential treatment for any asset classes can dramatically reduce avoidance possibilities. Third, leveraging modern information technology, it is possible for tax authorities to collect data on the market value of most forms of household wealth and use this information to prepopulate wealth tax returns, reducing evasion possibilities to a minimum. We also discuss how missing market valuations could be obtained by creating markets. In brief, the specific way in which wealth was taxed in a number of European countries is not the only possible way, and it is possible to do much better today.

Fourth, we discuss the real economic effects of wealth taxes on wealth inequality, the capital stock, entrepreneurial innovation, top talent migration, family structure, and charitable giving. For many of these aspects, there is relatively little empirical evidence to draw on, and we flag the most important avenues for future research.

Fifth, we present a new tractable model of wealth taxation of billionaires that can be applied to the Forbes 400 data since 1982. The model can be used to illustrate the long-run effects of concrete wealth tax proposals such as those put forth by the Warren and Sanders campaigns on top fortunes and wealth concentration.

I. Wealth Inequality and Tax Potential

A progressive wealth tax is an annual tax levied on the net wealth that a family (or an individual) owns above an exemption threshold. Net wealth includes all assets (financial and nonfinancial) net of all debts. The tax can be levied at progressive marginal tax rates above the exemption threshold. For instance, the wealth tax proposed by Senator Warren in January 2019 would be levied on families (defined as a single person or a married couple with dependents, if any) with net wealth above \$50 million. The marginal tax rate is 2 percent above \$50 million and 3 percent above \$1 billion. A family with \$50 million in net wealth would owe no tax, a family with \$100 million would owe \$1 million (2 percent of \$50 million), and a family with \$2 billion would owe \$49 million (3 percent of \$1 billion plus 2 percent of \$950 million).

Wealth tax potential revenue depends on the wealth tax base, which obeys the simple informal equation:

$$\text{tax base} = \text{total wealth} \times \text{top wealth share} \times (1 - \text{evasion rate}),$$

where total wealth is total aggregate wealth in the economy, the top wealth share measures the share of aggregate wealth held by the wealthy that would be targeted by the wealth tax, and the evasion rate measures the fraction of their true wealth that the wealthy could hide from taxation. Based on this basic equation, it makes sense to look at each of the three factors.

I.A. What Is Wealth?

The standard and broadest measure of household wealth includes all financial and nonfinancial assets valued at their prevailing market prices,

net of debts. Assets include all property that is marketable or, even if not directly marketable, whose underlying assets are marketable.⁴ Financial assets include fixed-claim assets (checking and saving accounts, bonds, loans, and other interest-generating assets), corporate equity (shares in corporations), and noncorporate equity (shares in noncorporate businesses, for instance, shares in a partnership). Financial assets can be held either directly or indirectly through mutual funds, pension funds, insurance companies, and trusts. Nonfinancial assets include real estate, that is, land and buildings.⁵ Debts primarily include mortgage housing debt, consumer credit (such as auto loans and credit card debt), and student debt. Assets owned by businesses, such as a headquarters building or a patent, contribute to household wealth through their effect on share prices. Net wealth does not include “human capital,” such as future wages and pension rights that have not yet been accrued.⁶ Wealth also excludes the present value of future government transfers (such as future Social Security benefits or health benefits), which are not marketable.

Private wealth includes household wealth plus the wealth of nonprofit institutions (university and foundation endowments, church buildings, and so on). The frontier between household and nonprofit wealth is sometimes fuzzy, as in the case of private foundations controlled by wealthy individual donors, such as the Bill and Melinda Gates Foundation. Our statistics exclude nonprofit wealth.⁷ Private wealth is not the same as national wealth, which also includes the assets owned by the government such as public land and infrastructure (net of government debt). In the

4. For example, claims on a defined benefit plan may not be sold but the underlying assets in the defined benefit plan (typically corporate stock and bonds) can. A trust might not allow beneficiaries to sell the underlying assets but the underlying assets (again typically corporate stock and bonds) generally are marketable.

5. We exclude consumer durable goods (such as cars, jewelry, collectibles) from our wealth statistics. In aggregate, cars are the largest item, and this item is evenly and widely distributed. Contrary to popular belief, jewelry, collectibles, and private planes and boats are very small at the top relative to other forms of wealth, as shown by the Survey of Consumer Finances. A well-functioning wealth tax, however, would have to include these assets (at least above some threshold) to prevent tax avoidance. A wealth tax that does not tax art collectibles could produce an art collectible price boom.

6. It is only in slave societies that human capital can constitute marketable wealth. From the point of view of slave owners, the value of slaves was a large component of U.S. wealth before the Civil War (Piketty and Zucman 2014).

7. As we shall discuss below, to limit tax avoidance opportunities it might be desirable to include wealth that is still controlled by the initial owner in the wealth tax base, even if this wealth has been pledged for charitable giving.

Table 1. Aggregate Household Wealth and Its Composition, 2018

	<i>Amount (\$ trillion)</i>	<i>Percentage of total net worth</i>	<i>Percentage of national income</i>
Total net worth	88.7	100	503
Assets	107.7	121	611
Housing	32.4	37	184
Business assets	9.7	11	55
Equities (direct holding)	18.6	21	105
Publicly listed	13.6	15	77
Privately listed	4.9	6	28
Fixed income assets	16.1	18	91
Interest-bearing	14.9	17	84
Deposits and currency	1.2	1	7
Pensions and insurance	30.9	35	175
DB and DC pensions	17.0	19	96
IRAs	8.8	10	50
Life insurance	5.1	6	29
Liabilities	19.0	21	108
Mortgages	14.3	16	81
Student loans	1.6	2	9
Other consumer credit	2.5	3	14
Other	0.7	1	4

Source: Piketty, Saez, and Zucman (2018), aggregate series appendix table TB1 updated to 2018.

Note: Aggregate statistics on household wealth in 2018 are averaged over the four quarters. Housing and mortgages include both owner-occupied and tenant-occupied housing. Equities and fixed income assets exclude those held indirectly through pension and insurance funds.

United States, public wealth is about zero on net: public debt is about as large as public assets (Alvaredo and others 2018).⁸

Table 1 displays the value of total U.S. household wealth and its composition by asset class in 2018. The data come from the U.S. financial accounts published by the Federal Reserve Board. Total U.S. household wealth reaches about \$90 trillion, or about five times the national income (or about 4.5 times GDP). The wealth tax base is thus potentially large.

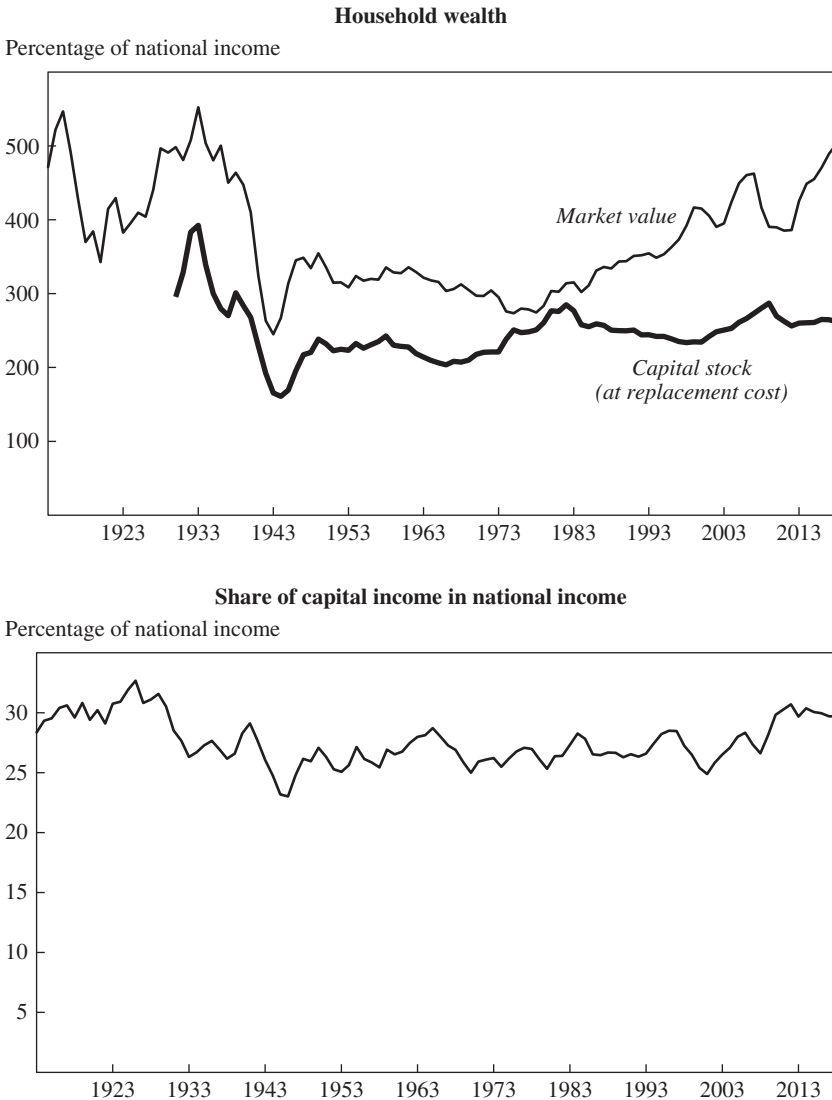
8. In official balance sheets, public assets only include assets that can be sold. Natural resources and the environment are not included but there are efforts to try to incorporate them. Note that a country with a large public debt held by residents can have high private wealth and negative public wealth, and may have to devote significant fiscal resources to service the debt. In recent decades, public debt has increased in the United States, but a large fraction of this extra debt is held by foreign central banks as reserves (U.S. Department of the Treasury 2018). The interest rate paid on public debt is currently low, limiting interest payments.

Wealth arises from capital accumulation and price effects (changes in asset prices absent any net saving). Capital accumulation takes many forms: improved land, residences and buildings, equipment and machinery, intangible capital such as software. Capital accumulation is made possible by savings that are invested in growing the capital stock. The national accounts provide a measure of the capital stock—the replacement cost of capital, sometimes called wealth at book value—reflecting only past saving poured into the capital stock, net of the depreciation of capital and adjusted for general price inflation. This measure does not take into account changes in asset prices (such as increases in real estate prices or stock prices). By contrast, the measure of household wealth at market value published in the financial accounts captures such price effects.

The top panel of figure 1 compares the evolution of household wealth at market value to the evolution of the replacement cost of private capital, both expressed as a percent of national income. Strikingly, the ratio of household wealth to national income has almost doubled from about 270 percent in the mid-1970s to more than 500 percent in 2018, the most recent year available. By contrast, the replacement cost of the private capital stock has not increased since the mid-1970s and has remained around 250 percent of national income over the last four decades. This means that the rise in aggregate wealth relative to income is primarily due to price effects.⁹

While more capital is valuable (since capital makes workers more productive), a higher market value for private wealth is not necessarily desirable. A higher market value for private wealth is a positive economic development if the market value of wealth reflects expectations about the future income (or utility) stream that assets will generate. For instance, if businesses become more efficient, the value of corporate equity will rise even if the replacement cost of capital does not. But a rise in the market value of wealth can also reflect an increase in the capacity of property owners to extract economic resources at the expense of other groups of the population. This extractive power is constrained by regulations and can increase when regulations are removed. For example, a monopoly that can set its price freely is more valuable to its owners than the same monopoly whose price setting is regulated. But the higher value of the unregulated monopoly comes at the expense of consumers (with typically

9. In principle, the discrepancy between the replacement cost of the private capital stock and the market value of household wealth could also be due to nonprofit capital and to net foreign private assets. Both, however, are relatively small.

Figure 1. U.S. Aggregate Household Wealth and Capital Income

Source: Piketty, Saez, and Zucman (2018), updated to 2018.

Notes: Aggregate household wealth is calculated as assets minus liabilities. The replacement cost of capital value of the U.S. capital stock includes all residential structures, but not land, and capital assets, including the value of intangible assets such as patents and copyrights, valued at replacement cost.

negative distributional implications) and at the expense of overall efficiency (monopoly prices are too high). When antitrust becomes more lax, private wealth can rise despite the fact that the economy becomes less efficient and less equal. Similarly, a patent generates wealth for its owner at the expense of the users of the technology. When a patent expires, the private wealth associated with the ownership of the patent goes to zero, but production becomes cheaper. Like antitrust, patent regulation affects the market value of wealth.

The value of businesses can also increase when owners more aggressively pursue profits by cutting workers' pay or increasing prices. The business of private equity firms is precisely to increase shareholder value by any means: productive improvements but also squeezing existing stakeholders such as workers, suppliers, or customers (Appelbaum and Batt 2014).

The relative share of for-profit and not-for-profit organizations also affects the market value of wealth. For-profit businesses represent wealth for their shareholders while nonprofits do not have shareholders. A country with privatized for-profit education and health care will typically have a higher market value of private wealth than a country where education and health are provided by the government or nonprofit institutions.¹⁰ Yet there is no particular reason to presume that this extra wealth is socially valuable. Whether private for-profit, private not-for-profit, or government provision is best (even from a pure efficiency perspective) depends on the situation. To give one example from the financial sector where profit motives are generally thought to be crucial for incentives, consider the case of mutual funds. One of the largest for-profit mutual funds, Fidelity, managed \$1.4 trillion for its clients in 2018 (Morningstar 2019). Fidelity stock has a substantial value (over and above the funds it manages on behalf of its clients). The founding Johnson family made a fortune of about \$40 billion from Fidelity and still owns about half of the company. But there is an even larger not-for-profit mutual fund, Vanguard, which manages \$4.2 trillion in 2018 but has no stock value (over and above the funds it manages on behalf of its clients). Vanguard developed the model of low-cost index funds, perhaps one of the most valuable inventions of the financial sector in recent decades. This invention created social value but hardly any marketable wealth. Vanguard's founder, John Bogle, had an

10. One example economists are familiar with is the example of scientific journals. Some journals are not-for-profit and priced low while others, most notably those published by Elsevier, are for-profit and priced high. For-profit journals create wealth for shareholders but at the expense of university budgets.

estimated fortune of less than \$100 million, four hundred times less than Fidelity founders. This example is particularly relevant for the analysis of wealth taxes, since mutual fund and pension fund fees constitute a significant privatized wealth tax for the middle class and upper-middle class. The average tax rate is 0.48 percent on \$17 trillion in assets, that is, \$90 billion (Morningstar 2019).¹¹

Ideally, one would like to know what part of the rise in the market value of private wealth (relative to the replacement cost of private capital) owes to expected extra future income streams due to real economic progress (expected new products or more efficient ways to produce) and what fraction owes to rent extraction from property owners at the expense of other stakeholders (workers, consumers, or governments). It can be tempting, as a first-order approximation, to treat the difference between the replacement cost of private capital and the market value of private wealth as an estimate of rent extraction. We stress, however, that such a naive computation is too simplistic and that more research is needed in this area.¹²

1.B. The Distribution of U.S. Household Wealth

How is U.S. household wealth distributed? There are four main sources to estimate the distribution of wealth in the United States: (1) the Survey of Consumer Finances (SCF), (2) named lists of wealthy individuals such as the Forbes 400, (3) estate tax data using the estate multiplier technique, and (4) income tax data using the capitalization technique. The capitalization method infers wealth from capital income by assuming a constant rate of return by asset class and year (estimated from macro data). The estate multiplier method reweighs each estate by the inverse probability of death (estimated by age times gender cells) to recover the distribution of wealth in the full population. Each source and method has limitations, and hence

11. The tax rate is slowly going down (it was about 0.94 percent in 2000) as the middle class slowly learns how to avoid this “tax.” Absent Vanguard, the strongest force driving down fees on index funds, it is likely that for-profit mutual funds would charge more. See Malkiel (2013, 97–98) for an overview of the industry. Without calling it a tax, he says: “the increase in fees is likely to represent a deadweight loss for investors” and “the major inefficiency in financial markets today involves the market for investment advice” (108).

12. One difficulty involves the measurement of intangible capital. Estimates of the replacement cost of private capital include some intangibles (software, research and development assets, and artistic originals) but not others (for example, brand-name organizational capital). Another difficulty involves the treatment of privatization: part of the increase in household wealth reflects sales of public assets at potentially low prices (thus at the expense of government), but macroeconomic balance sheets do not reveal what the “right” price is (as government assets are typically valued at their current replacement cost).

triangulating among sources is useful. The best source would be a well enforced and comprehensive wealth tax in the same way that the development of the income tax created a crucial tool to measure the concentration of income in the United States.¹³ Zucman (2019) discusses the methodologies and sources in detail.¹⁴

Because the SCF by design excludes the Forbes 400, it is natural to add the wealth of the Forbes 400 to the wealth reported in the SCF when estimating top wealth shares. The Forbes 400 data are not perfect but they are the best estimates we have of wealth at the very top.¹⁵ The wealth of large shareholders of publicly traded companies (for example, Amazon's Jeff Bezos) is probably well measured. In 2018, twelve of the fifteen richest Americans were shareholders of large public companies (see table 4).¹⁶ Forbes might miss diversified wealth coming from inheritance (Piketty 2014) and might not value private businesses accurately. Famously, Donald Trump misrepresented his wealth to reporters to get onto the Forbes list in the 1980s.¹⁷

The top panel of figure 2 depicts the evolution of the top 0.1 percent wealth share according to SCF data (with the Forbes 400 added); the estate multiplier method from Kopczuk and Saez (2004), updated in Saez and Zucman (2016), smoothed out after 2000, adjusted for more accurate mortality differentials by wealth groups in recent decades (Chetty and others 2016), and using tax units (instead of individual adults) as units of observation; and the capitalization method of Saez and Zucman (2016),

13. Before the start of the income tax in 1913, there were some estimates of how much revenue an income tax would bring, but these estimates were imprecise.

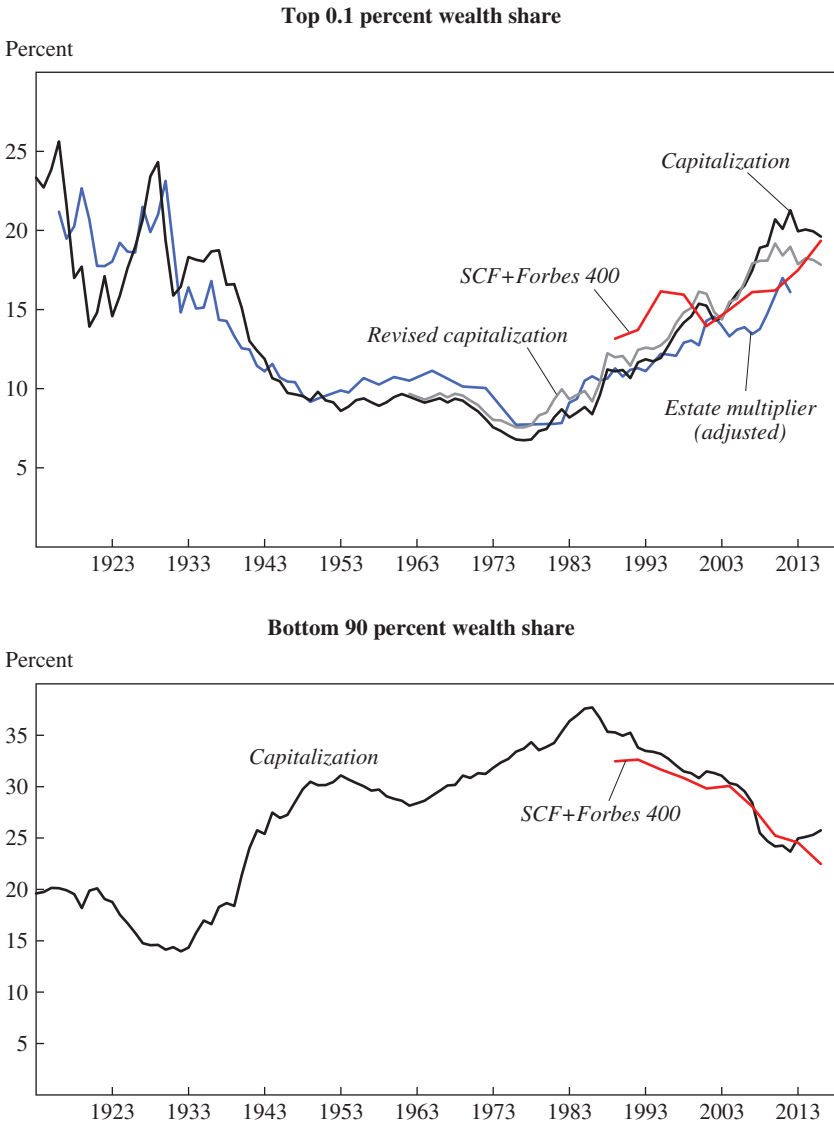
14. Kopczuk (2015), Bricker and others (2016), and Kennickell (2017) also discuss discrepancies between the SCF and estimates based on tax data.

15. Refusing to use the Forbes 400 amounts to saying we should not make any empirical statement about billionaires, a nihilistic attitude we reject, although we recognize that the data are imperfect.

16. The three exceptions were Charles and David Koch and Michael Bloomberg.

17. Kopczuk (2015) further notes that debt and wealth controlled through charities are not well measured. But private foundation wealth is public information and can be linked to founders. Except for the Bill and Melinda Gates Foundation, we have found that such private foundation wealth is negligible relative to the wealth held by the Forbes 400. Estate tax data show that debt is small among top wealth holders. According to Kopczuk and Saez (2004), debt represented 6.1 percent of wealth for the top 0.01 percent on average in 1991–2000. For estates filed in 2017, the latest year available, debt is 6.25 percent of gross estates for estates above \$50 million (data available online at <https://www.irs.gov/statistics/soi-tax-stats-estate-tax-statistics-filing-year-table-1>).

Figure 2. U.S. Wealth Inequality and Its Evolution



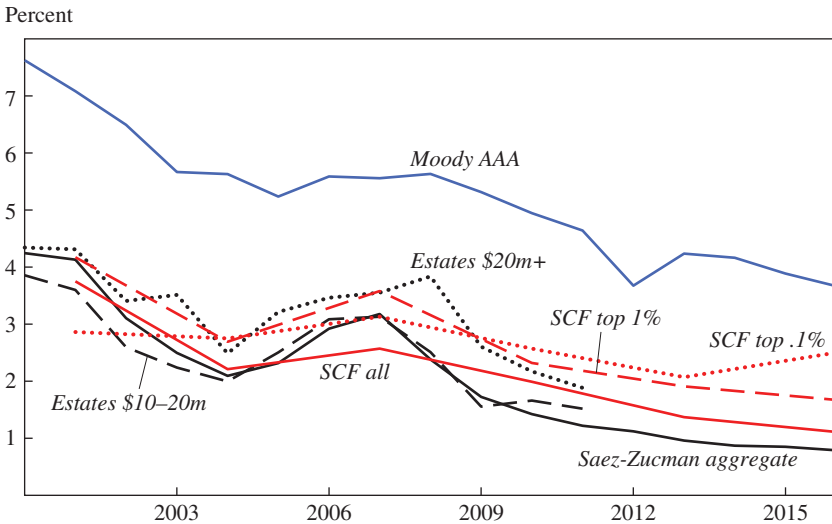
Source: Authors' calculations based on the Survey of Consumer Finances (SCF) and the Forbes 400 rich list, with estimates from Piketty, Saez, and Zucman (2018), Kopczuk and Saez (2004), and Saez and Zucman (2016).

updated to 2016 in Piketty, Saez, and Zucman (2018).¹⁸ All three series are based on taking 0.1 percent of all tax units (not individual adults).¹⁹ Both the estate multiplier and capitalization series show that wealth concentration was high in the 1910s and 1920s, with a particularly fast increase in the second half of the 1920s. The top 0.1 percent wealth share peaked at close to 25 percent in 1929. It then fell abruptly in the early 1930s (in the context of the Great Depression) and continued to fall gradually from the late 1930s to the late 1940s (in the context of the New Deal and the war economy). After a period of remarkable stability in the 1950s and 1960s, the top 0.1 percent wealth share reached its low watermark in the 1970s. Since the 1980s, all series show a marked increase in wealth concentration, although there is some variation across sources in the magnitude of the increase. The capitalization method suggests an increase from 7.5 percent in the late 1970s up to 20 percent in recent years. The estate multiplier method suggests an increase from 7.8 percent to 16 percent over the same period. In the shorter period from 1989 to 2016, the top 0.1 percent wealth share estimated using SCF data increases from 13 percent to 20 percent. In 2016, both the capitalization method and the SCF (plus Forbes 400) have the same 0.1 percent wealth share of about 20 percent. The top 0.1 percent wealth share is 16 percent in the estate tax data for 2011–12, the latest years available.

SENSITIVITY OF CAPITALIZATION ESTIMATES As noted in Saez and Zucman (2016) and the subsequent literature, there are a number of potential

18. See figure 4 for a step-by-step decomposition of the adjustments to the estate multiplier method. Three improvements were made relative to Saez and Zucman (2016): First, the series is updated to reflect the latest version of the macroeconomic household balance sheet published in the Financial Accounts of the United States. Second, the series includes a better treatment of wealth that does not generate taxable income, based on a more systematic use of the SCF. Third, it fixes an error in the computation of top wealth shares in the early 1930s; the new estimates show that wealth concentration fell more rapidly in the early 1930s than was originally reported. See Zucman (2019) for more details.

19. In the SCF, we select not the top 0.1 percent of the 130 million households present in the survey but 0.1 percent of the total 175 million tax units in the United States. So we select effectively the top 0.135 percent of SCF households. There are fewer households than tax units because households may include more than one tax unit (for example, adult children living with their parents). Typically, the SCF captures the wealth of the “economically dominant” tax unit in the household and misses wealth (or debt) from secondary tax units. This explains, for example, why the SCF captures only 70 percent of total student loan debt (for 2016:Q2, the SCF has \$0.96 trillion in student loans while the Financial Accounts have \$1.37 trillion). The sampling at the top for the SCF is made using tax data, and hence selecting the top 0.1 percent of tax units (rather than households) provides the most accurate comparison across sources for top groups.

Figure 3. Interest Rate by Wealth Class, 2000–2016

Source: Authors' computations based on the Survey of Consumer Finances (SCF) and Saez and Zucman (2016).

limitations with the capitalization method. Two issues are particularly noteworthy. In this paper, we present modified capitalized income top 0.1 percent wealth shares that account for these two issues.

Interest Rate by Wealth Class Interest rates may be heterogeneous across the distribution. If the rich own assets generating higher interest rates (such as risky corporate bonds), the capitalization method overestimates fixed-income assets at the top. This could be particularly problematic in recent years, in a context of low overall interest rates.²⁰

Figure 3 displays how the interest rate on fixed-claim assets (savings and checking accounts, taxable bonds) varies over time and by wealth class using linked income and wealth data sources: linked estate and income tax data and the Survey of Consumer Finances (SCF). The figure displays the aggregate rate of return economy-wide used in the baseline Saez and

20. This issue is pointed out in Kopczuk (2015). More recently, Bricker and others (2016), Bricker, Henriques, and Hansen (2018), and Smith, Zidar, and Zwick (2019) estimate top wealth shares using the capitalization method and assign higher interest rates to the rich. Bourne and others (2018) link estate and income tax data and make the reverse point that the very wealthy report low capital income relative to their wealth.

Zucman (2016) series. The figure depicts the interest rate using estate tax returns matched to prior year income tax returns for nonmarried filers from internal tax data for large estates over \$20 million and between \$10 and \$20 million (Saez and Zucman 2016, fig. 5b). Figure 3 also depicts the interest rate observed in the SCF in aggregate and for the top 1 percent and top .1 percent wealth holders. Overall, while somewhat noisy, the SCF data confirm the estate income tax data which shows that the interest rate for the wealthy tracks pretty closely the aggregate interest rate but is slightly higher. When interest rates are very low, as in recent years, this small difference translates into a significant difference in capitalization factors. Therefore, we revise the capitalization method to incorporate these empirical findings as we did in the earlier sensitivity analysis presented in Saez and Zucman (2016, 547–51 and appendix tables B41, B41b, and B41c). As in the Saez and Zucman (2016) appendix B41c series, we apply higher interest rates to the top 0.1 percent to match the interest rate differential observed in matched estate income tax returns for estates above \$20 million. Concretely, this correction reduces the fixed-income claims owned by the top 0.1 percent by a factor of about two in recent years, consistent with the more recent SCF evidence depicted in figure 3.

Finally, figure 3 depicts the Moody AAA rate of return on corporate bonds used by Smith, Zidar, and Zwick (2019) revised capitalization method. The AAA rate is much higher (by about 3 points) than the empirical interest rate earned by the wealthy from income to estate-linked tax data and from SCF data throughout the period. In recent years with low interest rates, using this AAA rate for capitalizing interest greatly underestimates fixed-claim assets at the top and hence underestimates top wealth shares.²¹

Value of Pass-Through Businesses A second known issue is that the official Federal Reserve Financial Accounts provide a low value for the value of private (that is, unlisted) corporations. Innovatively, Smith, Zidar, and Zwick (2019) value the stock of S-corporations and other pass-through businesses (partnerships, sole proprietorships) using a formula based on profits, book value of capital, and sales that replicates what is done by financial analysts trying to value private equity. Switzerland also applies

21. This reconciles our findings with Smith, Zidar, and Zwick (2019). We think that using the AAA return overstates the interest rate at the top because most of the bonds held by mutual funds are Treasury, agency, and foreign sovereign bonds (about 60–70 percent versus about 30–40 percent for domestic and foreign corporate bonds in recent years; see Financial Accounts of the United States, table L.122), and the yield on sovereign and quasi-sovereign debt is lower than on private AAA bonds (about half as low in recent years).

a similar method to administer its wealth tax. We follow their adjustment and increase the value of the pass-through businesses owned by the top 0.1 percent by a factor of 1.9 (adjusting the total wealth denominator accordingly). We apply the same 1.9 correction factor over time since 1962.²²

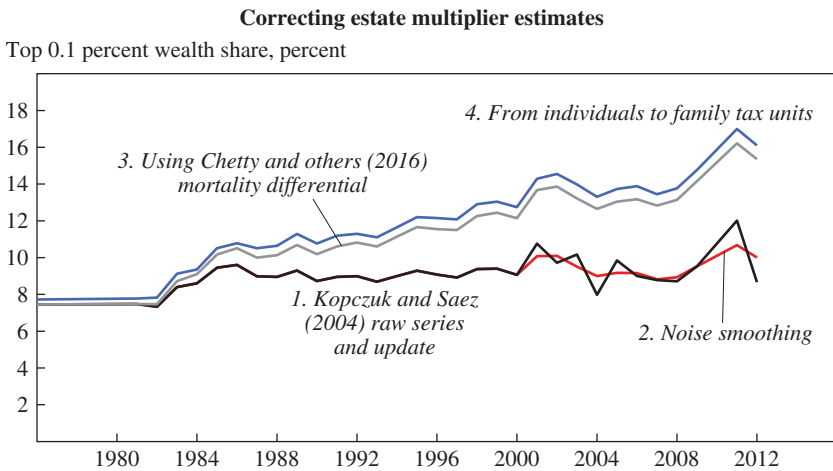
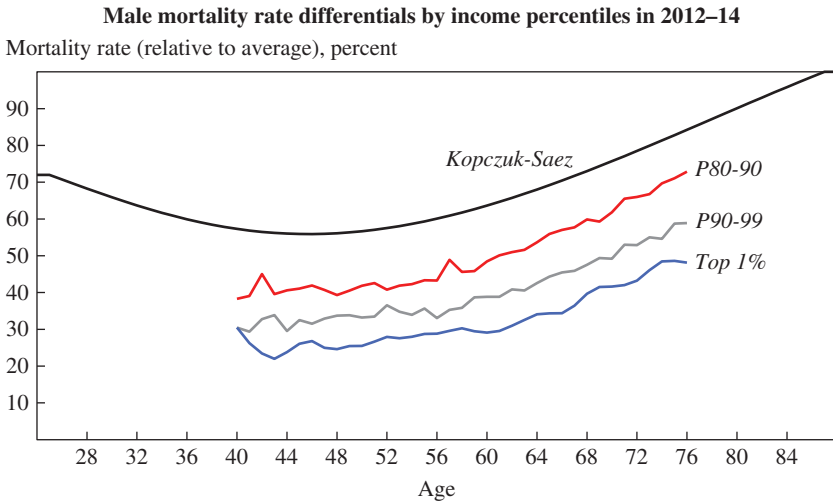
As shown by figure 2, the adjustments for the higher interest rate of the rich and the higher value of pass-through businesses offset each other, except in recent years when the interest rate adjustment slightly dominates. The benchmark Saez and Zucman (2016) top 0.1 percent wealth share, updated in Zucman (2019), is 19.6 percent in 2016. In the modified capitalized income series presented in this paper, the top 0.1 percent share is 17.8 percent. In the SCF (with the Forbes 400 added) it is 19.3 percent, closer to the original Saez and Zucman (2016) series (in all three cases statistics are for tax units, similarly defined). The main difference is in terms of wealth composition. The share of fixed-income assets in the top 0.1 percent in 2016 decreases from 42 percent in the original Saez and Zucman (2016) series to 26 percent in the modified series. Meanwhile, the share of pass-through business wealth increases from 18 percent to 34 percent, which is more in line with what is observed in the SCF.

CORRECTING ESTATE MULTIPLIER ESTIMATES The capitalized income estimates of Saez and Zucman (2016) and the raw estate multiplier estimates of Kopczuk and Saez (2004), updated in Saez and Zucman (2016), track each other well from 1916 to 1985 but diverge thereafter. The raw estate multiplier estimates for recent decades are depicted in the bottom panel of figure 4. They show a modest increase in the top 0.1 percent wealth share from 7.5 percent in the early 1980s to around 10 percent in recent years. A top 0.1 percent wealth share around 10 percent is similar to Denmark (Jakobsen and others 2019, fig. 2B), a country with one of the most equal distributions of wealth on earth (Alvaredo and others 2018). How could the United States have the most unequal income distribution among advanced economies (Alvaredo and others 2018) and the most equal wealth distribution? Something is wrong with the raw estate multiplier estimates.

As discussed in detail in Saez and Zucman (2016, sect. VII.B), there are two main potential explanations for the diverging trends in recent decades. First, there might have been an increase in estate tax evasion. Second, the

22. Smith, Zidar, and Zwick (2019) also implement two other changes: capitalizing equity using dividends and capital gains but putting a lower weight on capital gains (Saez and Zucman [2016] also conducted such a sensitivity analysis) and capitalizing property taxes using state specific multipliers (this has a minor effect on top wealth shares but is a useful innovation for creating state-specific estimates).

Figure 4. Correcting Estate Multiplier Estimates



Source: Authors' computations based on Chetty and others (2016), Kopczuk and Saez (2004), and Saez and Zucman (2016).

Notes: In the top panel income is measured two years earlier or at age 61, whichever is less. The panel also depicts the mortality rate advantage for top wealth holders assumed by Kopczuk-Saez estate multiplier series, from an estimate of the college graduate mortality differential in the 1980s created by Brown, Liebman, and Pollet (2002). The bottom panel shows a step-by-step correction of estate multipliers in four steps: (1) we start from the raw estimates from Kopczuk and Saez (2004), updated to 2012 in Saez and Zucman (2016); (2) we smooth the series after 2000 to reduce noise; (3) we use the mortality differential from the top 1 percent from Chetty and others (2016) in 2012 and the Kopczuk-Saez differential in 1980 (with a linear phased-in adjustment for years between 1980 to 2012); and (4) we convert the individual adult estimates coming from estates into tax unit family-based estimates, using the same ratios of individual adult versus tax unit from the Piketty, Saez, and Zucman (2018) top wealth share series.

estate multiplier estimates of Kopczuk and Saez (2004) fail to incorporate the longevity gains of the rich (relative to average).

Longevity Gains by the Wealthy The estate multiplier method blows up estates by the inverse probability of death. Mortality rates by age, gender, and year for the full population exist, but the wealthy are likely to live longer. Kopczuk and Saez (2004) assume that the mortality rate advantage of the wealthy is the same as the mortality rate advantage of college graduates in the 1980s (Brown, Liebman, and Pollet 2002). The correction factors of Kopczuk and Saez (2004) are depicted in the top panel of figure 4 (for males). Male college graduates in their forties have mortality rates only around 55 percent of the population average (for males of the same age). The Kopczuk and Saez series uses the same correction factors for all years, thereby ignoring the rising life expectancy differential by income groups documented for recent decades by Waldron (2007) and Chetty and others (2016).

Chetty and others (2016) provide precise and granular mortality rates by income percentiles, age, and year. The top panel of figure 4 depicts the mortality rates of upper income groups relative to average by age (for males) in 2012–14.²³ We depict three groups: the top 1 percent, the next 9 percent, and the next 10 percent (percentile 80 to 90). Two findings are worth noting. First, there is a strong mortality gradient within the top 20 percent. This suggests that it is not enough to consider the relative mortality advantage of large groups such as college graduates when applying the estate multiplier method. More granular corrections are required. Second, the mortality rate for the top 1 percent is only about half of the mortality rate of college graduates used in Kopczuk and Saez (2004).

The data in Chetty and others (2016) also provide a short time series, from 2001 to 2014. The time series shows that the mortality rate of the top 1 percent (relative to average) decreased from 40.6 percent in 2001–3 to 30.7 percent in 2012–14 (for individuals age 40 to 63). Using Social Security data, Waldron (2007) shows that the life expectancy difference between males in the top half versus bottom half of the lifetime earnings distribution at age 60 was only 1.2 years for the 1912 cohort but 5.8 years for the 1941 cohort. Therefore, the mortality differential between the wealthy and the rest was likely pretty small in 1980. Based on these data, it makes sense to use the Kopczuk and Saez (2004) mortality advantage up to

23. Income is measured two years earlier or at age 61, whichever is less. Income is measured at age 61 at the latest because income falls substantially after that age due to retirement.

1980 but then assume that the mortality rate advantage increases (linearly) from 1980 to 2012 up to the level of the top 1 percent from Chetty and others (2016). The data in Chetty and others (2016) imply that Kopczuk and Saez (2004) overstate mortality at the top by a factor of 1.9 on average.²⁴

As noted by Kopczuk (2015), using a mortality rate that is too high by a factor $1 + x$ lowers the estimated top wealth share by a factor of $(1 + x)^{1/a}$ where a is the Pareto coefficient of the wealth distribution, equal to 1.5 based on the Kopczuk and Saez (2004) estimates for recent years.²⁵ If we assume that the top 0.1 percent wealthiest Americans have the same mortality rate as the top 1 percent income earners from Chetty and others (2016), then the mortality rate in Kopczuk and Saez (2004) is off by a factor of $1 + x = 1.90$. This implies that the wealth shares in Kopczuk and Saez (2004) should be inflated by a factor of $(1 + x)^{1/a} = 1.9^{2/3} = 1.53$ in recent years. Concretely, instead of around 10 percent in recent years, the top 0.1 percent wealth share should be around 15.3 percent.

The bottom panel of figure 4 shows a step-by-step correction of the estate multiplier series. First, we start from the raw estimates from Kopczuk and Saez (2004), updated to 2012 in Saez and Zucman (2016). Second, we smooth the series after 2000 to reduce noise.²⁶ Third, we use the mortality differential of the top 1 percent from Chetty and others (2016) in 2012 and the differential in 1980 in Kopczuk and Saez (2004), with a linear adjustment between 1980 to 2012. Fourth, we convert the individual adult estimates coming from estates into tax unit–based estimates using the same ratios of individual adult versus tax unit top wealth as in Piketty, Saez, and Zucman (2018). The mortality adjustment (step 3) has a very large impact on the series.

In sum, improving the estate estimates with more accurate mortality rates has the potential to close about half of the gap between estate-based

24. To compute this average, we weight each age and gender by their weight in the top 1 percent distribution from Chetty and others (2016). Chetty and others (2016) do not provide data for ages below 40 (who hold 4 percent of the top 0.1 percent wealth according to SCF) and for ages above 76 (who hold 11.5 percent of the top 0.1 percent wealth). For those below age 40, we assume the same ratio as for ages 40–41, namely 2.41 (as the small wealth there is in this group is likely concentrated among those close to age 40). For those above 76, we assume that the ratio is 1.27, which is the average of the age 75–76 ratio (1.54) and 1 (as the mortality advantage of the rich has to disappear for the very old). In net we have $.040 \times 2.41 + (1 - .04 - .115) \times .675 / .343 + .115 \times 1.27 = 1.905$.

25. The reasoning is the same as for the effect of tax evasion that we spell out below.

26. As explained in Saez and Zucman (2016), Steve Jobs, who died at age 56 in 2011, has a weight of 200, which means that his \$7 billion wealth (from the Forbes 400) would weigh \$1.4 trillion, or 3 percent of aggregate wealth—enough to explain the 2011 spike.

and capitalized income estimates. It is important to note that the mortality of the super wealthy might not be the same as the mortality of high earners, as illness might reduce labor income (a flow) faster than wealth (a stock). Future work using internal IRS data could directly estimate mortality rates by capital income or capitalized income year by year. Since 2000, population-wide data would allow for precise and granular estimates, as in Chetty and others (2016). From 1979 to 1999, mortality rates could be estimated more roughly, as in Saez and Zucman (2016). Conditioning mortality rates on marital status would also likely improve accuracy.

Estate Tax Evasion One simple way to measure the growth in estate tax evasion is to assume that this evasion is captured by the residual (growing) gap between the adjusted estate-based top 0.1 percent wealth share and the other series depicted in the top panel of figure 2. While some forms of estate tax avoidance have always existed (Cooper 1979), it is likely that tax avoidance has increased substantially since the 1980s, as the political will for enforcement of the tax declined (Saez and Zucman 2019a, chapter 3). For example, in 1975, the IRS audited 65 percent of the 29,000 largest estate tax returns filed in 1974. By 2018, only 8.6 percent of the 34,000 estate tax returns filed in 2017 were audited.²⁷ Researchers in the tax administration found that the wealth reported by decedents from the Forbes 400 richest Americans on their estate tax returns is only half the wealth estimated by *Forbes* magazine (Raub, Johnson, and Newcomb 2010). In 2017, estate taxes raised only \$20 billion, or about 0.13 percent of the wealth of the top 0.1 percent richest households (in spite of a 40 percent tax rate above the \$5.5 million exemption threshold, which doubles to \$11.4 million in 2019). In 1976, the top 0.1 percent paid the equivalent of 0.7 percent of its wealth in estate taxes, primarily because of fewer deductions (especially no marital deduction), higher rates, and better enforcement.

I.C. Revenue Projections

As mentioned above, revenue projections for a wealth tax depend on three key elements: aggregate wealth, the share of aggregate wealth that the rich own, and finally what fraction of their wealth they could shelter from the tax. We will discuss in section III the issue of tax evasion. Our main conclusion is that evasion depends on the design of the wealth tax and the

27. These auditing statistics are published by the IRS annually and available online in U.S. Department of the Treasury (2019, table 9a) for the year 2018 and U.S. Department of the Treasury (1976, table 2, p. 89) for the year 1975.

strength of enforcement. It is a policy choice.²⁸ In this section, we consider various scenarios for enforcement.

PARETO DISTRIBUTION AND REVENUE It is useful to estimate the tax base of the top 1 percent, top 0.1 percent, and top 0.01 percent richest Americans. We also consider the tax base above fixed nominal cutoffs of \$10 million and \$50 million. The advantage of percentiles is that they are not tied to a specific nominal value or currency.

As is well known since Vilfredo Pareto noted it in 1896 (Pareto 1965), the top tail of the wealth distribution is well approximated by a Pareto distribution. Let p be a fractile (such as the top 1 percent) and w_p the wealth at threshold p . The fraction of people with wealth above w is given by a power law of the form $1 - H(w) = p \cdot (w_p/w)^a$ where $a > 1$ is the Pareto parameter. The Pareto law relates two fractiles p and q and their corresponding wealth thresholds w_p , w_q as follows: $p/q = (w_q/w_p)^a$ or $\log(p) - \log(q) = a \cdot [\log(w_q) - \log(w_p)]$.

A Pareto distribution has the property that the average wealth above a given threshold w is given by $b \cdot w$, where $b = a/(a - 1)$ is a constant. Empirically the U.S. wealth distribution has a thick tail with a coefficient $a \approx 1.4$ (Saez and Zucman 2016) and hence $b \approx 3.5$. Denoting by N the size of the population, the tax base above wealth threshold w_p (corresponding to percentile p) is $W_p = N \cdot p \cdot (b - 1) \cdot w_p = (N \cdot p \cdot b \cdot w_p)/a$ or $1/a$ times the total wealth of people with wealth above w_p . With $a = 1.4$, we have $1/a = 0.714$, or roughly 70 percent. Concretely, if the wealth share of the top 0.1 percent is 20 percent, then the tax base above the top 0.1 percent wealth threshold is 70 percent of 20 percent, or 14 percent of aggregate wealth, that is, \$13 trillion in 2019.

EVASION RATE AND REVENUE How does tax evasion affect these computations? Suppose the rich can hide a fraction h of their wealth. We consider two polar scenarios: (1) *homogeneous evasion*: everybody hides a fraction h of wealth, and (2) *concentrated evasion*: a fraction h of taxpayers hide their entire wealth while a fraction $1 - h$ reports truthfully. The real world is in between these two polar cases.

For a wealth tax on the top fractile p , the tax base is scaled down by a factor $1 - h$ when evasion is homogeneous, as the share of reported wealth at the top relative to true total aggregate wealth falls by a factor $1 - h$. When evasion is concentrated, the tax base is scaled down by less than $1 - h$.²⁹

28. This is also the main conclusion from the analysis of tax evasion in the income tax context (Slemrod 1994; Slemrod and Kopczuk 2002).

29. With a Pareto distribution, the factor is $(1 - h)^{1/a} = (1 - h)^{0.7}$. For example, with $h = 0.2$, the scale-down factor is 0.85 (instead of 0.8).

For a wealth tax above a fixed threshold w^* , the tax base is scaled down by a factor $1 - h$ when evasion is concentrated, as a fraction $1 - h$ of people with more than w^* vanish. When evasion is homogeneous, the tax base is scaled down by more than $1 - h$.³⁰

Therefore, a rough rule of thumb is that hiding a fraction h of wealth reduces revenue by a fraction h as well. If the exemption threshold is adjusted to always capture a given fractile, the fraction of revenue lost will be somewhat less than h . If the exemption threshold is kept fixed, the fraction of revenue lost will be somewhat higher than h .

REVENUE PROJECTIONS We project wealth tax revenue using the various wealth data sources depicted in the top panel of figure 2. The unit is always the family tax unit, not the individual adult.³¹ Table 2 presents the results. Columns (1) to (3) present estimates of the base above specific percentiles (top 1 percent, top 0.1 percent, top 0.01 percent). The percentiles are defined relative to the total number of family tax units in the economy (173 million in 2019). For example, the top 1 percent represents the top 1.73 million families. The statistics are reported assuming no tax evasion (over and beyond tax evasion in the raw wealth data source). Columns (4) and (5) display the base above fixed nominal amounts (in 2019 dollars): \$10 million and \$50 million.

The latest capitalized income and SCF statistics are for the year 2016. We extrapolate them to 2019 assuming no change in the distribution and using the Federal Reserve Financial Accounts aggregates for 2019. Estates-based estimates are the average from years 2009–12, corrected for differential mortality from Chetty and others (2016), converted to tax units, and extrapolated to 2019 (assuming again no change in distribution).³²

The bottom rows show by how much the tax base would shrink if taxpayers can hide a fraction of their wealth (10 percent or 50 percent). We assume that tax evasion comes half and half from intensive and extensive margins. We assume that the percentile thresholds would be adjusted to always capture the same fraction of the population. In contrast, the nominal thresholds (\$10 million and \$50 million) are not adjusted, explaining why the revenue loss is larger. The last row shows the implied estate

30. With a Pareto distribution, the factor is $(1 - h)^a = (1 - h)^{1.4}$. For example, with $h = 0.2$, the scale-down factor is 0.73 (instead of 0.8).

31. Recall that we converted estate multiplier estimates into family-based estimates.

32. For estates-based estimates, the wealth denominator is about 10 percent lower because it excludes annuitized wealth (for example, defined benefits pensions) that disappears at death. We conservatively assume that such annuitized wealth is negligible among top wealth holders.

Table 2. Wealth Tax Base Estimates, 2019

	<i>Top 1 percent cutoff (1)</i>	<i>Top .1 percent cutoff (2)</i>	<i>Top .01 percent cutoff (3)</i>	<i>\$10 million cutoff (4)</i>	<i>\$50 million cutoff (5)</i>
Capitalized incomes					
Threshold (2019 \$ millions)	5.9	30.8	171.8	10.0	50.0
Base above threshold (2019 \$ trillions)	25.9	13.0	6.3	21.3	10.9
As a percentage of aggregate wealth	27.7%	13.9%	6.8%	22.8%	11.6%
As a percentage of national income	140%	70%	34%	115%	59%
Revised capitalized incomes					
Threshold (2019 \$ millions)	5.3	28.0	156.2	10.0	50.0
Base above threshold (2019 \$ trillions)	23.6	11.8	5.8	18.4	9.4
As a percentage of aggregate wealth	25.2%	12.6%	6.2%	19.7%	10.1%
As a percentage of national income	127%	64%	31%	99%	51%
SCF plus Forbes 400					
Threshold (2019 \$ millions)	9.0	40.6	172.3	10.0	50.0
Base above threshold (2019 \$ trillions)	27.5	11.5	5.5	24.8	9.7
As a percentage of aggregate wealth	29.4%	12.2%	5.9%	26.5%	10.3%
As a percentage of national income	148%	62%	30%	134%	52%

Estates with multiplier

Threshold (2019 \$ millions)	25.5	123.6	10.0	50.0
Base above threshold (2019 \$ trillions)	8.9	4.3	14.2	6.8
As a percentage of aggregate wealth	9.5%	4.6%	15.1%	7.2%
As a percentage of national income	48%	23%	76%	37%

Base reduction with tax evasion

Strong enforcement: 15% evasion rate	13.0%	12.7%	17.7%	17.7%
Weak enforcement: 50% evasion rate	44.6%	43.8%	56.1%	56.2%
Estate tax implied evasion: 35%	31.6%	32.2%	33.5%	37.8%

Source: Authors' computations.

Notes: This table reports statistics on the wealth tax base above specific thresholds from various data sources. The unit is always the family tax unit, not the individual adult (estate multiplier individual-based estimates are converted into family-based estimates). For the percentiles thresholds (top 1 percent, top .1 percent, top .01 percent), percentiles are defined relative to the total number of family tax units in the economy (173 million in 2019). The top 1 percent represents the top 1.73 million families, and so on. The statistics are reported assuming no tax evasion (over and beyond the raw source, estates estimates are lower primarily because of tax avoidance/evasion). Capitalized incomes and Survey of Consumer Finances statistics are for year 2016 extrapolated to 2019 (assuming no change in distribution and using financial accounts aggregate wealth for 2019). Estates are the average from years 2009–2012, corrected for differential mortality (from Chetty and others 2016), converted to tax units, and extrapolated to 2019. The bottom rows show by how much the tax base would shrink if taxpayers can hide a fraction of their wealth (10 percent or 50 percent). We assume that tax evasion comes half and half from intensive and extensive margins. We assume that the percentile thresholds would be adjusted to always capture the same fraction of the population. In contrast, the nominal thresholds (\$10 million and \$50 million) are not adjusted, explaining why the revenue loss is larger. The last row shows the implied estate tax evasion rate that would fully explain the gap between the tax base from the capitalized incomes estimates at the top and the tax base from the estate multiplier estimates at the bottom.

tax evasion rate that would fully explain the gap between the tax base from the capitalized income estimates and the tax base from the estate multiplier estimates.

The tax bases are quite close across the first three sources. For example, the tax base above \$50 million is \$10.9 trillion according to the Saez and Zucman (2016) capitalized income series, \$9.4 trillion is the revised capitalized income series, and \$9.7 trillion is the SCF. The tax base is about a third lower for the estate-based estimates (\$6.8 trillion). Above the \$10 million cutoff, the SCF tax base estimate is larger than capitalized incomes (\$25 trillion instead of around \$20 trillion). The SCF (after adding the Forbes 400) has slightly fewer superrich than the capitalized income estimates but it has more merely rich—rich but not superrich—households in the \$10 million to \$50 million range. With a top 0.1 percent wealth share of around 20 percent, a wealth tax with an exemption threshold at the 99.9th percentile has a base of 14 percent of aggregate wealth, which is \$13 trillion in 2019 (assuming perfect enforcement). Top 0.1 percent wealth share from estate tax statistics is only 15 percent, suggesting that the evasion/avoidance rate for estate tax purposes is approximately 33 percent today. The estates-based wealth tax base is approximately 35 percent lower as well.

RECONCILIATION WITH SUMMERS AND SARIN Summers and Sarin (2019a, 2019b) argue that the wealth tax base above \$50 million would only be \$1.25 trillion (so that a 2 percent tax would raise only \$25 billion). All the estimates in table 2, including the estates-based estimates, are much larger. The SCF and the capitalized income estimates deliver estimates about eight times larger than the Summers and Sarin estimates. Even the estates-based estimates deliver estimates around 5.4 times larger than Summers and Sarin. The Forbes 400 alone represent (according to Forbes) a tax base of \$2.9 trillion in 2018, already more than twice the Summers and Sarin estimate. In other words, based on capitalized income or SCF (plus Forbes 400) data, Summers and Sarin's calculations amount to assuming an evasion/avoidance rate of around 85 percent.³³

Why do Summers and Sarin project such low revenue? They obtain their \$25 billion revenue estimate by noting that the estate tax collected only \$10 billion from estates above \$50 million in 2017 with a nominal tax rate of 40 percent (above \$10 million). They assume that one out of fifty rich

33. Even if one takes the wealth estimates coming out of the raw estate multiplier method of Kopczuk and Saez (2004) at face value, one would still find a tax base about three times larger than what Summers and Sarin find.

people die in a given year, so a wealth tax of 40 percent on the living population (instead of decedents only) would collect fifty times what the estate tax does. Hence a wealth tax at the rate of 2 percent (1/20 of 40 percent) would collect 50/20 times what the estate tax does, that is, \$25 billion.

The methodology in Summers and Sarin (2019a, 2019b) underestimates the revenue potential of a wealth tax for two main reasons. First, taxable estates are only one-third of the net worth of decedents, due to the full exemption of spousal and charitable bequests.³⁴ But such deductions would not apply for an annual wealth tax, which means that the Summers and Sarin estimate needs to be multiplied by a factor of three. Second, Summers and Sarin assume that one out of fifty rich people die in a given year. This multiplier of 50 approximately corresponds to the mortality rate used in Kopczuk and Saez (2004). But we have seen that the mortality rate of the rich is lower than this by a factor of 1.9. Using the correct multiplier would further increase the Summers and Sarin estimate by about 90 percent, and combining these two corrections increases their revenue projection by a factor of 5.7 (3×1.9). This is enough to approximately reconcile the Summers and Sarin revenue estimate with our estimate based on estate tax data in table 2.³⁵

II. Role in Overall Tax Progressivity

In this section, we examine the impact of wealth taxes on the progressivity of the tax system.

II.A. Tax Progressivity

Wealth taxes are very progressive because net wealth is more concentrated than income. Wealth taxes are more progressive than property taxes because property taxes are only levied on real estate, which is more equitably distributed than net wealth (Saez and Zucman 2016). Wealth taxes also more closely track ability to pay than property taxes because they allow

34. For estates filed in 2017, total deductions are 67.9 percent of the net estate for gross estates above \$50 million. Out of the 67.9 percent, 40 points come from the spousal bequest deduction and 20 points from charitable bequests (online at <https://www.irs.gov/statistics/soi-tax-stats-estate-tax-statistics-filing-year-table-1>).

35. There are other smaller differences. Summers and Sarin implicitly score a wealth tax on individual (not family) wealth above \$50 million, which mechanically reduces the base by about a quarter according to SCF data for 2016. They use 2016 numbers and do not adjust to 2019; nominal aggregate wealth has grown by about 25 percent from 2016 to 2019. Conversely, the estate tax applies starting at a lower threshold of \$10 million so there is an infra-marginal tax below \$50 million that should not be counted.

people to deduct debts. The progressivity of a wealth tax depends on how high the exemption threshold is and on whether a graduated rate schedule is applied among taxpayers.

Saez and Zucman (2019a) estimate effective tax rates (including all taxes at the federal, state, and local levels) by income groups using the data developed by Piketty, Saez, and Zucman (2018). We can use the same data on the joint distribution of income and wealth to estimate the effect of the wealth tax on the overall progressivity of the current U.S. tax system.

TAX RATE ON THE FORBES 400 One justification for a wealth tax is to increase the effective tax rate on the very wealthiest Americans who may not realize much income and hence may pay low effective tax rates today. Indeed, the two wealth tax proposals by Warren and Sanders target specifically billionaires (and multibillionaires) with higher rates.

As shown in table 4, the top of the Forbes 400 list includes founders of large companies (Amazon's Jeff Bezos, Microsoft's Bill Gates, Berkshire Hathaway's Warren Buffett, and Facebook's Mark Zuckerberg). Of these four companies, only Microsoft pays dividends. As long as Bezos, Buffett, and Zuckerberg do not sell their stock, their realized income is going to be minuscule relative to their wealth and true economic income. For example, Buffett disclosed that his fiscal income—defined as adjusted gross income reported on his individual income tax return—is in the tens of millions. Since his wealth is in the tens of billions, the realized return on his wealth is on the order of 0.1 percent.³⁶ Bezos's, Buffett's, Zuckerberg's, and Gates's companies are also multinational companies which can book a substantial share of their profits in tax havens to reduce their corporate income tax (Zucman 2015).

How much the top four hundred wealthiest Americans report in fiscal income—and hence pay in income taxes—is a central question for the desirability of a wealth tax. Absent direct evidence on the income taxes paid by the Forbes 400, we need to triangulate using various sources. We use three sources which turn out to provide consistent results. Table 3 summarizes the computations.

First, the IRS provides statistics on linked estate and income tax data. Bourne and others (2018) study the link between wealth on the estate tax

36. Buffett's fiscal income was \$63 million in 2010 when his wealth was \$45 billion and \$12 million in 2015 when his wealth was \$62 billion. Some billionaires do report substantial incomes (relative to wealth). In August 2019, candidate Tom Steyer disclosed that he reported on average \$133 million in annual income from 2009 to 2017 (for a total of \$1.2 billion) which is 8.3 percent of his \$1.6 billion wealth according to Forbes 400.

Table 3. Reported Income Relative to True Income for Top Wealth Holders

	<i>Estates above \$100 million (linked to income tax) (1)</i>	<i>SCF top .001 percent wealth holders (2)</i>	<i>SCF top .01 percent wealth holders (3)</i>	<i>Forbes 400 (combined with IRS top 400) (4)</i>
Year	2007	2016	2016	2014
Wealth (\$ millions)	313	951	365	5,725
Reported income (\$ millions)	9.4	30.5	11.6	159
Reported income/wealth	3.0%	3.2%	3.2%	2.8%
Average macro return on wealth	5.9%	6.4%	6.4%	6.8%
Percentage true income reported	51%	50%	50%	41%
Sample size	116	86	465	400

Source: Authors' calculations.

Notes: This table reports statistics on how much income top wealth holders report on their individual tax returns relative to their true economic income using various sources of publicly available data (across columns). Column (1) uses data from Bourne and others (2018); the sample is all estates above \$100 million for 2007 decedents. The source in columns (2) and (3) is the 2016 Survey of Consumer Finances (SCF household unit). Column (4) combines the Forbes Top 400 with the IRS top 400 highest income earners. Wealth and reported income on the individual tax return are averages. Average macro return on wealth is total capital income to total household wealth economy-wide. The percentage of true income reported on individual tax returns assumes conservatively that the rich get the same rate of return as the macro-average. In column (1), average wealth is estimated as 3.14 times the \$100 million threshold (based on estate tax statistics for 2007 decedents). The reported income of the Forbes 400 is estimated as 50 percent of the reported income of the IRS Top 400 (as SCF top .001 percent wealth holders have reported income of 50 percent of the SCF top .001 percent income earners in 2016).

return for 2007 decedents and fiscal income over the last five years preceding death (2002–6). In the highest wealth category they consider—\$100 million and above—reported capital income (averaged over 2002–6 and expressed in 2007 dollars) is 3 percent of 2007 wealth (Bourne and others 2018, fig. 4). In national and financial accounts, the ratio of aggregate capital income in 2002–6 to aggregate wealth in 2007 is 5.9 percent. This suggests that reported capital income of the wealthiest decedents is only 51 percent of their true income (assuming conservatively that the wealthy obtain a return on their wealth equal to the aggregate return). One objection is that the wealthy may avoid realizing capital gains toward the end of their life, since unrealized capital gains benefit from the step-up of basis at death. Bourne and others (2018, fig. 2), however, show that realized capital gains are very large in their sample, on average 45 percent of capital income.

Second, the SCF provides information on the joint distribution of wealth in year t and reported income in $t - 1$. In 2016, the ratio of reported income to wealth was 3.2 percent for the top 0.001 percent wealthiest Americans

(wealth above \$650 million, 86 records in the public SCF) and 3.2 percent for the top 0.01 percent (wealth above \$190 million, 465 records). This 3.2 percent rate of return is only 50 percent of the 6.4 percent aggregate capital income-to-wealth ratio in 2016. Earlier waves of the SCF provide similar results, which is reassuring given the small sample sizes. These SCF results are very similar to the IRS linked estate and income tax results and not subject to the issue that realized capital income might be particularly low within a few years before death.

Third, the IRS provides statistics on the top four hundred highest earners, a group we call the IRS top 400. In 2014, the latest year available, the IRS top 400 had an average fiscal income of \$318 million. The Forbes 400 wealthiest have, by definition, less fiscal income than this on average. How much less? To address this question, we relate the fiscal income of top income earners to the fiscal income of top wealth holders in the SCF. In the 2016 SCF, the top 0.001 percent income earners (sample of 64) reported fiscal incomes that were 6.7 percent of the wealth of the top 0.001 percent wealth holders. This is approximately twice the income of the top 0.001 percent wealth holders mentioned above. Averaged across all SCF years from 1998 to 2016, this ratio is 2.3 on average.³⁷ This result shows that there is indeed substantial re-ranking in wealth versus reported income. Based on this finding, we estimate that the Forbes 400 wealthiest Americans have a reported income of \$159 million (\$318 million divided by the ratio of 2). In 2014, the average wealth of the Forbes 400 was \$5.725 billion. So the fiscal income of the Forbes 400 was 2.77 percent of their wealth (2.77 percent \times \$5.725 billion = \$159 million), which is only 41 percent of the 6.77 percent economy-wide return on wealth in 2014. If we make the conservative assumption that the return on wealth for the Forbes 400 is the same as the economy-wide return, fiscal income for the Forbes 400 is only 41 percent of their true economic income.³⁸

In sum, using three different sources and methodologies, we find that top wealth holders have a fiscal income that is about or slightly less than half of their true economic income (defined as wealth times the average macroeconomic return to wealth). In what follows, we assume that the Forbes 400 have a ratio of fiscal income to true economic income of 45 percent; population-wide, this ratio is around 70 percent (Piketty, Saez,

37. For the top 0.01 percent (instead of top 0.001 percent), this ratio is 2.0 on average from 1998 to 2016.

38. Similar estimates would be obtained for other years using the same methodology.

and Zucman 2018).³⁹ The super wealthy do not realize as much income as the average person, but on average they realize substantially more than what Warren Buffett publicly disclosed.

Naturally, our 45 percent estimate of reported income relative to full economic income is based on triangulating the best available sources, and it could be refined in future work. We have applied this 45 percent ratio to estimate taxes paid by the top four hundred retrospectively to all years since 1950 in Saez and Zucman (2019a).⁴⁰ We are fully aware that this triangulation is an approximation, but it is the best approximation we could create using public sources. Given the importance of the policy question—How much do billionaires really pay in taxes?—we view it as important to mobilize internal data to provide better estimates.⁴¹

EFFECTS OF WEALTH TAXATION ON OVERALL TAX PROGRESSIVITY Figure 5 depicts the average tax rate by income groups in 2018, the year following the passage of the Tax Cuts and Jobs Act. All federal, state, and local taxes are included. Taxes are expressed as a fraction of pretax income, a comprehensive measure of income before government taxes and transfers (other than Social Security) that add up to total national income (Piketty, Saez, and Zucman 2018). P0-10 denotes the bottom 10 percent of adults, P10-20 the next 10 percent, and so on. The economy-wide average tax rate is 28 percent. Tax rates in the bottom seven deciles are slightly lower than average (25 percent instead of 28 percent). Tax rates between percentiles 80 and 99.9 are very slightly higher than average (around 29 percent). The tax rate peaks at 33 percent for P99.9-99.99 (that is, the bottom 90 percent of the top 0.1 percent). The tax rate then falls above P99.99 and is lowest for the top four hundred at 23 percent. Taking all taxes together, the U.S. tax system looks like a giant flat tax with similar tax rates across income groups but with lower tax rates for billionaires.

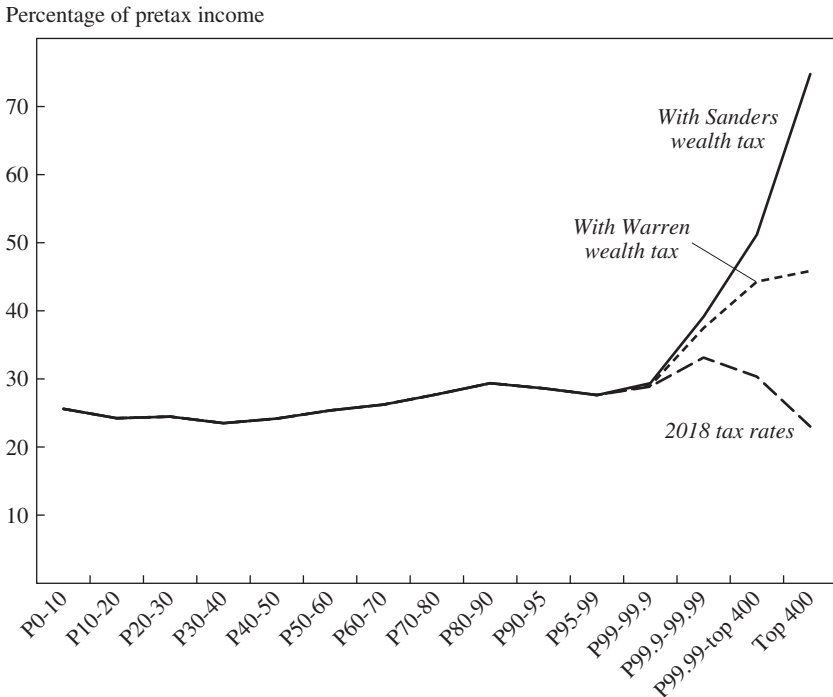
A wealth tax such as the one proposed by Elizabeth Warren would have a large impact on progressivity within the top 0.1 percent. To illustrate

39. In the Piketty, Saez, and Zucman (2018) micro-files, the ratio is about 65 percent for the top four hundred in recent years. It is too high because wealth is imputed based on realized fiscal income. We plan to address this issue in future research.

40. In earlier decades when the corporate tax was particularly large, the direct computation from the micro tax data generates ratios of reported income to actual income that are lower than 45 percent, in which case we do not adjust down reported income.

41. For example, linking the Forbes 400 to income tax data would allow for a direct estimation of the fiscal income of the four hundred richest. Similar linking for research purposes has already been done in the context of estate tax data by Raub, Johnson, and Newcomb (2010). A well-enforced wealth tax would be an even better source to study this question in depth and make sure the Forbes 400 estimates are themselves accurate.

Figure 5. The Effects of Wealth Taxation on Overall Tax Progressivity



Source: Saez and Zucman (2019) updated from Piketty, Saez, and Zucman (2018).

Notes: The figure depicts the average tax rate by income groups in 2018. All federal, state, and local taxes are included. Taxes are expressed as a fraction of pretax income. P0-10 denotes the bottom 10 percent of adults, P10-20 the next 10 percent, and so on. The figure depicts how adding the wealth taxes proposed by Elizabeth Warren and Bernie Sanders would affect the progressivity of the overall tax system. The Warren wealth tax has a 2 percent marginal tax rate above \$50 million and a 3 percent marginal tax rate above \$1 billion; the Sanders wealth tax has a 1 percent marginal tax rate above \$32 million, 2 percent above \$50 million, 3 percent above \$250 million, 4 percent above \$500 million, 5 percent above \$1 billion, 6 percent above \$2.5 billion, 7 percent above \$5 billion, 8 percent above \$10 billion.

this point, we use the capitalized income wealth estimates and assume that the wealthy would hide 15 percent of their wealth. The tax rate on the top 0.1 percent excluding the top 0.01 percent would increase modestly by 4 points. The tax rate in the top 0.01 percent would rise by 14 points. Among the top four hundred, the tax rate would double from 23 percent to 46 percent. A wealth tax with a high exemption threshold (\$50 million) and a marginal tax rate of 2 percent (3 percent above \$1 billion) would have a major impact on progressivity. It would restore tax progressivity at the top to levels last observed in 1980 (Saez and Zucman 2019a, chapter 7).

II.B. Alternatives

Several alternatives to increase tax progressivity have been proposed.

TAXING REALIZED CAPITAL GAINS BETTER There is widespread recognition that capital gains are not taxed systematically.⁴² The step-up of basis at death is the largest and most inefficient loophole (charitable giving of appreciated property is another). Conversely, the fact that price inflation is not taken into account when computing realized gains adds a “wealth tax” rate layer (equal to the rate of inflation times the tax rate on realized gains). But it is a capricious wealth tax that varies with the inflation rate and hits only gains eventually realized. Most economists agree that closing the step-up of basis loophole and adjusting gains for inflation would be a good idea. This would make the tax base less elastic (as everybody eventually dies or disposes of assets), allowing for an increase in the capital gains rate and possibly an alignment with ordinary tax rates. The key remaining issue would be that the tax might come with substantial delay for very wealthy individuals who are still fairly young and do not need to sell their stocks (for example, Mark Zuckerberg).

TAXING CAPITAL GAINS ON ACCRUAL One solution to remedy the delayed realization problem is to tax capital gains on accrual (or mark-to-market taxation).⁴³ The main difficulty is that there is a lot of year-to-year fluctuation in assets prices.⁴⁴ An appreciation of 20 percent (which is not uncommon) taxed at 40 percent could amount to a very large wealth tax of 8 percent. The tax would be particularly heavy on entrepreneurs. For example, Zuckerberg has experienced a 40 percent annual growth in wealth since 2008; a mark-to-market tax at 40 percent would amount to a 16 percent annual wealth tax. Taxing capital gains on accrual means a heavy tax on entrepreneurs growing a successful business and building up wealth. In contrast, the wealthy rentier or heir who is invested in bonds or mature stock might not be taxed much. This is in contrast with a wealth tax which is based solely on wealth and not returns.

MERGING WEALTH TAXATION AND CAPITAL GAINS TAXATION Taxing realized capital gains only means that the tax is delayed. Taxing capital gains

42. See Batchelder and Kamin (2019) for a recent detailed discussion.

43. See Weisbach (1999) for a detailed proposal.

44. For hard to value assets, such as private equity, generally, the mark-to-market tax is applied only when the asset is sold retrospectively. The tax can be computed as if a tax had been owed each year, what is called “retrospective taxation,” an idea originally proposed by Auerbach (1991). See Batchelder and Kamin (2019) for a recent discussion and Kleinbard and Evans (1997) for the practical difficulties it can generate.

on accrual means capricious taxation based on the ups and downs of volatile financial markets. An intermediate solution would be to track unrealized capital gains and have a prepaid withholding tax kick in whenever such unrealized gains exceed a chosen amount. For example, unrealized real capital gains above \$1 million would face a recurring annual tax of 2 percent, but the tax would be credited back when capital gains are realized. The withholding tax could be made progressive with higher tax rates on very large amounts of unrealized gains.⁴⁵ Such a tax would ensure more timely payment, and since it is a withholding tax, the issue of imperfect or imprecise valuation is less critical. In practice, such a withholding tax on unrealized capital gains would look quite similar to a wealth tax (except that the withholding tax is refundable upon realization and does not hit large wealth holdings with no unrealized gains).⁴⁶ This tax would be particularly useful for state income taxes that are based on residence (the current capital gains tax can be avoided by leaving a high-tax state such as California and becoming, for example, a Florida resident before realization).

CONSTITUTIONALITY: THE WEALTH TAX AS A MINIMUM INCOME TAX The key advantage of the wealth tax is that it hits the implicit return on wealth even if the realized return on the individual income tax is low. This can also be achieved through an income tax based on the presumptive income from wealth defined as a fixed return on wealth, as in the Netherlands. Colombia's income tax is based on the maximum of reported income and presumptive income defined as 3 percent of wealth (Londoño-Vélez and Avila 2020). The advantage of this system is that such a tax would clearly be constitutional.⁴⁷ In this system for example, if Warren Buffett's wealth is \$65 billion, then his presumptive income would be \$1.95 billion, much higher than his actual reported income, and hence his income tax would be computed based on presumptive income and not reported income.

45. And the tax would apply only if cumulative tax paid is below the tax owed upon realization of all gains.

46. Such a tax could also be integrated with the estate tax by making it creditable for estate tax purposes as well so that it also represents a prepayment on the estate tax that comes late by definition.

47. The constitutionality of a straight wealth tax is debated among legal scholars and hence would effectively depend on the makeup of the Supreme Court (Ackerman 1999).

III. Tax Enforcement

In this section, we analyze the issue of enforcement of the wealth tax.

III.A. Tax Avoidance and Evasion

A natural starting point to think about tax avoidance is the experience of the many countries that have implemented a wealth tax.

OVERALL RESPONSES A number of studies estimate the response of reported wealth to a change in the wealth tax rate. Note that such estimates do not directly tell us how much tax avoidance or evasion there is overall but instead how changes in the tax rate affect the level of wealth reported. Short-run responses likely capture tax avoidance and evasion (as real responses are expected to take longer).

Bunching Studies A wealth tax above a given threshold creates incentives to report (or reduce) wealth to just below the threshold to avoid the tax. Hence, there should be bunching in the distribution of wealth at the exemption threshold. The amount of bunching is proportional to the size of the behavioral response and can be used to recover the elasticity of reported wealth with respect to the tax rate.⁴⁸ Seim (2017) finds clear evidence of bunching at the exemption threshold for the Swedish wealth tax. This implies that there is a behavioral response to the wealth tax but it is quantitatively small: a 1 percent marginal wealth tax rate reduces reported wealth by 0.2 percent only. The response comes from self-reported assets suggesting that it is driven by avoidance and evasion rather than real response. Jakobsen and others (2019) also use a bunching design in the case of the Danish wealth tax and find even smaller elasticities. Londoño-Vélez and Avila (2020, also using bunching methods, find larger avoidance and evasion responses: a 1 percent marginal wealth tax rate reduces reported wealth by about 2–3 percent in Colombia, where third-party reporting is much less developed than in Sweden or Denmark. In both cases, the bunching methodology provides very compelling evidence of behavioral responses but perhaps not its full magnitude. If many filers ignore the exact details of the tax system but still respond to the overall tax, the total response could be much larger.⁴⁹

48. See Kleven (2016) for a survey of this bunching methodology.

49. This issue affects bunching studies in income tax contexts as well, as discussed in Kleven (2016).

Diff-in-Diff Studies In Denmark, where third-party reporting is extensive, Jakobsen and others (2019) also use a difference-in-differences approach and find estimates substantially larger than their bunching estimates. In particular, they find a growing effect of wealth taxes on reported wealth (possibly through a combination of avoidance and real responses). In Switzerland, where there is no third-party reporting of financial wealth (due to bank secrecy), Brulhart and others (2016) find very large responses to wealth taxation: a 1 percent wealth tax lowers reported wealth by 23–34 percent. This extremely large estimate is extrapolated from very small variations in wealth tax rates over time and across Swiss cantons and hence is possibly not as compellingly identified as the other estimates based on larger variations in the wealth tax rate.

EXPLOITING ASSET EXEMPTIONS Wealthy taxpayers can take advantage of asset exemptions to avoid the wealth tax. Alvaredo and Saez (2009) provide a striking illustration in the case of the Spanish wealth tax which exempted closely held stock when the business owner was substantially involved in the management and owned at least 15 percent of the company stock (but such exempted stock remained reportable). In 1994, the first year the exemption was introduced, exempted stock represented only about 15 percent of total closely held stock reported by the top 0.01 percent of wealth holders. By 2002, the fraction had grown to 77 percent. The time series from 1993 to 2002 shows stability in the value of taxable plus exempt closely held stock among top wealth holders, implying that the behavioral response comes from shifting from taxable to nontaxable closely held stock rather than a supply side effect of more business activity (Alvaredo and Saez 2009, 1159, fig. 10). This example shows that exempting assets can seriously undermine the wealth tax.

HIDING ASSETS ABROAD Wealthy individuals can try to hide assets abroad to evade income and wealth taxes. Zucman (2013, 2015) and Alstadsæter, Johannesen, and Zucman (2018) provide evidence on the amount of wealth held in tax havens for each country in aggregate. They estimate that U.S. residents hold about 9 percent of U.S. national income in offshore wealth or about 2 percent of total U.S. household wealth.

Recent evidence from customer lists leaked from offshore financial institutions matched to administrative wealth tax records (in Scandinavia and Colombia) shows that offshore tax evasion is highly concentrated among the rich. Alstadsæter, Johannesen, and Zucman (2019) show that in Norway about 75 percent of wealth hidden offshore is owned by the top 0.1 percent. This implies high rates of tax evasion at the top: the wealthiest 0.01 percent of households evade about 25 percent of their taxes through

offshore tax evasion. Londoño-Vélez and Avila 2020) show a rise in the use of offshore entities following the reintroduction of wealth taxation in Colombia. The use of offshore accounts is also extremely concentrated in Colombia. Interestingly, the Panama Papers leak generated a 800 percent surge in the use of a voluntary disclosure amnesty scheme. All in all, 40 percent of individuals in the top 0.01 percent used the amnesty scheme, implying that offshore tax evasion is very high but also very responsive to policy enforcement in Colombia.

Extrapolating these findings to the United States would imply that, of the 2 percent of total U.S. household wealth hidden in tax havens, about 1.5 points are owned by the top 0.1 percent, which would increase their wealth share from 20 percent to 21.1 percent ($= 21.5/1.02$). This implies that all our previous tax base estimates already factor in this baseline offshore evasion of about 7.5 percent for the top .1 percent ($= 1.5/20$).

Wealth concealment is a serious enforcement concern. However, just like legal avoidance, illegal evasion depends on policies and can be reduced through proper enforcement. Key to reducing evasion are (1) the collection of comprehensive data, (2) sanctions for the suppliers of tax evasion services (the countries and financial intermediaries that facilitate it), and (3) proper resources for auditing. In terms of data collection, the United States has taken an ambitious path forward with the 2010 Foreign Account Tax Compliance Act (FATCA) which requires all foreign financial institutions to identify and report their U.S. customers to the IRS. Future research will analyze whether FATCA has had a significant impact on compliance.

EXPATRIATION Another way to avoid taxes is to expatriate. There is some evidence that residential decisions of the wealthy are sensitive to taxes on wealth. Moretti and Wilson (2019) show that the Forbes 400 residential decisions are sensitive to state-level inheritance taxes (using as identification the repeal in 2004 of the federal estate tax credit for state inheritance taxes that made state-level taxes relevant after 2004). Martinez (2017) shows, in the Swiss context, that a sharp decrease in income tax progressivity in the canton of Obwalden in 2006 did increase the share of rich taxpayers in the canton by 20–30 percent relative to neighboring countries. There is a recent body of work showing that the residential decisions of high earners—football players in the EU, innovators, and highly skilled workers—are sensitive to taxes.⁵⁰ In all cases where large responses are

50. See Kleven and others (forthcoming) for a recent survey.

found, however, three conditions are met: mobility is easy (such as across Swiss cantons or U.S. states), mobility is allowed (EU football players did not move much in response to tax differentials before teams were freely allowed to hire foreign players; Kleven, Landais, and Saez 2013), and mobility reduces taxes. These conditions may be affected by policy, especially the last one.

In particular, avoiding taxes through residential mobility is particularly difficult for U.S. citizens because it requires renouncing U.S. citizenship, since U.S. citizens living abroad are liable for U.S. taxes (with credits for foreign taxes paid). The United States also currently has an exit tax to deter expatriation by individuals with over \$2 million in net worth. Individuals renouncing their citizenship are required to pay income tax on all their unrealized capital gains. Building on the existing exit tax, Senator Warren's proposal would introduce an exit tax of 40 percent of net worth above \$50 million, which would greatly reduce incentives to expatriate for tax reasons. Therefore, the threat of expatriation is primarily a policy variable.

III.B. Why Have Wealth Taxes Been Abandoned in a Number of European Countries?

As pointed out in the recent study of progressive wealth taxation by the OECD (2018), twelve OECD countries (all of them in Europe) had progressive wealth taxes in 1990, but only four still had wealth taxes in 2017 (Switzerland, Spain, France, and Norway). As of 2019, four OECD countries levy a progressive wealth tax on individuals.⁵¹ The decline of wealth taxation abroad is one of the main arguments from skeptics in the U.S. debate (Summers and Sarin 2019a, 2019b). It is important to understand why wealth taxes have been repealed in a number of European countries.

MOBILITY In the European public debate, the concern that the rich or their wealth will flee abroad is the most frequently used argument by opponents. For example, France's President Macron transformed the French wealth tax into a real estate property tax in 2018, arguing that real estate cannot move abroad while people or financial wealth can (Rose 2017). The rich can evade the wealth tax by putting their wealth in offshore tax havens (for example, Switzerland), which do not share information with foreign tax authorities. This is evasion, since wealth taxes are based on the global wealth of residents regardless of the location of the assets or the financial

51. France has eliminated its progressive wealth tax (and replaced it with a real estate property tax), and Belgium has introduced a modest wealth tax.

institutions managing the assets. The rich can also avoid the wealth tax by moving their residence to a foreign country, as wealth taxes are generally based on residence. These two issues are potentially serious in the European context. There is clear tax competition across EU countries, which try to attract high earners or wealthy residents from other countries with special tax breaks. Most of these tax breaks are focused on high earners but some are focused on high-wealth individuals.⁵² For example, Switzerland works out customized deals with wealthy individuals. Portugal and Italy provide income tax breaks for retirees (which is most valuable for high-pension retirees).⁵³

In the public debate, mobility of the wealthy versus mobility of their bank accounts versus mobility of the capital they ultimately own is often confused. Because progressive wealth taxes are based on the worldwide wealth of individual residents, wealth taxes do not generate incentives to move capital abroad. Hiding wealth abroad does reduce taxes, but this is tax evasion and in general the underlying assets (stocks and bonds) can be the same whether the wealth is held through offshore versus domestic bank accounts.

However, the central point is that this “European context” is not a law of nature but results from policy choices (or non-choices). Other choices could lead to radically different outcomes in terms of tax evasion and tax competition.

First, EU efforts at curbing offshore tax evasion have been weak. As shown, for example, by Johannesen and Zucman (2014), halfhearted tax enforcement efforts can be easily circumvented and end up having minimal effects on tax evasion. In contrast, the United States took a bold step toward enforcement in 2010 with FATCA, which imposes steep penalties on foreign financial institutions that fail to report accounts of U.S. residents to the U.S. tax authorities (Zucman 2015). It is possible to curb offshore tax evasion because such evasion is done through large and sophisticated financial institutions that keep records and know the ultimate owners of the accounts (even if such accounts are held through offshore shell corporations to make it more difficult for tax authorities to link the accounts to owners). As the recent leaks from HSBC, UBS, and the Panama Papers have shown, such financial institutions maintain the names

52. See OECD (2011) for a description of such tax breaks.

53. Since 2009, Portugal exempts foreign pensions from taxation for ten years. Starting in 2019 in Italy, new immigrants who receive foreign pensions benefit from a special low tax rate of 7 percent only for their first six years of residence in some regions in Italy.

of their clients. Such data can easily be linked to tax data.⁵⁴ The multiplicity of leaks also shows that clients are at risk of seeing their accounts disclosed.

FATCA follows the route of policing foreign financial institutions directly but with the difficulty that the U.S. tax authorities have less power to audit foreign financial institutions effectively than home financial institutions. Another route is to get foreign governments to share the information they can collect from their financial institutions. The second route is best in the long run but likely more difficult to establish, as it requires international cooperation.⁵⁵

Second, the degree to which residential decisions of the wealthy are affected by taxation is also heavily dependent on policy. The EU is organized to foster such tax competition. Individual income and wealth taxation depends solely on current residence. Hence, when France had a progressive wealth tax before 2018, moving from Paris to London would immediately extinguish progressive wealth tax liability (except for domestic real estate assets). Contrast this with U.S. policy: U.S. citizens remain liable for U.S. income taxes for life and regardless of residence (but with full credit for foreign income taxes paid). The only way to escape the U.S. income tax is to renounce U.S. citizenship and even then, the United States imposes a substantial exit tax. The exit tax, formally known as the expatriation tax, is essentially a tax on all unrealized capital gains upon expatriation. It applies to high-income (incomes over \$160,000) and high-wealth (wealth above \$2 million) expatriates. It applies to citizens who renounce citizenship and also to long-term residents who end their U.S. resident tax status.⁵⁶ While the EU and the United States are the two polar opposites along this tax competition dimension, midway solutions are possible and probably preferable.⁵⁷ For example, movers could remain tax liable in their country of origin (but with full foreign tax credit) for a certain number of

54. Indeed this is what the recent research studies by Alstadsæter, Johannesen, and Zucman (2019) and Londoño-Vélez and Avila (2020) have done.

55. At the level of the EU, it is almost impossible to make progress on this front as any change requires unanimous agreement of all EU countries, some of which are net beneficiaries of lax enforcement.

56. See the IRS website's page on expatriation tax (<https://www.irs.gov/individuals/international-taxpayers/expatriation-tax>) for a description of the expatriate tax regulations. The Sanders and Warren wealth tax plans further strengthen the exit tax with a 40 percent wealth tax on expatriates' assets.

57. The U.S. system imposes a lifetime tax filing burden on U.S. citizens who have lived abroad sometimes for decades and who might not be very rich.

years (for example, five years). This would essentially negate the effects of special, often temporary schemes set up to attract high-income foreigners.

While countries in the EU generally have bigger governments, more social spending, and more regulations than the United States, the EU superstructure actually promotes policies constraining subcentral governments more than in the United States. This is true for tax competition but also for government deficits and monetary policy.

FAIRNESS Opposition to the wealth tax also arises from a feeling of unfairness: “the wealth tax aggravates millionaires without bothering billionaires.”⁵⁸ The aggravated millionaires are taxpayers wealthy in illiquid assets (or at least wealthy enough to be above the exemption threshold) but poor in cash. As a result, such taxpayers feel the wealth tax as a heavy and unjust burden. In France, for example, some retired farmers on Île de Ré living on a small pension but owning very valuable land, due to the real estate boom for secondary residences, became liable for the wealth tax. In Denmark, there were complaints that owners of historical castles were liable for the wealth tax but had no income to pay it (Henrik Kleven, personal communication). The United States does not have a progressive wealth tax but has a long experience with real estate property taxes. The property tax also generates strong opposition when rapid tax appreciation leads to increasing property tax bills hitting people on fixed incomes (such as retirees or widows) hard.⁵⁹ A classic complaint against the U.S. estate tax is that it can force the sale of family businesses or farms that have high market value but little in liquid assets.

Obviously, to an economist, such complaints do not make sense, since wealth is by definition marketable, and credit markets are supposed to function well when there are collateral assets. But humans often do not behave as the standard, perfectly rational economic model predicts: people may not want to sell family estates or businesses or even borrow against them. Such behavioral effects have consequences and need to be taken into account for policymaking.

Indeed, in practice, stories of aggravated millionaires can fuel successful lobbying against wealth taxation. This leads to three types of reforms of the wealth tax that undermine the integrity of the wealth tax.

58. This statement was made by Dominique Strauss-Kahn in 1997 when he was minister of the economy, finance and industry in the French center-left government of Lionel Jospin: “l’impôt sur la fortune embête les millionnaires sans gêner les milliardaires.”

59. Wong (2019) shows that indeed property tax increases following reappraisals increase financial hardship measures such as delinquencies on mortgages.

Limitations Based on Fiscal Income First, a number of countries have introduced tax limitations whereby the sum of the wealth tax and the income tax cannot exceed a certain percentage of total fiscal income. As we discussed above, this precisely defeats the main purpose of the wealth tax, as the ultrarich can find ways to report very low fiscal income relative to their true wealth or true income. As a result, this type of tax limitation ends up exempting billionaires.

Base Erosion Second, special treatment is introduced for assets more likely to be illiquid, such as real estate assets and business assets. For example, the French and Spanish wealth taxes exempted business assets when the owner is substantially involved in the business. As mentioned above, when Spain exempted business assets from its wealth tax in 1994, top wealth holders were able to increase sharply the fraction of wealth held in the form of business assets, creating both efficiency costs and reducing the tax progressivity (Alvaredo and Saez 2009). In France, the very richest taxpayers were typically able to incorporate and deduct such assets from wealth taxation (Landais, Piketty, and Saez 2011). In the case of wealth taxation, exempting some asset classes is particularly damaging as marketable wealth can by definition be traded and hence converted into tax-exempt wealth.⁶⁰

Nonmarket Values Third, a number of countries have also used non-market values for some asset classes such as real estate. As discussed in Piketty (2014, chapter 15), the early progressive wealth taxes in Prussia and Sweden used assessed values for real estate linked to the land/real estate registries (“cadastral values”) and typically not updated with market prices. However, with rapid inflation, such assessed values can quickly lag behind market prices. Spain for example, uses low assessed values for wealth tax purposes (Alvaredo and Saez 2009). While this can provide relief to some of the aggravated millionaires, in the long run this undermines the horizontal equity of the wealth tax. Indeed, the German wealth tax was repealed in 1997 following a ruling by the Constitutional Court that demanded equal taxation of all property. As U.S. states know, there is a tension between using market prices for real estate property taxes versus introducing property tax assessment limits. The use of market prices in a context of fast price increases led to the famous tax revolt Proposition 13 in

60. While there can also be income shifting for income tax purposes when some income forms are treated preferentially, such shifting is likely to be more limited than for wealth. Most wage earners, for example, would not be able to transform their income into corporate profits, dividends, or capital gains.

California in 1978 that froze real estate assessment for property taxation to purchasing prices (with only a 2 percent annual adjustment). Four decades later, the property tax in California has huge horizontal inequities: long-term residents may pay one-tenth of what a new resident pays for identical homes. A number of U.S. states have also passed some form of property tax assessment limits, often following ballot initiatives.

The cleanest solution to liquidity issues is to increase the exemption thresholds so that mere millionaires are not liable. This route was followed for the U.S. estate tax. The exemption was increased from \$1 million in 2000 to \$5 million in 2011. The main argument was that the “death tax” was also killing family businesses and family farms. With the higher exemption threshold, the estate tax is harder to repeal, as this argument is much harder to make. For example, the recent tax reform of the Trump administration, the Tax Cuts and Jobs Act, did not eliminate the estate tax even though this was an initial goal of the reform. Instead, the reform doubled the exemption level to \$11.2 million (in 2018). The recent wealth tax proposal by Senator Warren also has a very high exemption level of \$50 million—about fifty times higher than typical European progressive wealth taxes (OECD 2018). As a result, the policy debate on the proposal has not emphasized the issue of illiquid wealth and lack of cash.⁶¹

What lesson do we draw from the decline of progressive wealth taxes in Europe? First, history shows that wealth taxes are fragile. They can be undermined by tax limits, base erosion, and weak enforcement. When wealth taxes were repealed in Europe, it was primarily because policy-makers took the view that tax competition and offshore tax evasion were a given, making a wealth tax too hard to enforce. This somewhat nihilistic view is, however, incorrect: tolerating tax competition and tax evasion is a policy choice. Developing policies to curb evasion and tax competition was hard for a single country in a context where until recently little was done to tame tax competition and offshore evasion at the EU level, but the U.S.

61. Another possibility that seems most natural to economists is to provide credit to aggravated millionaires (if markets fail to do so). One simple way would be to allow taxpayers to borrow from the government to pay the wealth tax and repay the loan when the illiquid assets are sold or transferred. For example, the U.S. estate tax allows for spreading payments over fifteen years at low interest for illiquid estates. Some state property taxes also allow tax deferral in special cases (such as elderly or disabled homeowners in Texas). In practice, such tax deferrals are rarely used. Aggravated millionaires or homeowners dislike borrowing to pay taxes, whether borrowing on the private market or from the government (Wong 2019). Therefore, it is probably economists’ fantasy to believe that creating credit markets will resolve the issue.

context today is different. European wealth taxes were also undermined because of a poor policy response to complaints by merely rich taxpayers. Instead of increasing the exemption threshold, the responses eroded the base and created tax limitations that benefited billionaires the most. Drawing lessons from this experience, a U.S. wealth tax could avoid this pitfall.⁶²

III.C. Enforcing a U.S. Wealth Tax

The key to successful modern income taxation is information reporting by third parties such as employers and financial institutions (Kleven and others 2011). This reporting allows the tax administration to get direct information on most income sources so that self-reporting is reduced to a minimum. The same principle should be followed for the wealth tax. Taxpayers and the IRS would receive information returns from financial institutions showing the value of their assets at the end of the year. For administrative success, it is essential that such third-party reporting cover the widest possible set of assets and debts (just as the income tax is most successfully enforced on the types of income with third-party reporting). A wealth tax also requires policies regarding information reporting, the valuation of assets, and the treatment of trusts, among other design considerations.

INFORMATION REPORTING The most important extension of the current information reporting system would be to require financial institutions to report year-end wealth balances to the IRS. In some cases, this could be combined with existing information reporting for capital income payments, while in other cases it would require new forms. For many types of assets, this information is already stored by third parties (typically financial institutions), so reporting it to the IRS would be straightforward. Information reporting requirements could be readily applied to many types of assets and liabilities including checking and savings accounts and publicly listed stocks, bonds, and mutual funds.

—Interest-bearing assets (deposits, saving accounts, bonds, and so on): information return 1099-INT already provides information on all interest income. It could also report the outstanding balance. This requirement

62. If the tax exemption threshold were lowered considerably, complaints from the merely rich would easily arise. In this case, one potential solution would be to provide credits for local property taxes paid, which would effectively protect real estate assets, the most common form of illiquid assets among the merely rich, from the federal wealth tax.

could be extended to noninterest-paying accounts such as zero-interest bank deposits.

—Publicly listed stock: form 1099-DIV for dividend income would report the market value of the corresponding stock holdings (and this requirement could be extended to nondividend-paying stock).

—Assets indirectly held through mutual funds: mutual funds already provide information returns on income earned through mutual funds. It would be easy to add a balance reporting requirement on all mutual funds held by U.S. residents.

—Defined contribution pension assets: the current reporting requirement of IRA balances (form 5498) could be extended to all defined contribution plans such as 401(k)s.⁶³

—Defined benefits pension assets: pension distribution form 1099-R could report whether the distribution is an annuity (so as to be able to compute the value of defined benefits pensions for current pensioners).

—Vehicles: states already systematically register vehicles (including luxury vehicles such as boats and planes). Such databases could be used to generate assessed values (based on initial value and standard depreciation schedules).

—Mortgage balances: mortgage interest payments are already reported on form 1098. Mortgage debt balances have been reported on form 1098 since tax year 2017.

—Other debt balances: student loan balances could be reported on form 1098-E (following the model for mortgages). Consumer credit debt is already reported to the credit bureaus, and the IRS could require the credit bureaus to provide information returns on outstanding balances.

—Closely held business ownership: the ownership of closely held businesses organized as partnerships and S corporations is already reported through the schedule K-1 (form 1065) which reports the business income for each partner or shareholder.⁶⁴ This ownership reporting requirement should be extended to closely held businesses that are C corporations. The information is already stored in depositories (deposit trust corporations) and could be shared with the IRS.

63. Form 5498 in particular already requires valuations of closely held business assets in IRAs.

64. The recent work of Cooper and others (2016) shows that the reporting system for partnerships is not perfect and ought to be improved as they were not able to allocate about 15 percent of income to any final individuals (most likely because of the use of offshore partnerships for tax avoidance).

III.D. Valuation

The general principle guiding valuations should be that all assets should be assessed at their prevailing market value. In the majority of cases, market values are easy to observe by the IRS with proper information reporting. Here we discuss the cases that raise challenges. Two general points should be kept in mind. First, value arises from the expected income stream and expected sale value in the future. The current and past income stream can be observed. Second, values are often eventually revealed by the market when a sale takes place. If the revealed value is significantly different from values used for wealth tax purposes, it is always feasible to apply a retrospective wealth tax correction at the time of sale.⁶⁵

VALUING CLOSELY HELD BUSINESSES As discussed above, it is likely that the share of private businesses among top 0.1 percent wealth holders is fairly large—probably around one-third—and hence the valuation of closely held businesses is very important. It is useful to distinguish between large versus small closely held businesses.

Large Private Businesses For large private businesses, it is possible to draw on the financial system to put market values on many of these assets. Large private businesses (such as Uber or Lyft before their IPOs) are typically valued on secondary markets, and their stock transactions are centrally registered. Making such transactions reportable to the IRS would allow the tax administration to value such stock systematically. More broadly, the financial industry regularly values private businesses (in the context of venture capital funding, mergers and acquisitions, or share issuance). These valuations could be made reportable to the IRS for the purpose of administering a wealth tax and could be used to value assets retrospectively.⁶⁶ More ambitiously, in case of disagreement about valuation for large private businesses between the IRS and the owners, owners should pay in stock, and the government can then create the missing valuation market when selling back the stock. A defining feature of modern capitalism is precisely the ability to divide business ownership with dispersed shareholding. Creating a valuation market is the best solution, since any asymmetry in treatment between comparable publicly traded corporations versus private corporations would create incentives to

65. Various cantons in Switzerland use such retrospective corrections, which are called “supplementary net wealth tax[es]” (Lehner 2000, 670).

66. Of course, taxpayers have an incentive to undervalue their business for tax purposes. This is why the IRS should use systematically existing valuations for business purposes.

game the system and, in particular, to remain private if private equity gets preferential treatment.⁶⁷

Small Private Businesses For smaller businesses for which no information exists within the financial industry, there already exists a section of the Internal Revenue Code (409A) that values private businesses for the purpose of taxing stock options or valuing IRAs.⁶⁸ These valuations can be perfected based on best international practices. Switzerland is the best example of a country that has successfully taxed equity in private businesses by using simple formulas based on the book value of business assets and multiples of average profits in recent years. The IRS already collects data about the assets and profits of private businesses for business and corporate income tax purposes, so it would be straightforward to apply similar formulas in the United States. Smith and others (2019) give a recent example of how to use administrative data to systematically create valuations for S corporations using formulas based on profits, book value, and sales.

This means that when the business is owned by a very wealthy individual above the exemption threshold, the business faces a higher tax through the wealth tax that takes the form of a profits surtax, a property surtax, and a sales surtax. The important point is that no costly valuation would be required each year, as the calculation would be entirely formula based. Also note that few small businesses are owned by the 75,000 families with net worth above \$50 million, meaning that such surtaxes would apply only to a small fraction of small businesses.⁶⁹

A number of intangible assets (such as property rights on patents and trademarks, royalty rights for books) are owned directly by individuals. In this case, the simplest approach would be to consider such ownership as a business (producing income) and value it using the standard formula. Some closely held businesses, especially large ones, own financial assets. For example, the largest private businesses, such as Bloomberg LP or Koch Industries, own large chunks of publicly traded stock. In this case, it seems

67. Allais (1977) and Posner and Weyl (2018) have a more radical proposal where the government can buy any asset at its reported value (plus some premium), which sharply reduces incentives to underreport but would likely generate backlash (as many people do not want to be bought out even at prices above market).

68. The IRS issued Ruling 59-60 (in 1959) as guidance on how to credibly value a closely held business. This ruling has in turn influenced private valuations.

69. Based on our estimates (Piketty, Saez, and Zucman 2018), families with wealth above \$50 million receive only 1.7 percent of total schedule C (sole proprietorship) income. They receive 19 percent and 25 percent of partnership and S corporation income, respectively.

desirable to value financial assets separately at the value of the underlying securities. This effectively shuts down the ability to mask the value of underlying assets by using intermediate shell corporations.

WEALTH HELD THROUGH INTERMEDIARIES Some assets are held through intermediaries such as trusts, holding companies, partnerships, and so on. Current estate tax enforcement allows taxpayers to claim valuation discounts for assets repackaged into such intermediaries. But this opens the door to widespread avoidance.⁷⁰ The model to follow is the income tax model where dividends, realized capital gains, and interest paid by stocks and bonds flow through intermediaries (trusts, partnerships, mutual funds) to the individual income tax return of the ultimate beneficiary. Third-party reporting of balances like the third-party reporting of income would enable the same procedure for the wealth tax. Trust income distributed to beneficiaries is considered income for beneficiaries and taxed as such. Trust income that is retained within the trust is taxed directly at the trust level with very narrow brackets so that the top tax rate is quickly reached.⁷¹ The rationale is to deter progressive tax avoidance through splitting one's wealth into many smaller trusts.

WEALTH CONTROL VERSUS BENEFITS In contrast to income, there can be a separation between who controls wealth and who benefits from wealth. For example, private foundations are often controlled by their wealthy funders (the Bill and Melinda Gates Foundation is the most prominent recent example), but the funds can only be used for charitable causes.⁷² Foundations often survive their funder and operate as independent entities. A trust allows for separating who controls the fund, who receives the income stream, and who might be the ultimate recipient of the fund (when the grantor dies, for example). How should such trusts and foundations be treated for wealth tax purposes?

To prevent tax avoidance, there need to be clear rules that allocate such wealth to the individuals who control or benefit from it. For example, the Sanders plan assigns trust wealth to the original funder. Assigning wealth in priority to the wealthiest person involved (such as the funder if that person retains control over the use of funds) and with lowest priority to nontaxable entities (such as a charitable organization, which may use the

70. Repetti (2000, 613) notes, "These devices currently result in valuation of interests in the partnership that are approximately 30% to 40% less than the value of the partnership's underlying assets."

71. In 2018, trust income above \$12,500 is taxed at the top tax rate of 37 percent.

72. On a smaller scale, donor-advised funds function in the same way.

funds or will eventually be able to use the funds) is the best way to curb tax avoidance. In all cases and to avoid liquidity issues, the wealth tax liability created by the trust should be paid nominally out of the trust fund itself.

More broadly, a progressive wealth tax (like a progressive income tax) raises the issues of using straws—individuals who legally own the wealth but who do not control or benefit from it in practice. This issue looms larger in developing countries where property rights are not as clearly established as in advanced economies.

VALUING REAL ESTATE Local governments maintain registers of real estate property for the administration of local property taxes. Such property taxes are based on assessed value. In most states, assessed values closely follow market value. Commercial websites such as Zillow have also developed systematic methods to estimate real estate values. Therefore, the technology to systematically obtain reliable real estate values exists, and these values could be reported to the IRS. This would also help improve local governments' assessments for property tax purposes, which are often highly imperfect and hence discriminatory (Avenancio-Leon and Howard 2019).

WORKS OF ART AND OTHER VALUABLES Valuables such as works of art are often mentioned as hard-to-value assets. In reality, they are quantitatively small, and they are most often insured, which generates a valuation. There are also systematic catalogs of the most valuable art and other collectibles.

VALUING DEFINED BENEFIT PENSION ASSETS In the case of defined benefit pensions not yet in payment, the value of assets could be apportioned in proportion to the accrued benefits of each worker using simple formulas based on current salary, tenure, and age. The key requirement is that the total current value of each defined benefit fund should be distributed across beneficiaries.⁷³

IV. Economic Effects

All economists agree that, to the extent that it would not be entirely avoided, a progressive wealth tax would have real economic effects.

73. Most pension wealth is owned on a pretax basis, which means that pension contributions were exempt from income taxation, but pension benefits are taxed at withdrawal. As a result, the government has a claim on such pension wealth (in contrast to wealth owned outright or posttax pensions such as Roth IRAs). Some downward adjustment to pretax pension wealth could be made to restore balance. Pension assets are small at the top (Saez and Zucman 2016), but this issue could become significant in the case of a wealth tax with a lower exemption threshold.

IV.A. *Optimal Tax Theory*

A significant body of work has analyzed the problem of optimal capital taxation. In a basic model with homogeneous return r on all assets, a capital tax at rate τ_k is equivalent to a wealth tax at rate $\tau_w = r\tau_k$ as both result in the same net of tax return $\bar{r} = r(1 - \tau_k) = r - \tau_w$.

ZERO CAPITAL TAX RESULTS Two famous zero capital tax results have been highly influential.

In the Atkinson and Stiglitz (1976) life-cycle model where people earn and save when young and consume their savings when old, the optimal capital tax is zero because there is no heterogeneity in wealth, conditional on labor income: any combination of labor and capital taxes can be replaced by a more efficient tax on labor income only that leaves everybody better off (Kaplow 2006; Laroque 2005). In the real world however, there is enormous heterogeneity in wealth, conditional on labor income history. Such heterogeneity arises because of inheritances, heterogeneous rates of returns, and preferences for wealth accumulation. In this case, taxing capital becomes desirable (Piketty and Saez 2013; Saez and Stantcheva 2018).

In the Chamley (1986) and Judd (1985) model, the optimal capital tax is zero in steady state because long-run capital supply is infinitely elastic. As is well known, taxing infinitely elastic bases is not desirable. However, the infinite elasticity assumption is not backed up by empirical evidence. Introducing finite elasticities in the Chamley-Judd model leads to positive taxes on capital income that follow classical inverse elasticity rules (Saez and Stantcheva 2018).

In basic models, taxing consumption is equivalent to taxing labor income and initial wealth but exempting capital income. Therefore, the zero capital tax recommendation is often expressed as “we should only tax consumption.” Concrete policy proposals have been made in this direction.⁷⁴ On normative grounds, there is a long-standing philosophical debate (at least since Hobbes) over whether it is better to tax consumption or income. Empirically, savings are concentrated at the top of the distribution (Saez and Zucman 2016). Therefore, taxing consumption allows the income-rich to defer taxation (relative to an income tax). For example, Jeff Bezos’s recently accumulated fortune may not be consumed before decades or even longer if wealth is bequeathed across generations. Is it fair that Bezos pays low taxes if his personal consumption is low?

74. See the flat tax proposals by Hall and Rabushka (1985) and, more recently, Carroll and Viard (2012).

For the ultra wealthy, personal consumption is likely to be modest relative to economic power and hence seems almost beside the point when thinking about their proper tax burden. The progressive wealth tax goes after accumulated wealth before consumption takes place or even sometimes before income happens (for example, when a start-up is created and expected to be lucrative in the future).

WEALTH IN THE UTILITY FUNCTION Carroll (2002) notes that it is a challenge to explain wealth accumulation at the very top with standard preferences that depend only on consumption. Saez and Stantcheva (2018) show that wealth in the utility function can be microfounded in several ways. It can arise from bequest motives, from a utility flow of running a business, or from direct service flow from wealth (such as housing services or liquidity value). Adding wealth in the utility function changes dramatically the analysis of optimal capital taxation as shown by Saez and Stantcheva (2018). In this case, the response of wealth accumulation with respect to the net of rate of return is finite, and a capital tax would be desirable if society puts low social marginal welfare weights on wealth holders and follows the standard inverse elasticity optimal tax rules.

HETEROGENEOUS RETURNS Guvenen and others (2019) consider a model with heterogeneous returns on wealth where wealth taxation differs from capital taxation. A wealth tax bears more heavily on low-return assets (such as low-yield bonds or unused land) than a capital income tax. Under capital income taxation, entrepreneurs who are more productive, and therefore generate more income, pay higher taxes. Under wealth taxation, entrepreneurs who have similar wealth levels pay similar taxes regardless of their productivity, which expands the tax base, shifts the tax burden toward unproductive entrepreneurs, and raises the savings rate of productive ones. In a calibrated model, Guvenen and others (2019) show that replacing the capital income tax with a wealth tax in a revenue-neutral fashion increases aggregate productivity and output (7.5 percent in consumption-equivalent terms). They conclude that wealth taxation has the potential to raise productivity while simultaneously reducing consumption inequality.⁷⁵

IV.B. Effects on Wealth Inequality

A well-enforced wealth tax would reduce wealth concentration. That seems to be a consensus view among economists: in the IGM poll on wealth

75. This idea of the greater efficiency of wealth taxation had been considered informally for a long time, at least since the 1940s, by Maurice Allais (Allais 1977) and more recently by Posner and Weyl (2018).

taxes, 73 percent of economists agreed and only 12 percent disagreed with such a statement (results weighted by self-reported expertise).⁷⁶

The reason is simple: if the rich have to pay a percentage of their wealth in taxes each year, it makes it harder for them to maintain or grow their wealth. Changes in consumption versus saving can exacerbate this effect. With a wealth tax, wealthy taxpayers may decide to spend more today and save less (this is the substitution effect: consuming now rather than later becomes relatively cheaper). Changes in consumption versus saving could conversely dampen this effect if the wealthy decide to spend less to preserve their wealth (this is the wealth effect, as the wealth tax reduces economic resources of the taxpayer). In any case, the wealth of people subject to the tax is expected to rise more slowly after the introduction of the wealth tax than before. There is relatively little empirical work evaluating whether a progressive wealth tax can reduce wealth concentration. One recent exception is Jakobsen and others (2019), who exploit compelling identification variation with the Danish wealth tax and find that the long-run elasticity of wealth with respect to the net-of-tax return is sizable at the top of the distribution.

IV.C. Effects on the Capital Stock

A potential concern with wealth taxation is that by reducing large wealth holdings, it may reduce the capital stock in the economy—thus lowering the productivity of U.S. workers and their wages. This conclusion certainly arises from the standard economic model where savings decisions are driven by rational intertemporal maximization and are therefore very sensitive to the after-tax rate of return on capital, as in the Chamley-Judd model discussed above. However, these effects are likely to be dampened in the case of a progressive wealth tax for several reasons.

First, the United States is an open economy and a significant fraction of U.S. saving is invested abroad, while a large fraction of U.S. domestic investment is financed by foreign saving. Therefore, a reduction in U.S. savings does not necessarily translate into a large reduction in the capital stock used in the United States. In the extreme case of a small open economy model, a reduction in domestic saving has no effect on domestic investment (as it's fully offset by an increase in foreign investment).

Second, calibrated models that add heterogeneity, risk, and finite life can shrink the response of capital to capital taxation (Conesa, Kitao, and

76. See Chicago Booth IGM Forum, "Wealth Taxes," April 9, 2019, <http://www.igmchicago.org/surveys/wealth-taxes>.

Krueger 2009). Therefore, in the end, the response of the capital stock to wealth taxation has to be an empirical question.

Last, even if the empirical response is large, increased savings from the rest of the population or the government sector could possibly offset any reduction in the capital stock. This argument does not make sense in a fully rational model where each actor saves optimally, but there are strong reasons to believe that society plays a big role in savings decisions that standard models do not capture.

A large body of recent academic work in behavioral economics has shown that institutions and nontax policies can have major effects on middle-class saving (Thaler and Sunstein 2008). Middle-class wealth consists primarily of pensions, housing (net of mortgage debt), consumer credit debt, and student loans. Each of these components has historically been directly affected by government regulations. Government-sponsored thirty-year mortgages increased home ownership rates and provided an effective tool to save over a lifetime. Regulations encouraged employer-provided pensions in the post-World War II period. Student loans are affected by public funding for higher education. Changes in government regulations since the 1980s have contributed to the decline in middle-class saving. The rise in middle-class debt took place in a context of financial deregulation and decline in the public funding of higher education. The surge in mortgage refinancing before the Great Recession was associated with equity extraction (refinancing into a larger mortgage) and amortization extensions (starting a new thirty-year mortgage), both of which reduce saving (Saez and Zucman 2016).

The recent behavioral economics literature has shown compellingly that behavioral nudges such as changing default choices for pension savings, or commitment choices, are much more effective ways to encourage retirement savings than traditional tax incentives exempting returns on pension funds from taxation. Madrian and Shea (2001) showed extremely large and persistent effects of default choices on 401(k) pension contributions for new hires. Chetty and others (2014) showed that defaults in Denmark not only change retirement savings but also affect overall savings, as individuals do not adjust their nonretirement savings; in contrast, the traditional policy of exempting returns from taxation has minimal effects on overall savings, as (sophisticated) individuals just shift nonretirement savings into retirement savings.

In the standard economic model, where people maximize intertemporal utility, most of the institutional forces affecting saving would be offset by individual decisions (barring corner solutions). In modern societies,

however, government is always heavily involved in the key consumption smoothing decisions: education for the young, retirement benefits for the old and disabled, health benefits for the sick, and insurance for the unemployed. It looks like societies know better than individuals how to smooth consumption. Economists mistakenly assume that individuals should know equally well how to smooth consumption.

IV.D. Effects on Entrepreneurial Innovation

A wealth tax would reduce the financial payoff of extreme business success (we will illustrate this quantitatively in section V) and hence could potentially discourage innovation. Smith and others (2019) show that typical top earners derive most of their income from human capital, not financial capital. The Forbes 400 list also shows that many of the top wealth holders built up their fortunes through entrepreneurship.

There are many calibrated models that can capture the effects of wealth taxation on entrepreneurship and wealth accumulation (Cagetti and De Nardi 2006, 2009) but unfortunately little direct evidence on whether wealth taxation dampens incentives to start a firm in the first place. The key parameter we would like to estimate is the elasticity of entrepreneurship with respect to the wealth tax rate.

There is, however, a larger body of work on the effects of business income taxation on entrepreneurship.⁷⁷ There is clear evidence that credit constraints affect entrepreneurship. For example, inheriting wealth increases the likelihood to become an entrepreneur (Holtz-Eakin, Joulfaian, and Rosen 1994). But a wealth tax with a high exemption threshold by definition spares the credit constrained.

There is also evidence that innovators move to avoid taxation. Akcigit, Baslandze, and Stantcheva (2016) find that superstar top 1 percent inventors are significantly affected by top tax rates when deciding in which country to locate. Akcigit and others (2018) exploit variation in state tax policies and find that higher personal and corporate income taxes negatively affect the quantity and quality of inventive activity and shift its location. Business stealing from one state to another is important but does not account for all of the effect. Both papers also find that concentrated activity due to agglomeration effects dampens the effects of taxes on location choices. This suggests that a wealth tax in a large country with worldwide taxation

77. See Rosen (2005) for a survey.

based on citizenship like the United States is likely to have much smaller effects than a wealth tax in a small jurisdiction with residency-based taxation (such as a state or a small European country).

It is harder to evaluate whether high taxes on success (such as a wealth tax) would discourage young innovators to start with. The literature has found conflicting results on the effect of progressive income taxes on risk taking; for example, Gentry and Hubbard (2005) find negative effects while Cullen and Gordon (2007) find the reverse.⁷⁸ Therefore, more empirical and well-identified research is needed to resolve this key question.

To foster innovation, it is key to encourage young—and not yet wealthy—people to become entrepreneurs. Bell and others (2019a) have shown that exposure to innovation during childhood has significant causal effects on children's propensities to become innovators themselves later in life. Building on these results, Bell and others (2019b) present a stylized model of inventor career choice. The model predicts that financial incentives, such as top income tax reductions, have limited potential to increase aggregate innovation in a standard intertemporal expected utility model. In contrast, increasing exposure to innovation (for example, through mentorship programs) could have substantial impacts on innovation by drawing individuals who produce high-impact inventions into the innovation pipeline.

Established businesses typically devote a lot of their resources to protect their dominant positions by fighting new competition. A progressive wealth tax hits wealthy owners who have already established their businesses, while it does not immediately affect emerging businesses. Other policies, like antitrust, should also play a major role in leveling the playing field. Large businesses with diluted ownership can also be anti-competitive (even if the rents accrue to a large number of middle-class owners rather than a few superwealthy owners). Antitrust was typically thought of as a market efficiency policy blind to distributional considerations. In practice, monopoly rents are concentrated at the top of the wealth distribution, and therefore the bad distributional consequences of monopoly power are likely more important than the efficiency consequences. The antitrust movement of the early twentieth century was famously fueled by anger at the robber barons.

78. Theoretically, taxation makes the government a shareholder in the business venture (and cushions failure with more generous transfers) so that entrepreneurs might be willing to take more risk.

IV.E. Charitable Giving

A wealth tax that does not apply to private foundations or public charities could spur an increase in charitable giving among the extremely wealthy. This increase would reflect both an acceleration in the timing of donations that would otherwise have been made later in life and an increase in the overall level of charitable giving. This increase in charitable giving would also reduce wealth concentration.

To prevent abuse, donor-advised funds or funds in private foundations controlled by funders should be subject to the wealth tax until the time that such funds have been spent or moved fully out of the control of the donor. For example, assets in the Bill and Melinda Gates Foundation should be counted as part of the wealth of Bill and Melinda Gates. If the foundation receives funding from others, such as Warren Buffett, this wealth would also be part of the Gateses' wealth. More generally, how to treat wealth held in foundations not controlled by the original funder (who may have passed away) is a difficult question. To the extent that the foundation is controlled primarily by one person or family (as opposed to a board that rotates), such wealth constitutes concentrated individual power, and it makes sense to make such wealth taxable. At the same time, because such wealth is pledged to charitable giving, it could arguably receive preferential treatment. Currently, private foundation wealth is slightly above 1 percent of total U.S. wealth, so this is small relative to the 20 percent owned by the top 0.1 percent.⁷⁹

Charities no longer related to a living founder, such as universities or older foundations, can also accumulate wealth. Indeed, their long life puts them at an advantage to patiently accumulate and take advantage of the high rate of return on expertly managed assets. This type of accumulation can snowball, as explained by Piketty (2014). A wealth tax is a potential tool to curb this risk. Allowing charities to pay in-kind in the form of giving some control rights to society is an avenue to explore. For example, instead of paying 2 percent of its wealth in cash, a charity could instead cede 2 percent of its board seats to representatives of the public.⁸⁰

IV.F. Inter Vivos Giving

A progressive wealth tax could also accelerate giving to children. However, gifts trigger gift tax liability and result in a real deconcentration

79. According to Saez and Zucman (2016), 1.2 percent in 2012.

80. Similar proposals have been made in the corporate context to give workers stakes on the board of their companies.

of wealth, thus generating tax revenues while achieving one of the goals of the wealth tax—reducing wealth concentration. In some situations, it is possible that such splitting could be done on paper while not changing how wealth is controlled or used. For example, a business founder could give parts of his or her wealth to children while effectively running and controlling the business. The wealth of minor children should be added to the wealth of their parents.⁸¹ Adult children may waste the wealth away, a significant concern of wealthy parents. Indeed, in the U.S. estate tax context, Poterba (2001) shows that only about 45 percent of the wealthy take advantage of the opportunity for tax-free inter vivos giving.

The exemption levels for married versus single families can also create tax arbitrage (either toward marriage or toward divorce). The Warren tax proposal has the same brackets for singles and married, creating a marriage penalty (splitting wealth through divorce reduces taxes). The Sanders wealth tax halves the brackets for singles, creating a marriage subsidy (a wealthy single gains by marrying a poorer spouse). It is well known that a tax cannot be progressive, marriage neutral, and family-based. Resolving this impossibility requires a move to individual taxation (instead of family taxation). Absent this, some average of the Warren and Sanders treatment of couples can reduce marriage penalties or subsidies on average and is, for example, how the U.S. individual income tax traditionally operates (singles brackets are less than, but more than half of, the married brackets).⁸²

IV.G. Other Effects

In this section, we examine the effects of the wealth on two additional dimensions.

EFFECTS ON TOP TALENT MIGRATION Would a wealth tax deter the talented from coming to the United States? This issue looms large in the public debate but there is scant empirical evidence on this issue. Many factors affect the migration of top talent. Top universities and research centers are a key factor in attracting and retaining talented foreign students. The number of skilled foreign workers is regulated through immigration and visa policies. The United States is currently restricting top talent migration

81. Children's trust funds that are still controlled by parents should also be taxed with parental wealth.

82. Some countries with wealth taxes (such as France before it repealed its wealth tax) treat cohabiting partners in a nonmarital relationship as a single tax unit for wealth tax purposes to avoid couples splitting wealth through divorce.

through its immigration policy with strict quotas in H1B visas. In principle, a change in any of these policies could reverse any adverse effect of steeply progressive wealth taxation on immigration in the United States.

MACROECONOMIC STABILIZATION A wealth tax would be procyclical as the stock of wealth is more procyclical than income (see the top panel of figure 1). Furthermore the most procyclical component of wealth is corporate equity, which is even more concentrated than overall wealth. Therefore, a wealth tax would add to automatic macro stabilizers.⁸³

V. Optimal Billionaire Taxation

In this section, we would like to consider the specific problem of optimal taxation of billionaires' wealth. This has the advantage of addressing a pressing issue, the surge of large fortunes, for which there are actually data created by *Forbes* magazine's lists of the wealthy. It is important to keep in mind that the Forbes 400 data are far from perfect, but they are the best we have for billionaires (while waiting for a well-enforced wealth tax). Another advantage is that, when talking about billionaires, it is immediately obvious that issues of consumption smoothing are irrelevant, forcing us to depart from the traditional model of intertemporal utility maximization.

V.A. Basic Positive Model

Forbes magazine has created a useful panel of the four hundred richest Americans since 1982 that tracks their net worth year after year. The data offer a fascinating, almost four-decade-long view of how billionaires arise, how their wealth can grow explosively as they create new corporate behemoths (like Google, Amazon, and Facebook), how their wealth matures as their businesses remain dominant (for example, Microsoft), and how it is split among heirs (for example, Walmart and Mars).

Suppose person i has the (real) wealth trajectory $W_{it}, \dots, W_{iT}, \dots, W_{iT}$ from time $t = 1$ to time $t = T$, absent the wealth tax. Let us denote by $1 + r_{it} = W_{it+1}/W_{it}$ real wealth growth from t to $t + 1$. The variable r_{it} captures the full return of wealth (price effects and income) net of any consumption (or transfers to heirs or charities). For billionaires, it is likely that consumption is small relative to wealth.

83. Corporate profits and, especially, realized capital gains are highly procyclical, even more so than wealth. This cyclicity raises issues for states that have balanced budget requirements. In this context, a wealth tax construed as a prepayment on future realized capital gains might be helpful to reduce tax revenue cyclicity.

Suppose that at time 1, we introduce a wealth tax at average tax rate $\tau > 0$ on individuals with net worth above \$1 billion. We assume that the tax rate applies to total wealth (and not just wealth above \$1 billion), as in the Colombian wealth tax analyzed in Londoño-Vélez and Avila (2020). Let us denote by $W_{i1}^\tau, \dots, W_{it}^\tau, \dots, W_{iT}^\tau$ the wealth trajectory of person i under the billionaire wealth tax at rate τ .

Absent tax evasion and avoidance, in the first year of the tax, billionaire i pays τW_{i1} reducing wealth by a factor $1 - \tau$ so that $W_{i1}^\tau = W_{i1} \times (1 - \tau)$. For example, if Bill Gates held 10 percent of Microsoft in year 1, with a tax of $\tau = 1$ percent, he would hold only 9.9 percent of Microsoft after the tax in year 1.

Let us make the simple assumption that the wealth tax does not affect the return r_{it} on wealth after the tax has been paid in period t and before the tax has to be paid in period $t + 1$. In the case of Bill Gates, this amounts to assuming that the Microsoft stock price evolves in the same way with or without the tax: Bill Gates makes the same executive decisions, and the wealth tax rate is small enough that it does not affect Bill Gates's ability to remain CEO and chair. This also amounts to assuming that Bill Gates scales down by a factor $1 - \tau$ his consumption, giving, and hence savings decisions due to his reduced wealth. For billionaires, consumption decisions are likely small relative to the stock of wealth. Giving could potentially be affected by the tax in a nonproportional form. If giving only happens at the end of life, the proportional assumption holds. It is conceivable that Bill Gates could accelerate giving to avoid the tax. He could also slow down giving if his goal is to keep ownership control of Microsoft longer. Therefore, the proportionality assumption seems like a natural benchmark to start with.

If we carry these assumptions up to year t , wealth in year t is going to be $W_{it}^\tau = W_{it} \times (1 - \tau)^t$. Hence, t years of taxation at rate τ reduce wealth by a factor $(1 - \tau)^t$. The reduction is exponential with time. If person i is exposed only t' years to the tax over the t year period (because the person might not be a billionaire for the full period), then wealth would be $W_{it}^\tau = W_{it} \times (1 - \tau)^{t'}$.

It is important to note that the simple multiplicative assumption makes sense for billionaires but would break down for less wealthy individuals. For people of more modest wealth, savings is driven to a much larger extent by labor income rather than returns from wealth. As a result, it is likely that the wealth tax would have less than a proportional impact on savings. For example, a homeowner whose wealth is only home equity is likely to pay for the property tax out of labor income (and reduced consumption) rather than downsizing the home.

Hence, the elasticity of the individual billionaire with respect to the net-of-tax rate $1 - \tau$ is simply the number of years exposed to the tax. The wealth of a young billionaire, like Zuckerberg, is less elastic than the wealth of a more mature billionaire, like Buffett. For heirs, for example, members of the Walton family, the elasticity is not only the number of years they have faced the tax but also includes the number of years their parents have been exposed to the wealth tax as well.

In sum, young billionaires' wealth is inelastic and affected less by the wealth tax, as it has not been exposed long to the tax, while old billionaires' and their heirs' wealth is very elastic, as the wealth tax has had more time to erode wealth.

Let us denote by B the set of billionaires in year T and by $W^A(1 - \tau)$ their collective wealth under a tax at rate τ since time 1. Let $T(i)$ be the number of years that billionaire i has been exposed to the wealth tax from year 1 to year T . We have

$$W^A(1 - \tau) = \sum_{i \in B} W_{iT} \times (1 - \tau)^{T(i)}.$$

Therefore, the elasticity e_T of the billionaire tax base with respect to the net-of-tax base after T years of taxation is given by:

$$e_T = \frac{1 - \tau}{W^A} \frac{dW^A}{d(1 - \tau)} = \frac{\sum_{i \in B} T(i) \times W_{iT} \times (1 - \tau)^{T(i)}}{\sum_{i \in B} W_{iT} \times (1 - \tau)^{T(i)}}.$$

The parameter e_T is simply the average number of years billionaire fortunes have been exposed to the wealth tax (weighting each billionaire by wealth).⁸⁴

This average length of exposure e_T is less than T and grows with T . Presumably, it converges to some long-run e_∞ . If wealth rankings were frozen, as in the standard dynastic model with no uncertainty, then $e_\infty = \infty$. That is, the progressive wealth tax would eradicate all billionaires in the long run, a point made by Piketty (2003) and Saez (2012). In contrast, with uncertainty, there would always be new billionaires arising and hence the tax base would not shrink to zero and $e_\infty < \infty$. In other words, a country

84. This computation is an approximation because it assumes that a marginal change in τ does not affect $T(i)$ nor the set B . We ignore such issues for simplicity of exposition. The rigorous way to obtain this formula would be to consider a continuum with a smooth wealth density and assume that the wealth tax applies to all individuals above a fixed percentile (in this case reshuffling due to a marginal tax change has only second-order effects, as people falling below percentile p are replaced by people with approximately the same wealth).

where billionaires come from old wealth will have a large e_∞ and hence a very elastic billionaire tax base. Conversely, a country where new billionaires constantly arise and replace older ones will have a low e_∞ and hence a fairly inelastic billionaire tax base.

With the Forbes 400 data, it is possible to simulate the path of wealth under a billionaire at rate τ starting in year 1982 and trace out the effect on the tax base to compute the elasticity e_T . In the Forbes 400 data, 2018 billionaires have been on the list for fifteen years on average, implying that $e_T = 15$ for $T = 36$.

Here, we have considered a single average tax rate τ , but it is possible in simulations to consider more-complex tax systems with several brackets. More-complex tax systems, however, do not lend themselves to simple analytical expressions.

V.B. Revenue Maximizing Tax Rate

What is the wealth tax rate τ that maximizes wealth tax revenue? In our basic setting, this is a very simple question to answer. Wealth tax revenue is given by $R = \tau W^A (1 - \tau)$. A small increase $d\tau$ generates a change in revenue dR given by:

$$dR = W^A d\tau - \tau \frac{dW^A}{d(1 - \tau)} d\tau = \left[1 - \frac{\tau}{1 - \tau} \times e_T \right] \times W^A d\tau,$$

which is the classic expression from tax theory: the mechanical revenue effect is reduced by the behavioral response effect. The revenue-maximizing rate τ^R is such that $dR = 0$, that is, the mechanical and behavioral response effect cancel out. It is given by $e_T \times \tau / (1 - \tau) = 1$, which can be rearranged into the standard inverse elasticity rule:

$$\text{revenue-maximizing billionaire wealth tax rate: } \tau^R = \frac{1}{1 + e_T}.$$

In words, the revenue-maximizing wealth tax rate for billionaires is the inverse of one plus the average number of years billionaires have been subject to the tax.

Naturally, with a new tax, the revenue-maximizing wealth tax rate is large. It is actually 100 percent in the first year of operation of an (unexpected) wealth tax. In the long run, τ^R converges to $1/(1 + e_\infty)$. If, as in the United States, billionaires have been around for about fifteen years

on average, the long-run revenue-maximizing (annual) wealth tax would be around 6.25 percent, which is higher than the Warren tax proposal of 3 percent on billionaires and in the ballpark of the Sanders tax proposed with graduated rates from 5 percent to 8 percent for billionaires and multibillionaires.

Several points are worth noting. First, we are computing the rate that maximizes revenue from the wealth tax. To the extent that billionaires pay other taxes (such as corporate or individual income taxes), the wealth tax rate that maximizes *total* tax revenue would be lower.⁸⁵

Second, our theory is predicated on the key assumption that savings is in proportion to wealth among billionaires. If billionaires accelerate giving or increase (enormously) their own consumption, then the elasticity would be higher and τ^R correspondingly lower.

Third, we have assumed that the wealth tax can be perfectly enforced. But it is easy to use our simple model of tax evasion or avoidance laid out in section I.C to extend the analysis to take into account tax evasion/avoidance.

EMPIRICAL ILLUSTRATION Table 4 lists the name, source of wealth, and wealth in 2018 of the top fifteen richest Americans (*Forbes* magazine estimates). Columns (2) to (4) show what their wealth would have been if a wealth tax had been in place since 1982. Column (2) considers the Warren wealth tax which has a 2 percent marginal tax rate above \$50 million and a 3 percent marginal tax rate above \$1 billion. Column (3) considers the Sanders wealth tax, which has a 1 percent marginal tax rate above \$32 million, 2 percent above \$50 million, 3 percent above \$250 million, 4 percent above \$500 million, 5 percent above \$1 billion, 6 percent above \$2.5 billion, 7 percent above \$5 billion, 8 percent above \$10 billion. Column (4) considers a radical wealth tax with a 2 percent tax rate above \$50 million and a 10 percent marginal tax rate above \$1 billion. The tax thresholds apply in 2018 and are indexed to the average wealth per family economy-wide in prior years. The wealth tax has a much larger cumulative effect on inherited and mature wealth than on new wealth. Young billionaires like Bezos and Zuckerberg would still be decabillionaires even with a 10 percent tax rate above \$1 billion. More mature billionaires like Gates and Buffett would be hit much harder, having faced the tax for over three decades.

85. Lower top wealth generates a negative fiscal externality in the public economics jargon (Saez, Slemrod, and Giertz 2012).

Table 4. Effect of Long-Term Wealth Taxation on Top Fifteen Wealth Holders in 2018

<i>Source</i>	<i>Current wealth (\$ billions)</i> (1)	<i>With Warren wealth tax</i> (2)	<i>With Sanders wealth tax</i> (3)	<i>With radical wealth tax</i> (4)
1. Jeff Bezos	160.0	86.8	43.0	24.1
2. Bill Gates	97.0	36.4	9.9	4.3
3. Warren Buffett	88.3	29.6	8.2	3.2
4. Mark Zuckerberg	61.0	44.2	28.6	21.3
5. Larry Ellison	58.4	23.5	8.5	4.0
6. Larry Page	53.8	35.3	19.5	13.3
7. David Koch	53.5	18.9	8.0	3.6
8. Charles Koch	53.5	18.9	8.0	3.6
9. Sergey Brin	52.4	34.4	19.0	13.0
10. Michael Bloomberg	51.8	24.2	11.3	5.8
11. Jim Walton	45.2	15.1	5.0	2.0
12. Rob Walton	44.9	15.0	5.0	2.0
13. Alice Walton	44.9	15.0	4.9	2.0
14. Steve Ballmer	42.3	18.2	7.5	3.5
15. Sheldon Adelson	35.5	18.4	9.3	5.6
Total	943	434	196	111

Source: Authors' calculations.

Notes: Columns (2) to (4) show what the wealth of the top fifteen wealth holders would have been if a wealth tax had been in place since 1982. The Warren wealth tax has a 2 percent marginal tax rate above \$50 million and a 3 percent marginal tax rate above \$1 billion. The Sanders wealth tax has a 1 percent marginal tax rate above \$32 million, 2 percent above \$50 million, 3 percent above \$250 million, 4 percent above \$500 million, 5 percent above \$1 billion, 6 percent above \$2.5 billion, 7 percent above \$5 billion, 8 percent above \$10 billion. A radical wealth tax stipulates a 2 percent tax rate above \$50 million and a 10 percent marginal tax rate above \$1 billion. The tax thresholds apply in 2018 and are indexed to the average wealth per family economy-wide in prior years. The wealth tax has a much larger cumulative effect on inherited and mature wealth than on new wealth.

With a wealth tax, top wealth would look younger and more actively entrepreneurial. This also means that the stake owned by founders (or their heirs) would shrink faster with a wealth tax, and hence they might lose control of the business faster. In principle, founders who remain active managers could be hired as CEOs even if they no longer control their company (like Apple's Steve Jobs, who famously lost control as founder but was later rehired as CEO).⁸⁶ On the negative side, separation of control and ownership can create agency costs, but U.S. capitalism has historically resolved the issue of control and ownership separation well (which is not the case in many countries, especially those with developing economies). On the positive side, external CEOs might be more competent than family heirs. Pérez-González (2006) shows that U.S. firms where incoming CEOs are from the family of the departing CEO, founder, or large shareholder underperform relative to firms that promote unrelated CEOs.⁸⁷

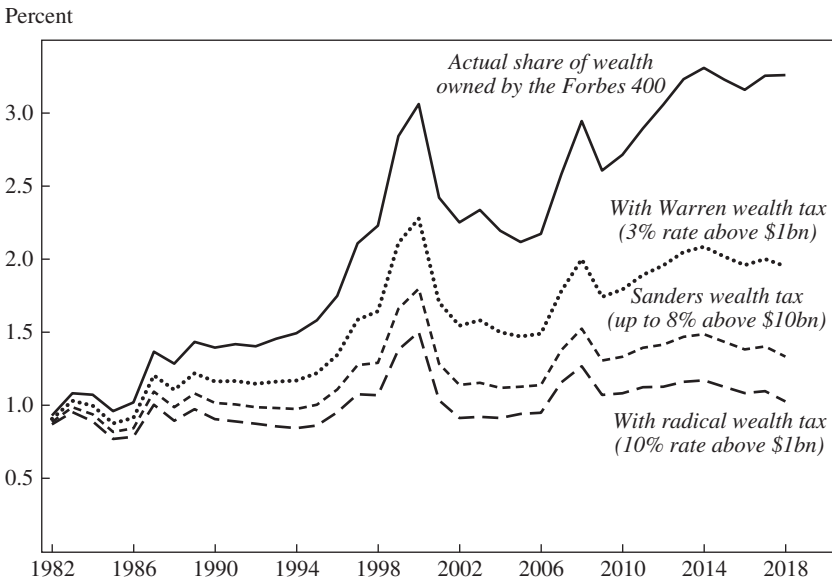
What would be the consequences for top wealth concentration? Figure 6 depicts the share of total wealth owned by the top four hundred richest Americans since 1982 from *Forbes* magazine. We adjust for growth in the number of total U.S. families by picking exactly the top four hundred in 2018 but correspondingly fewer rich people in earlier years. As is well known, the share of wealth going to this top group, approximately the top 0.00025 percent richest U.S. families, has increased dramatically from 0.9 percent in 1982 to 3.3 percent in 2018. The figure also depicts what their wealth share would have been if various wealth taxes had been in place since 1982. The Warren wealth tax has a 2 percent marginal tax rate above \$50 million and a 3 percent marginal tax rate above \$1 billion. The Sanders wealth tax has a 1 percent marginal tax rate above \$32 million, 2 percent above \$50 million, 3 percent above \$250 million, 4 percent above \$500 million, 5 percent above \$1 billion, 6 percent above \$2.5 billion, 7 percent above \$5 billion, 8 percent above \$10 billion. The radical wealth tax has a 2 percent tax rate above \$50m and a 10 percent marginal tax rate above \$1 billion.⁸⁸ The bracket thresholds apply in 2018 and are indexed to the average wealth per family economy-wide in prior years.

With the Warren wealth tax in place since 1982, their wealth share would have been 2.0 percent in 2018. With the Sanders wealth tax in place since

86. Steve Jobs restarted as Apple CEO with no Apple stock. At the end of his life, through CEO compensation, he had accumulated a stake of about 0.1 percent of Apple.

87. Bennedsen and others (2007) confirm this finding in the Danish context using gender of founders' first child as an instrument for family versus external CEO succession.

88. As discussed in Saez and Zucman (2019).

Figure 6. The Effects of Wealth Taxation on Top Wealth Holders

Source: Saez and Zucman (2019).

Notes: The figure depicts the share of total wealth owned by the top 400 richest Americans since 1982 from *Forbes* magazine. The figure also depicts what their wealth share would have been if the Warren, Sanders, or a radical wealth tax had been in place since 1982. The Warren wealth tax has a 2 percent marginal tax rate above \$50 million and a 3 percent marginal tax rate above \$1 billion. The Sanders wealth tax has a 1 percent marginal tax rate above \$32 million, 2 percent above \$50 million, 3 percent above \$250 million, 4 percent above \$500 million, 5 percent above \$1 billion, 6 percent above \$2.5 billion, 7 percent above \$5 billion, 8 percent above \$10 billion. The radical wealth tax has a 2 percent tax rate above \$50 million and a 10 percent marginal tax rate above \$1 billion (as discussed in Saez and Zucman 2019). The bracket thresholds apply in 2018 and are indexed to the average wealth per family economy-wide in prior years.

1982, their wealth share would have been 1.3 percent in 2018. With a radical wealth tax, it would have been about 1.0 percent in 2018, as in the early 1980s. By 2018, the Warren wealth tax would have raised \$49 billion from the richest four hundred families, the Sanders wealth tax would have raised \$62 billion, and the radical wealth tax would have raised \$66 billion. This confirmed, as our theoretical discussion above showed, that the long-run revenue maximizing tax rate is quite high. Even the Sanders wealth tax with its high 8 percent top tax rate (above \$10 billion) remains slightly below the revenue maximizing rate. The radical wealth tax of 10 percent (above \$1 billion) is approximately the revenue maximizing tax (it achieves an annual average wealth tax rate of about 7.2 percent on the Forbes 400).

V.C. Normative Discussion

Is the revenue-maximizing rate a good normative criterion for taxing billionaires? For economists who believe in utilitarianism and decreasing returns to consumption, it is natural to assume that the marginal utility of billionaires' wealth is close to zero. As a result, revenue considerations—and consequences on the rest of the economy—should be the only relevant issue from a normative perspective. Another way to arrive at the same conclusion is to note that billionaires are negligible demographically (around nine hundred Americans, or 0.0005 percent of all U.S. families) relative to the wealth they own (around 4–5 percent of total U.S. wealth): billionaires are about ten thousand times more important economically than demographically. The suffering from one multibillionaire losing a billion dollars cannot be ten thousand times worse than the suffering of an ordinary American family losing \$100,000. As a result, the revenue consequences of taxing billionaires outweigh the costs on the welfare of billionaires.

There are three main arguments made against higher taxes on the super wealthy. First, such taxes could not be enforced. Second, such taxes would hurt the economy and hence ordinary people. Third, such taxes would undermine respect for property rights and lead to a slippery slope of spoliation: today billionaires, tomorrow millionaires, and then everybody.⁸⁹

In our model old wealth is more elastic than new wealth because the wealth tax has cumulative exponential effects with time. From a revenue-maximizing perspective and applying the classical Ramsey rule that elastic tax bases should be taxed less, this would imply that old wealth should be taxed less than new wealth. Normatively, however, this conclusion feels wrong as old wealth is more likely to come from inheritances than be self-made.

The wealth tax accelerates the process of dispersion of stock ownership for very successful businesses that make their owners-founders billionaires. Dispersed stock ownership has been a feature of U.S. capitalism and is a key reason why taxing wealthy business owners is feasible. Importantly and in contrast to labor income, this dispersion does not mean that economic activity disappears. There might not even be any effect on the wealth stock if the government uses the wealth tax proceeds for public investment, debt reduction, or to create a sovereign fund. The wealth disappears only if the government cannot save the money and cannot encourage middle-class saving.

89. Piketty (2019) presents a broad history of such property right–sacralizing ideology.

VI. Conclusion

What can we conclude from our analysis about the prospects for progressive wealth taxation in the United States?

First, the wealth tax is likely to be the most direct and powerful tool to restore tax progressivity at the very top of the distribution. The greatest injustice of the U.S. tax system today is its regressivity at the very top: billionaires in the top four hundred pay less (relative to their true economic incomes) than the middle class. This regressivity is the consequence of the erosion of the corporate and estate taxes and the fact that the richest can escape the income tax by reporting only half of their true economic incomes on their individual income tax returns. A wealth tax with a high exemption threshold specifically targets the richest and could resolve this injustice.

Second, our analysis shows that the wealth tax has great revenue- and wealth-equalizing potential in the U.S. context. Household wealth has grown very large in aggregate (five times annual national income in 2018), and the rich own a growing fraction of it (around 20 percent is owned by the top 0.1 percent of families). The wealth tax, if the tax rates are high enough, is also a powerful tool to deconcentrate wealth. Wealth among the Forbes 400 has grown about 4.5 percentage points faster annually than average since 1982. A wealth tax of 2 or 3 percent per year can put a significant dent in this growth rate advantage. With successful enforcement, a wealth tax must either deliver revenue or deconcentrate wealth.⁹⁰ Set the rates low (1 percent) and you get revenue in perpetuity but little (or very slow) deconcentration. Set the rates medium (2–3 percent) and you get revenue for a long time and deconcentration eventually. Set the rates high (significantly above 3 percent) and you get deconcentration quickly but revenue does not last long. Which is best depends on one's objectives.

Can a wealth tax be successfully enforced? Our review of past and foreign experiences in addition to recent empirical work tells us that enforcement is a policy choice. We certainly have plenty of evidence showing that a poorly designed wealth tax generates a lot of avoidance and little revenue. But we have also learned lessons about how to design a wealth tax well. First, cracking down on offshore tax evasion, as the United States has started doing with FATCA, is crucial. Second, taxing expatriates, as the United States currently does, is also very important to

90. If neither materializes, it means that enforcement is not successful, or we learn that, in contrast to what all the data sources tell us, U.S. wealth is equally distributed.

prevent the mobile wealthy from avoiding the tax. Third, systematic reporting of wealth balances (instead of relying on self-assessments as for the estate tax) is a necessary condition for good enforcement, as the income tax amply demonstrates. Finally, the issue of valuation of closely held businesses is key for the integrity of the wealth tax. Our view is that the government has to create the currently missing (or highly private) markets for equity of large closely held businesses. It is often the case that accounting rules develop in synergy with the tax system.

As a caveat, it is important to note that progressive wealth taxes are fragile and susceptible to being undermined. The left could undermine its political support by lowering the exemption threshold too much and creating hardship for the illiquid merely rich. The right could then undermine its effectiveness by providing exemptions (and hence loopholes) for certain asset classes or by imposing tax limitations based on income.

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