Wealth Taxation and Charitable Giving*

Marius A. K. Ring† and Thor O. Thoresen‡

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Abstract

We provide novel evidence on capital taxation and charitable giving on two fronts. First, we use quasi-experimental variation in the annual Norwegian wealth tax to study how wealth taxation affects giving. Inconsistent with the notion that households give more to reduce future tax liabilities, we find that wealth taxation reduces the amount that households give. Second, using bunching at an income-tax exemption threshold for giving, we find a modest own-price elasticity. This elasticity is slightly decreasing in income and wealth. We find no evidence that it is causally affected by wealth taxation. We use our combined findings to estimate the structural parameters needed to model the effects of a wide range of tax reforms.

Keywords: Charitable giving, wealth taxation, capital taxation, intertemporal substitution
JEL codes: H24, H31, H41, D64

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1 Introduction

The use of tax incentives to promote charitable giving is ubiquitous. These incentives typically take the form of an income tax deduction that lowers the marginal price of giving (Saez 2004; Diamond 2006; List 2011). Such policies are in place in nearly all OECD countries (OECD, 2020) and have produced fertile grounds for a large empirical literature. The main focus of this literature has been to estimate the own-price elasticity of giving that is needed for determining the optimal tax incentives (Saez, 2004). The indirect effects of other types of taxation, such as those on household savings, have been neglected. This is despite a surging interest in taming wealth inequality through policies such as more comprehensive capital taxation (Bastani and Waldenström 2020b; Scheuer and Slemrod 2021; Saez and Zucman 2019a). Importantly, these policies may also tame households' willingness to voluntarily redistribute their wealth through charitable giving. Yet, these cross effects have seen little empirical attention nor played a role in the growing optimal capital taxation literature (see, e.g., Straub and Werning 2020; Rotberg and Steinberg 2021; Broer, Kohlhas, Mitman, and Schlafmann 2021; Guvenen et al. 2021; Gaillard and Wangner 2021; Boar and Knowles 2022).

This paucity of empirical evidence is problematic as there are clearly defined but theoretically ambiguous links between capital taxation and household giving behavior. Capital taxation in the form of a wealth, capital income, or capital gains tax reduces the after-tax return on savings that households can achieve. This renders current consumption as well as charitable giving relatively more attractive than saving for the future, which causes households to give more through an intertemporal substitution effect. This substitution effect behaves as a pseudo avoidance strategy in which households give more today in order to reduce life-time wealth taxes. Working in the opposite direction is the income effect. As wealth taxes reduce after-tax wealth and disposable income, households choose to give less. In sum, whether the giving channel accelerates the redistributive potential of capital taxation or tames it is theoretically ambiguous. Whether these linkages between giving and capital taxation should be a first-order concern in optimal taxation is an open, unexplored question.

Empirically studying the effect of capital taxation on giving is challenging due to (i) a scarcity of identifying variation in the after-tax return on savings that is both exogenous and plausibly uncorrelated with other determinants of charitable behavior; and (ii) limited data on household giving. In many settings, charitable giving is self-reported, which leaves it unclear whether one is observing changes to reporting or actual giving behavior (Tazhitdinova, 2018). We overcome these challenges by using rich Norwegian administrative data and exploiting quasi-experimental variation in the annual taxation of net wealth.

We present new empirical evidence on capital taxation and charitable giving on two fronts and tie the results together in a simple life-cycle model that incorporates charitable giving. *First*, we provide novel empirical evidence on how capital taxation affects charitable giving, obtaining identifying variation from salient changes to the wealth tax treatment of housing wealth. Starting in 2013, secondary housing wealth enters the wealth tax base at an increasingly higher fraction of its estimated market value. This means that secondary home owners saw more of their wealth pushed above the wealth tax threshold, thereby increasing their wealth tax exposure on both the intensive margin (how much they paid in wealth taxes) and extensive margin (their marginal tax rate on wealth). The nature of the reform allows us to control for overall estimated housing wealth while obtaining identification from pre-reform portfolio allocation into secondary versus primary housing wealth. We use this variation in a difference-in-differences (DiD) instrumental-variables (IV) framework.

For many years prior to the reform, treated and control households were on identical trajectories in terms of their giving behavior.[1] However, as soon as the reform occurs in 2013, we find that there is a sharp reduction in the giving of secondary home owners. Using our IV specification, we find that a one percentage point increase in the tax rate on wealth decreases giving by a sizable 23%.

For modeling purposes, it is useful to understand the underlying forces. Theoretically, our negative giving estimate is the combination of a negative income effect of paying more in wealth taxes and a positive intertemporal substitution effect from extensive-margin wealth taxation increasing the relative price of future giving. By disentangling the effects, we may better understand how giving would be affected if the wealth tax were more progressive and thus substitution effects more important. Using a Gruber and Saez (2002) style approach, we empirically decompose the two effects by exploiting the current progressivity of the Norwegian wealth tax schedule. We find that the negative effect on giving is, in accordance with theory, driven by households' paying more in wealth taxes on the intensive margin. Interestingly, we find no evidence of offsetting positive effects of paying a wealth tax on the extensive margin. Inconsistent with intertemporal substitution effects being important, our point estimate is economically and statistically close to zero. In other words, the pseudo avoidance strategy of giving more now to reduce life-time wealth taxes is not present in our data.

Second, we use a bunching framework to estimate the elasticity of charitable giving with respect to its after-tax price. This elasticity, although nominally unrelated to wealth taxation, provides a crucial empirical moment for calibrating a structural model of giving. In Norway, charitable giving is deductible from the income tax base, up to a fixed deduction limit. These deductions occur automatically as charitable organizations report giving amounts directly to the tax authorities. Importantly, the presence of a deduction limit creates a large discontinuity in the marginal after-tax price of giving, which allows us to make novel use of a bunching framework to infer the compensated after-tax own-price elasticity of giving. We find that the elasticity is

[1] We find the lack of pre-trends reassuring as we are not aware of other economic shocks occurring during 2013 that could explain the lack of pre-trends but a sharp effect as of 2013. Nevertheless, we include a rich set of control variables, including over-all housing wealth, taxable wealth, income, age, and family size to limit the set of potential confounding factors.

economically modest at about -0.37 but precisely estimated.

To inform structural modeling efforts, we investigate whether it is reasonable to assume that the compensated own-price elasticity is constant and uniform across taxpayers. By using regression-based techniques to uncover bunching heterogeneity (Bastani and Waldenström, 2020a), we find that the magnitude of the elasticity is decreasing in income and wealth, but that this heterogeneity is economically small. The lack of meaningful own-price elasticity heterogeneity can be driven by (i) an absence of preference heterogeneity together with (ii) no causal connection between wealth or income and price sensitivity; or, alternatively, that (iii) preference heterogeneity cancels out a causal connection. We investigate this third hypothesis by using our quasi-experimental variation in wealth tax exposure. This plausibly holds preferences constant and identifies the effect of a shock to after-tax wealth and disposable income. Interestingly, this reveals no effect. Taken together, our findings support the common assumption, that we also use in our model, of a constant compensated price elasticity that is uniform across taxpayers.

Finally, we combine our empirical findings to inform a model of charitable giving. We assume that households' per-period utility is given by

$$\frac{c_t^{1-1/\sigma}}{1-1/\sigma} + \kappa \frac{g_t^{1-1/\varepsilon}}{1-1/\varepsilon}, \tag{1}$$

where c_t is consumption, σ is the elasticity of intertemporal substitution, g_t is charitable giving, and ε is a key preference parameter governing how giving responds to various tax incentives. We first show theoretically that giving responses to wealth taxation are jointly determined by σ and ε, but that the compensated own-price elasticity is driven only by ε. Accordingly, we use the bunching evidence to determine that $\varepsilon = 0.37$ to help calibrate our model. We then find that the EIS (σ) must equal 0.065 to replicate our findings on how wealth taxes affect giving. This low implied EIS is consistent with our finding of no substantial effects of extensive-margin wealth taxation. Our calibration exercise highlights how our findings from two different research designs inform the core parameters needed to model how charitable giving responds to a wide range of tax incentives. We illustrate the applicability of our calibrated model by simulating the partial-equilibrium response of a removal of the income-tax deductibility of giving. The effect of this removal implies an uncompensated own-price elasticity of -0.38, which is quite close to our estimated compensated elasticity of -0.37.

An important question is whether the effects of giving is of a magnitude that warrants attention in optimal tax models and from policymakers. In terms of a propensity to give out of wealth tax payments, our estimate is in fact economically modest at -0.011. However, this low level effect is driven by the low level of giving in welfare-state countries such as Norway. Hence, we further use our model to calculate dollar for dollar crowd-out effects in a high-giving environment such as the U.S, where giving as a fraction of GDP is more than ten times higher than in most European countries (OECD, 2020). By recalibrating κ such that giving equals 5% of gross income (List, 2011), we find a considerably higher crowd-out effect: each additional \$1 of annual wealth tax revenues would reduce the revenues of charitable organizations by \$0.19. We further find that the low EIS drives this large crowd out. Setting the EIS equal to unity (i.e., log utility), each \$1 of annual wealth taxes *increases* giving by \$0.02. Hence, spillover effects on charitable giving may indeed play a first-order role in determining the total redistributive effect of wealth taxation when the EIS is low, which is what this and other quasi-experimental papers find (e.g., Best, Cloyne, Ilzetzki, and Kleven 2020), and when the overall level of giving is high, as in, e.g., the U.S. and the U.K.

Literature. Our paper contributes to a growing empirical literature on the effects of capital taxation (see, e.g., Lavecchia and Tazhitdinova 2021; Agersnap and Zidar 2021; Glogowsky 2021; Nekoei and Seim 2021; Martínez-Toledano 2020; Boissel and Matray 2021; Arefeva, Davis, Ghent, and Park 2021; Agrawal, Foremny, and Martinez-Toledano 2020; Dray, Landais, and Stantcheva 2022), and in particular, the literature on household responses to wealth taxation (Seim 2017; Zoutman 2018; Durán-Cabré, Esteller-Moré, and Mas-Montserrat 2019; Londoño-Vélez and Ávila-Mahecha 2020a; Londoño-Vélez and Ávila-Mahecha 2020b; Jakobsen et al. 2020; Brülhart, Gruber, Krapf, and Schmidheiny 2021; Ring 2020; Berg and Hebous 2021). Our main contribution to this literature is to consider the effect on charitable giving. This contribution is important for three reasons. (i) Any effect on giving may amplify or muzzle the intended redistributional effects of wealth taxation. (ii) There is no direct evidence on how wealth taxation affects consumption, charitable giving included. (iii) In our setting, charitable giving is third-party reported, which allows us to isolate real responses. The existing wealth tax literature primarily either focuses on evasion or considers combined evasion, avoidance, and real responses to wealth taxes. A central finding in the wealth tax literature is that reported wealth is very sensitive to taxation. Extrapolating from this, one might expect to find that a way in which households reduce their wealth tax burden is to increase their giving. Our findings do not support this notion.

We further add to the body of research on the role of tax incentives in charitable giving. This literature is particularly concerned with the own-price elasticity of giving (see, e.g., Feldstein 1975; Randolph 1995; Auten, Sieg, and Clotfelter 2002; Meer 2014; Meer and Priday 2020; Bakija and Heim 2011; Fack and Landais 2010; Duquette 2016; Almunia, Guceri, Lockwood, and Scharf 2020; Hungerman and Ottoni-Wilhelm 2021; Cage and Guillot 2021). Our most direct contribution is to estimate the after-tax own-price elasticity using a methodology that is new to this literature in combination with third-party reported data on giving. Few papers in this literature exploit non-linear price schedules, as we do, likely because exemption caps are typically not fixed, but depend on taxable income, as in the U.S. federal tax code.[2] The fact that we employ third-party reported data on giving allows us to focus on actual giving rather

[2] A notable exception is Hungerman and Ottoni-Wilhelm (2021) who exploit a state tax exemption threshold to estimate the elasticity of giving to a specific university.

than itemization responses to tax incentives (Meer and Priday, 2020). Consequently, our price elasticity of -0.37 is considerably smaller in magnitude than the elasticity of around -1 found in several of the analyses based on U.S. data.[3] In addition, we provide important evidence on elasticity heterogeneity. Our finding that richer, higher-income households are less price elastic suggests that the opposite finding in other settings may be purely driven by itemization as opposed to real giving responses.

Our main addition to this literature is to consider the effects of capital taxation.[4] By documenting how capital taxation affects giving, we shed new light on the intertemporal aspects of charitable giving (see, e.g., Breman 2011; Andreoni and Serra-Garcia 2021; and Meier 2007). In particular, our finding of weak intertemporal substitution effects implies that households care not only about how much they give but also *when* they give it. This has implications for how one should model preferences for giving. Our paper also provides novel evidence on income effects. By studying the response to wealth taxation, we provide information on the marginal propensity to give out of unearned income. To our knowledge, few such quasi-experimental estimates exist (see Drouvelis, Isen, and Marx 2019 for an overview). We also study whether capital taxation can affect the *own*-price elasticity of giving. This is related to the notion that behavioral elasticities are not immutable parameters, but can rather be influenced by various policy instruments at the tax authorities' disposal (Slemrod and Kopczuk, 2002). While, e.g., Fack and Landais (2016) document the effect of tax enforcement on the price elasticity of giving, there is no evidence on whether nominally unrelated tax parameters, such the tax rate on wealth, may alter this elasticity.

Relatedly, we also contribute to the rich literature that studies crowd-out effects in charitable giving (see, e.g., Deryugina and Marx 2021; Gruber and Hungerman 2007; Andreoni and Payne 2003; Okten and Weisbrod 2000; Meer 2017; Payne 1998; Nyborg and Rege 2003; and Boberg-Fazlić and Sharp 2017). This literature is particularly concerned with how government spending crowds out private giving. However, little attention is given to how the *financing* of government spending through taxation may play an additional role.

The paper proceeds as follows. Section 2 introduces a simple life-cycle model with charitable giving that highlights the relationship between our reduced-form findings and structural primitives. Section 3 introduces the data and describes the wealth tax scheme and the tax treatment of charitable giving. Section 4 presents quasi-experimental evidence on the effect of wealth taxation on giving. In section 5, we use a bunching approach to estimate the own-price elasticity. In section 6, we calibrate the life-cycle model to our empirical findings and discuss some applications of the model. Section 7 concludes.

[3]It should be noted that the U.S. evidence does not unambiguously point to large estimates. While Bakija and Heim (2011) conclude that the price elasticity is close to -1, Randolph (1995) reports estimates ranging from -0.3 to -0.5. Our estimate is larger than the intensive margin elasticity of -0.2 found by Almunia, Guceri, Lockwood, and Scharf (2020) in the U.K. but close to that found by Fack and Landais (2010) in France.

[4]Cage and Guillot (2021) exploit a wealth tax reform in order to obtain identifying variation in the relative price for political and charitable giving, as opposed to the after-tax return on savings (as we do).

2 Conceptual framework

In this section, we introduce a simple partial-equilibrium model of charitable giving. The resulting comparative statics demonstrate the connection between giving, wealth taxation, and the own-price elasticity of giving.

Model. Suppose an agent optimally chooses consumption, c_t, annual giving, g_t, and savings, s_{t+1}. The agent derives per-period utility from consumption and giving. We use the standard constant elasticity of intertemporal substitution preference specification, $u(c_t) = \frac{c_t^{1-1/\sigma}}{1-1/\sigma}$. We parameterize "warm-glow" utility from giving as $\kappa\frac{g_t^{1-1/\varepsilon}}{1-1/\varepsilon}$, where κ is a utility weight. This parametrization is convenient as it provides a constant compensated own-price elasticity equal to ε.

$$\max_{\{c_t, s_{t+1}, g_t\}} \quad \sum_{t=0}^{T} \beta^t \left[\frac{c_t^{1-1/\sigma}}{1-1/\sigma} + \kappa \frac{g_t^{1-1/\varepsilon}}{1-1/\varepsilon}\right], \tag{2}$$

$$\text{such that} \quad c_t = w_t - p_t g_t - s_{t+1} + s_t R_t \tag{3}$$

where c_t is period t consumption, g_t is period t giving, and p_t is the (after-tax) price of giving. R_t is the gross after-tax rate of return on any savings (i.e., it equals 1 plus the interest rate, r_t, minus the wealth-tax rate, τ_t). w_t is exogenous, disposable income.

If r_t is held constant, then $d\log R_t \approx -d\tau_t$ and $dR_t = -d\tau_t$. Hence, for simplicity, we do comparative statics with respect to R_t, but consider these equivalent to the effect of changing (in an opposite direction) the effective wealth tax rate, τ_t.

Proposition 1 *Assume that $R_t = R$ is constant from t to the end of the life-cycle, T. Then the level of giving, g_t, at some point in time, t, is determined by the following equation:*

$$g_t^{\sigma/\varepsilon}\left(\frac{p_t}{\kappa}\right)^{\sigma} \sum_{s=t}^{T} \beta^{\sigma(s-t)} R^{(\sigma-1)(s-t)} = \sum_{s=t}^{T} w_s R^{-(s-t)} - g_t p_t^{\varepsilon} \sum_{s=t}^{T} p_s^{1-\varepsilon} \beta^{\varepsilon(s-t)} R^{(\varepsilon-1)(s-t)}, \tag{4}$$

where w_t also contains beginning-of-period-t wealth.

Proof: See Appendix A.1.

Discussion: This equation is useful for calibrating the parameters, σ and ε, as we can use it to simulate the effects of changing R on g_t, and then determine which parameters produce responses that best resemble the empirical findings.

Proposition 2 *If R_t is constant over time, $p_t = 1$, and $T = \infty$, then the derivative of giving at time t with respect to the future after-tax rate of return, evaluated at $R = \beta^{-1}$, is given by*

$$\underbrace{\left(\frac{\sigma c_t + \varepsilon g_t}{\varepsilon g_t}\right)}_{\textit{Weighting}} \frac{dg_t}{dR} = \underbrace{-(\sigma-1)\sum_{s=t}^{\infty} w_s R^{-(s-t)-1}}_{\textit{Income v. substitution}} \underbrace{-\left(1-\frac{1}{R}\right)\sum_{s=t}^{\infty}(s-t) w_s R^{-(s-t)-1}}_{\textit{Human wealth effect}} \underbrace{-\frac{\varepsilon-\sigma}{R^2(1-R^{-1})} g_t}_{\textit{Elasticity adjustment}}. \tag{5}$$

Proof: See Appendix A.1.

Discussion: Letting $T \to \infty$ and evaluating at $R\beta = 1$ allows for simple comparative statics useful for building intuition. The shows that the key parameters governing responses to tax-induced rate-of-return shocks are σ and ε. The proposition further shows that the effect is governed by familiar sources: the first term on the right-hand side is the classic income versus substitution trade-off. Inside this term, the agent increases giving if the after-tax rate goes down (due to, e.g., a wealth tax) if and only if $\sigma > 1$. The second term is a human wealth effect in which lowering R increases present-value wealth, and thus giving through a wealth effect. The third term says that if giving is more elastic than consumption ($\varepsilon > \sigma$), then there is an additional intertemporal substitution effect. Finally, the *weight* term on the left-hand side says that the giving effect is larger whenever the quantity-weighted (i.e., by c_t or g_t) giving elasticity is large relative to the total weighted elasticity.

The proposition also shows that one empirical moment is not enough to pin down the structural parameters. Both σ and ε are important, but an empirical estimate of $\frac{dg_t}{dR}$ cannot be used to calibrate both. This motivates our empirical strategy, in which we use the estimated own-price elasticity to infer ε (see Proposition 3), and then the empirical estimate of $\frac{dg_t}{dR}$ to calibrate σ.

Proposition 3 *ε determines both the elasticity of the growth rate of giving with respect to the after-tax gross rate and the compensated own-price elasticity.*

$$\frac{d\log(g_{t+1}/g_t)}{d\log(R_t)} = \varepsilon \quad \text{and} \quad \frac{d\log(g_t)}{d\log(p_t)}\Big|_{u'(c_t)} = -\varepsilon. \tag{6}$$

Proof: The budget constraints and first-order condition for g_t imply that

$$-\mu \ \log(g_t) + \log\kappa = \log p_t + \log u'(c_t). \tag{7}$$

When substituting in the first-order condition for s_{t+1} (Euler equation), we obtain $\frac{d\log(g_{t+1}/g_t)}{d\log(R_t)} = \varepsilon$ and $\frac{d\log(g_1)}{d\log(p_1)} - \varepsilon - \frac{d\log u'(c_1)}{d\log(p1)}$. When considering a *compensated* (as in a bunching design) price elasticity, $d\log(u'(c_1)) = 0$, and hence the second term equals $-\varepsilon$.

Discussion: Our simple model and Proposition 2 show that ε is a key parameter in understanding how giving responds to (tax-induced) changes in the rate of return. We further learn that it may be directly estimated either (i) from the effect of rate-of-return changes on the growth of giving or (ii) from estimating the compensated own-price elasticity, using, e.g., a bunching design.

We also emphasize that $\frac{d\log(g_{t+1}/g_t)}{d\log(R_t)}$ provides an estimate for ε purely through an intertemporal substitution channel (i.e., Euler equation). Empirically, if the shock to R_t is correlated with unexpected shocks to R_{t+1}, then there will be an additional income effect during $t+1$ that drives down g_{t+1} and hence the growth rate. In our empirical setting, households treated by more wealth tax exposure in 2013 were even more treated in the subsequent years. Theoretically, this would cause a downward bias in the estimated ε.

Proposition 4 *The sensitivity of giving to the log gross after-tax rate of return is a constant fraction of the consumption sensitivity:*

$$\frac{d\log(g_t)}{d\log(R_t)} \quad = \quad \varepsilon \, \frac{1}{\sigma} \, \frac{d\log(c_t)}{d\log(R_t)}. \tag{8}$$

Proof: This follows from differentiating equation (7) with respect to $\log(R_t)$.

Discussion: Equation (8) shows that the sign of the giving response, $\frac{d\log(g_t)}{d\log(R_t)}$, equals the sign of consumption responses to changes in the after-tax rate of return. This highlights how the theoretical ambiguity regarding consumption responses to rate-of-return changes apply to giving as well.

3 Data and Institutional Setting

3.1 Data

We employ administrative register data on households' income and wealth over the period 2010–2018 (Statistics Norway, 2019). These data contain information on how much a given household pays in wealth taxes each year and the composition of taxable wealth. In particular, estimated housing wealth is one of the key contributors to households' taxable wealth. In assigning housing wealth, the tax authorities distinguish between primary (regular abode) and secondary housing wealth. Importantly for our approach, we observe this distinction in our data.

We combine these administrative data on income and wealth with third-party reported data on charitable giving, recently available from administrative registers for the 2012–2018 period. Since charitable giving is tax deductible in the personal income tax, the tax authorities keep records of how much taxpayers give to charitable organizations. In order to limit the scope for tax evasion and reduce the the administrative burden for the taxpayer, the tax authorities require these amounts to be reported directly by the recipient organizations. The tax authorities maintain a comprehensive list of qualified charitable and religious organizations, and all of these report yearly donated amounts at the individual level to the tax authorities. Importantly, data are not truncated at the personal income tax deduction threshold; full amounts are reported. This provides us with rather unique, as well as comprehensive, panel data of charitable giving at the household level. It follows that these data are not affected by issues related to self-reporting. Finally, since these data are only available from 2012, we supplement with a longer panel of charitable giving deductions from household tax returns. While these are truncated, they allow us to assess the internal validity of our study by examining pre-trends.[5]

3.2 The Norwegian Wealth Tax

Norway has a long tradition of annually taxing net wealth using a progressive scheme. As of 2009, the wealth tax has taken a relatively simple form, where households pay wealth taxes according to the following formula:

$$wtax_{h,t} = \tau_t \mathbb{1}[TNW_{h,t} > T_t](TNW_{h,t} - T_t), \tag{9}$$

which states that for household h, observed at the end of year t, any taxable net wealth (TNW) in excess of a threshold, T_t, is taxed at a rate of τ_t.[6] Tax rates and thresholds (2011–2018) are presented in Panel A of Table 1. The threshold increased from NOK 750,000 (USD 125,000) in 2012 to NOK 1,480,000 (USD 250,000) in 2018.[7]

The tax revenue from wealth taxation is relatively modest. In 2020, it accounted for 1.2% of total tax revenue and 0.4% of GDP. However, this is not necessarily caused by enforcement issues, but is rather due to the policy choice of a modest nominal tax rate, as well as favorable treatment of some of the TNW components.[8] In particular, while financial wealth predominantly enters at third-party reported market values, taxable (estimated) housing wealth is set a discounted value, as indicated by

$$\text{Taxable Value of Housing Wealth} = (1 - d_t^{primary})MVHP_t + (1 - d_t^{secondary})MVHS_t, \tag{10}$$

where $d_t^{primary}$ and $d_t^{secondary}$ refer to the discount rates for the different types of housing assets. $MVHP$ is the estimated market value for primary housing.[9] This refers to the value of the habitual abode of households, the address at which households are registered to live in according to government registers. $MVHS$ refers to secondary homes, which are homes that, based on their construction code in real-estate registers, would qualify for permanent residency. However, they are categorized as secondary rather than primary housing only because of their registered current use: taxpayers may only own one unit of primary housing, but multiple units of secondary housing.

[5] This longer panel is used when we provide event plots in order to evaluate pre-trends. In Appendix Figure A.1 we show that reduced-form effects after 2012 differ only slightly when using these different data sources.

[6] We account for the fact that married households are subject to two times the nominal threshold.

[7] We use the 2012 USD/NOK exchange rates for 2012 of about 6.

[8] Enforcement issues appear limited to the very wealthiest households who may hide wealth abroad. See, e.g., Alstadsæter, Johannesen, and Zucman (2019) and Alstadsæter, Johannesen, and Zucman (2018) for more on this.

[9] From 2010 and onwards the tax administration has been operating a completely new valuation procedure for primary and secondary housing. The new procedure is based on hedonic regressions to predict the market value for each Norwegian house. See Ring (2020) for a detailed discussion of the methodology.

The evolution of the valuation discount rates, and how they changed for different types of housing, is our central source of identifying variation in wealth tax exposure. The valuation discount on primary housing, $d_t^{primary}$ has been been fixed at 75% over the whole period, while the discount on secondary housing, $d_t^{secondary}$, decreased from 60% in 2011 to 10% in 2018. This implies that even if we keep the total value of housing wealth, $MVH = MVHP + MVHS$, constant, households who hold more $MVHS$ will see a rapid increase in TNW over time. From equation (9), we see that this may cause both a higher annual wealth tax bill, as well as higher propensity to face a lower marginal return on any marginal saving (working through τ_t).

The presence of a wealth tax threshold in equation (9), as represented by the indicator function, $\mathbb{1}[TNW_{h,t} > T_t]$, is a key ingredient in this institutional setting. If the tax were linear, changes in the discount rates on estimated housing wealth would not affect marginal rates-of-return on savings, and therefore intertemporal substitution effects would not be present. Instead, we have a setting in which marginal and average wealth tax rates (MWTR and AWTR) generally differ, and may be affected differently from changes in assessed housing wealth.

$$MWTR = \tau_t \mathbb{1}[TNW_{h,t} > T_t], \tag{11}$$

$$AWTR = \tau_t \mathbb{1}[TNW_{h,t} > T_t] \frac{TNW_{h,t} - T_t}{Net\ Wealth_{h,t}}, \tag{12}$$

where $Net\ Wealth$ is obtained by removing assessment discounts on housing wealth from TNW.

Finally, we note that is an easy task for taxpayers to understand how secondary housing wealth affects how much they pay in wealth taxes. Annual tax returns are pre-filled with an individual's assets, and how much they contribute to taxable wealth. From this pre-filled return, it is straightforward to see how different housing assets increase the wealth tax bill. In addition, prior to any given tax year, a households' income tax withholding rate is set by the tax authorities, and is calculated by predicting future income and wealth taxes. Households who wish to revise their withholding rate will see how secondary housing wealth affects their estimated tax bill.

3.3 Tax Treatment of Charitable Giving

Since 2003, donations to nonprofit charitable and religious organizations are tax deductible in the "ordinary income" tax base. The list of exemption-approved organizations is comprehensive (Sivesind, 2015) and includes international organizations such as Amnesty International, the Red Cross, and Doctors Without Borders. The ordinary income tax base is taxed at a flat rate, which implies that the after-tax price of giving does not depend on an individual's taxable income. This differs from other countries, such as the U.S., where charitable giving is also deductible in the tax bases that are subject to progressive taxation. For the 2021 tax year, for example, the government refunded 22% of taxpayers' charitable giving up to a limit of NOK 50,000 (USD

8,300).

More generally, a taxpayer, i, gets a tax refund of τ_t^g on any charitable giving, $g_{i,t}$, that does not exceed the exemption cap, K_t. This creates a jump in the marginal net-of-tax price of 1 NOK worth of giving from $1 - \tau_t^g$ to 1. The Norwegian tax treatment of charitable giving thus offers a tax-induced kink in the (after-tax) price, which allows the use of the bunching estimator (Saez 2010; Kleven 2016) to derive conventional tax-price elasticity estimates for charitable giving.

We summarize these tax rates and exemption caps in Panel A of Table 1. Over the period for which we have data, the after-tax price of giving has increased, but at the same time, the exemption caps have risen, allowing more giving to be deductible from the income tax. The tax rate, τ_t^g, has gone down from 28% in 2012 to 23% in 2018, the maximum deduction, K_t has moved from NOK 12,000 (USD 1,500) in 2012 to NOK 40,000 (USD 6,700) in 2018.[10]

Importantly, while the Norwegian income tax scheme directly incentivizes charitable giving through lowering its after-tax price, the wealth tax does not. This differs from wealth taxation in other settings. For example, in France, charitable giving was partially deductible from the annual wealth tax (Cage and Guillot, 2021): €1 in giving could reduce the wealth tax bill by €0.75. In the U.S. estate tax, charitable donations are deductible from the estate tax base (Bakija, Gale, and Slemrod, 2003), which is subjected to high marginal rates. Thus, in these settings, capital taxation has a strong, direct effect on incentives to give through altering its after-tax price.

3.4 Summary Statistics

Panel B of Table 1 provides the main summary statistics for our data. Our primary sample consists of households whose TNW was at most 0.5 million NOK (MNOK) below the threshold in 2012, and at most 6 MNOK. This restricts the sample to households for whom decreases in housing discount rates may materially affect their wealth tax position. These TNW restrictions are not imposed when studying bunching at the giving deductibility threshold. We further condition on households having strictly positive (estimated) market-value housing wealth (MVH) as of 2012. The table shows that 42% of the individuals in our sample paid a wealth tax in any given year, and conditional on paying the tax, they paid about NOK 14,000 (USD 2,300 as of 2012) on average.

Approximately 19% of the households in our sample owned a secondary house. We further see that 27% of the individuals in our sample donated in any given year, and conditional on giving, they gave on average approximately NOK 4,700 (USD 780).

[10] The tax rate reductions follow from a reduction in the corporate tax. The rate was reduced from 28% in 2013 to 22% in 2019 and as the Norwegian dual income tax system maintains a link between the corporate tax and the tax on ordinary income in the personal income tax scheme, the tax price on charitable giving changed accordingly.

Table 1: INSTITUTIONAL DETAILS AND SUMMARY STATISTICS

Notes: Panel (A) provides details on wealth taxation during our sample period. Panel (B) provides summary statistics for the primary analysis sample. Charitable giving and age are measured at the individual level. Wealth taxes, income, and wealth variables are measured at the household level, but a married household will appear twice for the purposes of the summary statistics. Net wealth equals undiscounted taxable wealth; this is done by removing housing discounts from TNW. Amounts in Norwegian kroner (NOK) may be divided by 6 to obtain an approximate USD amount as of 2012.

PANEL A: INSTITUTIONAL DETAILS

	2011	2012	2013	2014	2015	2016	2017	2018
Contribution to TNW, $(1 - d_t^{(\cdot)})$								
Primary, MVHP	25%	25%	25%	25%	25%	25%	25%	25%
Secondary, MVHS	40%	40%	50%	60%	70%	80%	90%	90%
Wealth tax rate, τ_t	1.1%	1.1%	1.1%	1.0%	0.85%	0.85%	0.85%	0.85%
Wealth tax threshold, T_t (MNOK)	0.7	0.75	0.87	1	1.2	1.4	1.48	1.48
Giving tax deduction rate, τ^g	28%	28%	28%	27%	27%	25%	24%	23%
Giving deduction cap, K_t (NOK 1,000)	12	12	12	16.9	20	25	30	40

PANEL B: SUMMARY STATISTICS, MAIN SAMPLE, 2012–2018

	N	mean	p25	p50	p75
$1[\text{Giving}_{i,t} > 0]$	6,144,211	0.27			
$\text{Giving}_{i,t}$ if > 0	1,677,608	4,694	1,240	2,880	4,800
$1[wtax_{h,t} > 0]$	6,144,211	0.42			
$wtax_{h,t}$ if > 0	2,596,350	14,131	3,518	8,705	18,229
$\text{MWTR}_{h,t}$ if > 0	2,596,350	0.0096			
$\text{AWTR}_{h,t}$ if > 0	2,596,350	0.0020			
As of 2012:					
$\text{MVH}_{h,2012}$, MNOK	934,025	3.57	2.03	2.96	4.49
$\text{MVHS}_{h,2012}$ if > 0, MNOK	179,970	2.06	0.97	1.66	2.64
Net $\text{wealth}_{h,2012}$	934,025	3,818,223	2,424,777	3,377,356	4,747,851
$\text{Age}_{i,2012}$	934,025	61	51	62	71
Gross $\text{income}_{h,2012}$	934,025	792,994	411,101	646,040	1,019,486
Number of adults_h	934,025	1.65	1.00	2.00	2.00

We make a few adjustments to mitigate the impact of outliers. We bound the amount of wealth taxes paid, $wtax_{h,t}$, to 10% of $TNW_{h,2012}$. This adjustment affects only a modest number of households (who saw a cumulative TNW increase of at least 1000%). In addition, to account for moderate level increases from a small initial TNW, we limit $wtax_{h,t}$ to 10% of 1 MNOK if $TNW_{h,2012}$ is below 1 MNOK. We also limit both individual and household-level annual giving to NOK 100,000 (USD 16,700). This affects very few households.[11] When taking logs of giving, we do not limit the amount, but shift it by an inflation-adjusted NOK 1,000 in order to limit the influence on very small level differences in regressions. Gross income, whose logarithm is

[11] Conditional on giving a positive amount, the 99th percentile of household giving is NOK 50,000.

used as a control variable, is shifted by an inflation-adjusted NOK 10,000 prior to taking the logarithm.

4 The Effect of Wealth Taxation on Charitable Giving

Hypotheses. There are at least two straightforward ways of producing hypotheses about the effect of wealth taxation on charitable giving. We may consider charitable giving as a form of consumption or assume that it is tightly linked to consumption through intratemporal first-order conditions as in our model in section 2. In these cases, the sign of the giving response equals the sign of the consumption response, which is theoretically ambiguous (see, e.g., Straub and Werning 2020). This ambiguity is driven by countering income and substitution effects. The income effect lowers the amount of charitable giving, as more wealth taxation lowers lifetime after-tax wealth under the assumption that a charitable transfer is a normal good. The substitution effect causes more giving by changing the relative price of consumption across periods. More specifically, future consumption becomes relatively more expensive, which incentivizes households to consume (and give) more today rather than in the future.

The standard assumption in public finance is that substitution effects dominate. In structural models, a sufficient condition is generally that the elasticity of intertemporal substitution exceeds unity. Hence, the baseline hypothesis is that wealth taxation *increases* charitable giving.

4.1 Descriptive Evidence on Charitable Giving Around the Wealth Tax Threshold

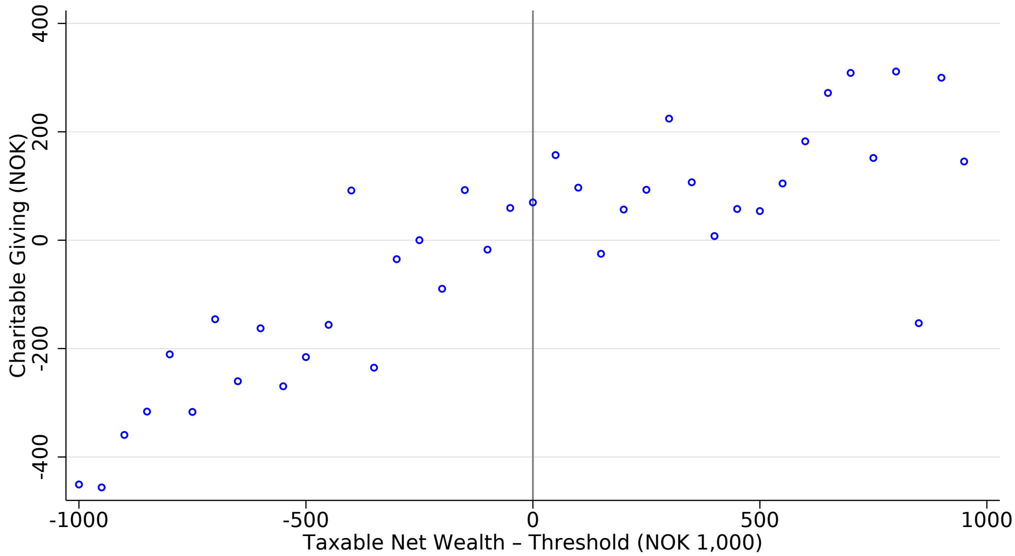
We first provide purely descriptive evidence on the relationship between wealth taxation and charitable giving. Since only taxpayers with taxable net wealth (TNW) above a threshold (T) are subject to the wealth tax, we examine how giving behavior changes around this threshold in Figure 1. Since wealthier households give more (Andreoni 2006; Meer and Priday 2021; Thoresen et al. 2021), we expect an overall positive slope. To the extent that wealth taxation affects giving, we expect intertemporal substitution to increase giving right around the threshold, and income effects to reduce the slope as we move further to the right. These expectations are mostly met in the data, with the absence of anything resembling a spike in giving at the threshold.

4.2 Quasi-Experimental Evidence from Housing Assessments

While our descriptive findings in Figure 1 suggest a negative association between wealth taxation and giving, the vast scope for identification issues such as omitted variable bias lend them little causal credibility. Our solution is to employ quasi-experimental variation in wealth tax exposure caused by changes in the wealth tax scheme. Specifically, we exploit the decrease in the assessment discount rate on secondary housing over the period 2013–2018 as a shock to wealth tax exposure, which is increasing in initial ownership of secondary housing.

Figure 1: Descriptive Evidence on Charitable Giving Around the Wealth Tax Threshold

This figure shows the relationship between charitable giving and households' position relative to the wealth tax threshold. Households with taxable net wealth above the threshold, pay a wealth tax on the excess amount. The scatter points are obtained by regressing the amount of charitable giving, at the individual level, on NOK 50,000 TNW bins, reordered such that 0 corresponds to the wealth tax threshold applicable to the household. This regression includes controls for age, log household gross income, as well as year fixed effects. Scatter points are normalized, such that the negative 250,000 TNW bin takes a value of zero. When estimating separate linear slopes on the left and right of the threshold, we find a significant slope change of -0.00058 (se=0.00014) and an insignificant discontinuity of -77.8 (se=62.5).



4.2.1 Quasi-Experiment Empirical Methodology

Our empirical framework exploits the fact that households with the same total housing wealth will see differential wealth taxation from 2013 to 2018, depending on the share of taxable housing wealth due to secondary housing (see section 3.2 for details.

We use an instrumental variables (IV) approach, where the initial stock of secondary housing wealth is used as an instrument for wealth tax exposure. Importantly, this is done by controlling for over-all housing wealth and other measures of wealth and income. More specifically, we estimate the following system of equations to identify the effect of wealth tax exposure on charitable giving behavior.

$$
\begin{aligned}
wtax_{h,t} &= \underbrace{f_t(MVHS_{h,12}, TNW_{h,12})\mathbb{1}[t > 2012]}_{\text{Secondary housing wealth instrument}} + \tilde{f}^{FS}(MVHS_{h,12}, TNW_{h,12}) \\
&+ g_t^{FS}(MVH_{h,12}, TNW_{h,12}) + \alpha_t^{FS} + \eta_t^{FS} C_{h,t} + \epsilon_{h,t}^{FS}, \qquad (13)
\end{aligned}
$$

$$
\begin{aligned}
Giving_{h,t} &= \underbrace{\beta x_{i,t}}_{\text{Instrumented variation}} + \underbrace{\tilde{f}^{RF}(MVHS_{h,12}, TNW_{h,12})}_{\text{Differences out 2012 effect}} \\
&+ \underbrace{g_t^{RF}(MVH_{h,12}, TNW_{h,12})}_{\text{Controls for overall housing wealth}} + \alpha_t^{RF} + \eta_t^{RF} C_{h,t} + \epsilon_{h,t}^{RF}, \qquad (14)
\end{aligned}
$$

where MVH includes the total market value of primary ($MVHP$) and secondary housing ($MVHS$), g_t^{FS} and g_t^{RF} are estimated as time-varying polynomial functions, which take the same functional form as f, $\tilde{f}^{FS}$, and $\tilde{f}_t^{RF}$.[12] $C_{h,t}$ is a vector of household-level controls, which includes third-order polynomials in $TNW_{h,2012}$ and age, as well as a second-order polynomial in family size. $C_{h,t}$ further includes a dummy variable for whether there are two adults in the household, and log household labor income in 2012. We also include a 2012-valued indicator variable for ownership in secondary or recreational housing.[13] α_t^{FS} and α_t^{RF} are year fixed effects, and $\epsilon_{h,t}^{FS}$ and $\epsilon_{h,t}^{RF}$ are the error terms.

The instrumental variation comes from $f_t(MVHS_{h,2012}, TNW_{h,2012})$, which provides identifying variation for $t > 2012$, when the post-2012 indicator, $\mathbb{1}[t > 2012]$, turns on. This exploits exogenous variation in wealth tax exposure driven by an increased contribution of $MVHS$ to the wealth-tax base over time, which allows us to estimate β, the coefficient of interest. The $\tilde{f}(\cdot)$ terms difference out the baseline (2012) effect from the instrument. In other words, we employ a DiD-IV specification.

In order to estimate differential effects with respect to extensive and intensive margin wealth tax exposure (e.g., using both the marginal and average wealth tax rate as the left-hand-side variable in equation 13), we allow the first-stage effect of $MVHS_{h,12}$ to vary by TNW in 2012. A reasonable assumption is that households with higher initial TNW (and who therefore are further away from the wealth tax threshold) see relatively larger intensive margin (i.e., amount paid) than extensive margin effects (i.e., whether you pay). To the extent that this holds, we will be able to separately identify the effects of intensive and extensive margin variation in wealth tax exposure.[14] We parameterize by letting first-stage and reduced-form effects vary

[12] For each function, g_t^{FS}, g_t^{RF}, f_t, $\tilde{f}^{FS}$, and $\tilde{f}^{RF}$, we estimate three parameters, as indicated by equation (15).

[13] A third category of housing, recreational housing (as cabins and other recreational dwellings) is assessed at historical cost (typically initial construction cost). This indicator variable thus controls for whether the household owns more than one housing unit.

[14] See Gruber and Saez (2002) for an implementation of this approach in the context of labor income taxation,

non-parametrically with initial TNW.

$$f(MVHS, TNW) = \sum_j \eta_{b_j} \mathbb{1}[b_j <= TNW - T_{12} \geq b_{j+1}] \cdot MVHS, \tag{15}$$

where T_{12} refers to the wealth tax threshold in 2012,[15] and $b_j = -0.5, -0.4, ..., 0.3,\ 0.4, 0.6, 0.8, 1.2, 1.6,\ 2M, \infty$ MNOK, and the sample is limited to households with $TNW_{h,12} - T_{12} \geq b_1$.

In one application of this approach, we define the intensive margin to be the average wealth tax rate, $AWTR$, and the extensive margin to be the marginal rate, $MWTR$. We thus estimate two coefficients, β^{AWTR} and β^{MWTR}. The sum of these two coefficients provide an important statistic: the effect of changing a linear tax rate on capital. That is, the effect of changing the wealth tax rate in an environment in which there is no tax threshold.

4.2.2 Results on Giving Behavior

Graphical, reduced-form evidence. We first provide reduced-form evidence in Figure 2 on how secondary-housing ownership affects wealth tax exposure and charitable giving over time. This is done by estimating a linear, time-varying relationship between initial secondary housing wealth and wealth taxes paid as well as the amount of charitable giving.[16] For this analysis, we use the longer panel of giving, which is truncated at the tax-deduction threshold.

Figure 2 shows that initial ownership of more secondary housing, $MVHS_{h,2012}$, provides a strong first-stage effect on wealth tax exposure. Each additional MNOK of $MVHS_{h,2012}$ increases the annual wealth tax bill by about NOK 2,400 by the end of the sample period. We further see that it has a clear effect on charitable giving: By 2018, household giving is reduced by about NOK 43. Combining these estimates, we find that each additional NOK of wealth tax reduces annual giving by 0.018. Below, when we use the full IV specification and the nontruncated (shorter) panel on giving, we find qualitatively similar results.

These findings are useful in understanding the dynamics of the effect. Households appear to respond gradually as the treatment intensifies, and there is no evidence of pre-trends. However, the underlying specification does not use the full potential power of the experiment: we are not exploiting the fact that households with different pre-period taxable wealth see very different first-stage effects on wealth tax exposure (as documented in Appendix Table A.2) . In addition, the specification does not allow us to distinguish between extensive and intensive-margin wealth tax exposure—which is why we turn to the richer IV specification below.

---

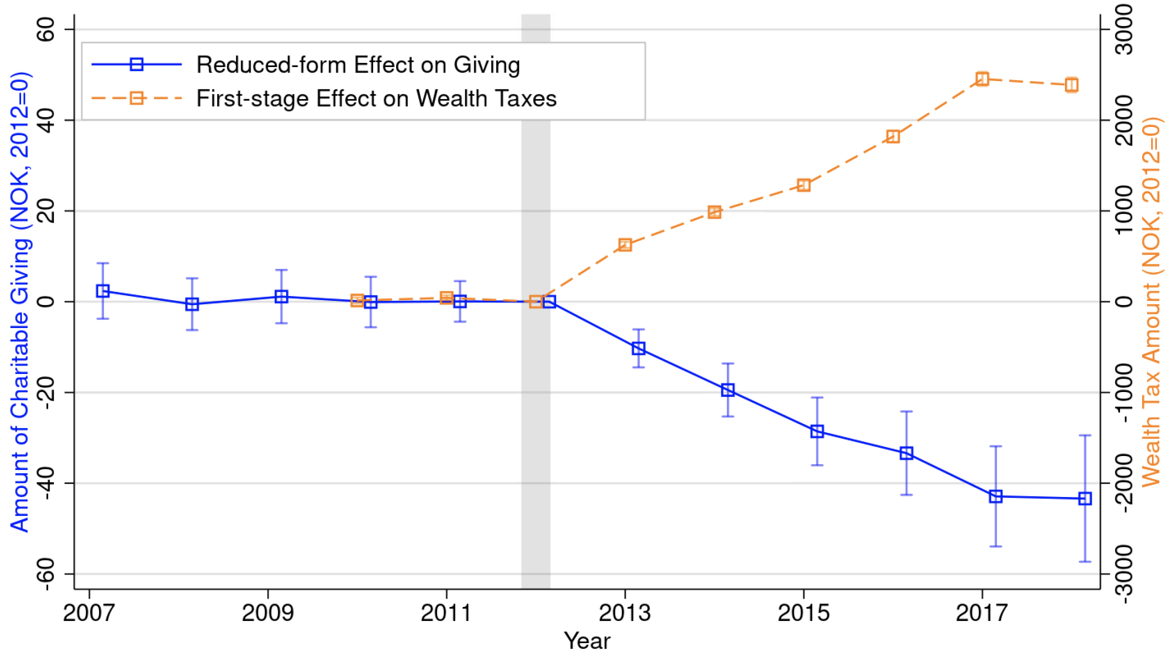
and Ring (2020) in the context of saving responses to wealth taxation.

[15] While there is no household-level subscript on T_{12}, we account for the fact that married households face a double threshold by using 2012 marital status.

[16] We modify f in equations (13)-(14) to be a linear function in $MVHS$, where the slope may differ across years.

Figure 2: Wealth Taxation and Charitable Giving: Quasi-Experimental Evidence from the Tax Valuation of Secondary Housing

Notes: The point estimates come from estimating equations (13) and (14), simplifying $f(\cdot)$ to be a year-specific linear function of $MVHS_{h,2012}$ alone. Giving is measured using the "long panel" of charitable giving deductions from tax returns. The point-estimates for 2018 are -43.4 (se=7.11) for giving and 2388.5 (se=41.5) for amount of wealth taxes.



IV results. In Table 2, we present results from the full DID-IV estimation, which also uses the shorter, nontruncated panel on charitable giving that starts in 2012.

Estimated propensities to give out of higher wealth taxes. Columns (1)-(2) examine the effect on the amount given. In column (1), we find that each additional NOK paid in wealth taxes reduce giving by a modest 0.011. Importantly, this does not isolate intensive-margin effects. Some of this effect comes from households also newly exposed to the wealth tax. If intertemporal substitution is strong, this reduction in the marginal tax rate will cause households to increase their giving. Hence, 0.011 is potentially the combination of stronger, negative income effects and slightly weaker positive substitution effects. However, in column (2), we find this not to be the case. The instrumented variation in whether households pay a wealth tax does not cause additional giving. The point estimate of -36.582 (USD 6) is economically small and statistically insignificant.

Semi-elasticity of giving with respect to the wealth tax rate. Columns (3)-(4) consider the log of giving as the outcome variable and tax rates as the explanatory variables.[17]

[17]We shift giving by an inflation-adjusted NOK 1,000 (USD 167) prior to taking logs. This accommodates zeros and reduces the influence of small level differences. This is akin to assuming that all households give an unobserved fixed amount of NOK 1,000 each year.

This produces point estimates that correspond to semi-elasticities. Column (3) says that a 1 percentage point reduction in the marginal wealth tax rate reduces charitable giving by about 9%. This effect is also not dramatic: a 1 percentage point reduction in the after-tax rate of return is quite large, but a 9% reduction in giving is much more contained.

Importantly, column (3) implicitly assumes that either marginal and average tax rates are the same or that only marginal tax rates matter. Column (4) instead estimates the effect of both $MWTR$ and $AWTR$ variation. This shows that the negative effect on giving is entirely due to average tax rate variation: the point estimate on $AWTR$ is large, negative, and highly significant. The point estimate on $MWTR$ pales in comparison, and is statistically insignificant.

The findings in column (4) are in line with economic intuition in which $AWTR$ variation causes negative income effects and $MWTR$ causes weakly positive effects. The coefficient on $MWTR$ is statistically indistinguishable from zero, which suggests weak or no intertemporal substitution of giving.

Model-based implications for how consumption responds to rate-of-return shocks. Our findings also speak to the theoretical ambiguity of consumption responses to changes in the after-tax rate of return. The frameworks underlying this ambiguity typically consider the effect of a "linear" or "proportional" change in the after-tax rate of return. This implies equally changing average and marginal tax rates. Our approach allow us to estimate the implied effect of such a change, as it is simply the sum of the coefficients on $MWTR$ and $AWTR$. We find that this coefficient is statistically significant and negative. Under Proposition 4, our findings imply that income effects dominate substitution effects in how *consumption* responds to rate-of-return shocks.

First-stage and reduced-form regressions. We report reduced-form and first-stage coefficients for these IV regressions in Appendix Tables A.1 and A.2. The first-stage results are intuitive: households initially close to the threshold see larger extensive margin ($MWTR$) effects, and households initially further above the threshold see larger intensive margin ($AWTR$, *amount paid*) effects. It is this heterogeneity that allows us to simultaneously identify the effects of two different margins of wealth tax exposure using only one core instrument (i.e., secondary housing wealth).

Our findings compared to existing estimates on the marginal propensity to give. Since the effects we find appear to be driven by income effects, it is useful to compare our findings to studies that strictly consider income effects on giving. For this, we rely on Drouvelis, Isen, and Marx (2019) who provide a summary of existing estimates. They show that existing non-experimental estimates on the marginal propensity to give (MPG) out of total income range from 0.024 to 0.093. However, estimates from windfall gains may be more closely aligned with our quasi-random variation in wealth taxation, and these are considerably larger, ranging from 0.16 to 0.74 (Drouvelis et al. 2019), which is an order of magnitude more than our estimated effect of 0.011. However, this is low MPG is likely driven by an overall low level of giving in

Table 2: Wealth Taxation and Charitable Giving: Main Results from DID-IV Regressions

Notes: The table provides the key coefficients from estimating the system of equations in (13)-(14). $AWTR$ is the average wealth tax rate, defined as the amount of wealth taxes paid divided by TNW. $MWTR$ is the marginal wealth tax rate and equals the nominal wealth tax rate if the household is above the wealth tax threshold and zero otherwise. See Appendix Tables A.1 and A.2 for the underlying reduced-form and first-stage estimates. Standard errors are clustered at the household level. One, two, and three stars indicate statistical significance at the 10%, 5%, and 1% levels.

	Amount		log of Giving	
	$G_{h,t}$	$G_{h,t}$	$\log G_{h,t}$	$\log G_{h,t}$
	(1)	(2)	(3)	(4)
$\text{wtax}_{h,t}$ (NOK)	-0.011***	-0.011***		
	(0.003)	(0.003)		
$1[\text{wtax}_{h,t} > 0]$		-36.582		
		(127.173)		
$\text{AWTR}_{h,t}$				-19.757***
				(5.370)
$\text{MWTR}_{h,t}$			-8.938***	-3.148
			(1.692)	(2.293)
Implied effect of proportional tax change = sum of coefficients on MWTR + AWTR				-22.9***
				(4.2)
rk-F-statistic	225.69	264.88	290.81	272.95
N	4007561	4007561	4007561	4007561

Norway. In section 6.2, we partially recalibrate our model to a high-giving environment, and find an MPG of 0.19, in the lower range of existing windfall-gains estimates.

Existing findings on intertemporal substitution. Notably, our findings indicate that intertemporal substitution effects in giving are rather small. This is an interesting finding in accordance with recent evidence showing that the intertemporal substitution effect with respect to general consumption is low (Best, Cloyne, Ilzetzki, and Kleven 2020; Ring 2020). For example, using a different quasi-experimental setting, Ring (2020) shows that income effects dominate substitution effects in household saving responses to wealth taxation. In order to offset the adverse effects of wealth taxes on life-time consumption, households save and work more. However, one may reasonably expect that giving behavior is more intertemporally elastic: while individuals need to consume certain goods and services on a daily basis, it is not ex-ante obvious that preferences dictate that giving must be smoothed out over time as well.

4.2.3 Discussion of Potential Confounding Factors

The fact that wealth-tax payers (by construction) are wealthier poses important challenges in obtaining causal effects of wealth taxation. The standard approach is to exploit wealth tax reforms that change marginal tax rates for households above the wealth tax threshold. This facilitates the removal of confounders that do not vary with time (i.e., fixed effects). However, identification relies on comparing households who differ in terms of their pre-reform (taxable) wealth (see, e.g., Jakobsen, Jakobsen, Kleven, and Zucman 2020 and Brülhart, Gruber, Krapf, and Schmidheiny 2021). Our empirical approach is more focused in that we can *control* for pre-reform wealth and isolate variation coming from changes to the tax authorities' *assessment rules.* Hence, we are not subject to the standard concern that wealthier households may be changing their behavior for reasons unrelated to wealth taxation. The causal interpretation of our findings is only limited to the extent that households with larger $MVHS$ in 2012—keeping over-all wealth and housing wealth fixed—increased or decreased their giving during 2013–2018 for reasons unrelated to wealth taxation.

Importantly, the lack of pre-trends in Figure 2 is reassuring. We are not aware of other reforms or economic shocks occurring precisely in 2012 that would differentially affect secondary homeowners. Since we address differential trends that may be driven by differences in initial overall taxable wealth, total housing wealth, income, age, and family size—any confounding factors would be limited to the convex allocation of housing into primary and secondary housing assets—and they would have to only play a role as of 2013. We address this to some extent by including a control variable that captures whether a household owns either secondary housing or *recreational* housing. Recreational housing units (e.g., cabins) are often qualitatively similar to secondary housing but are treated in a particularly tax-favored way, due to a different valuation system, and does therefore not give much variation in wealth tax exposure.[18] Thus, this control dummy may largely take out differential trends arising from owning a second housing unit, while retaining considerable first-stage predictive power on wealth tax exposure. In our opinion, this likely removes potential confounding effects arising due to changes in the economies of scale in homeownership.[19] Unfortunately, the fundamentally different ways in which secondary and recreational housing are valued precludes the use of recreational-housing owners as a (exclusive) control group.

Property taxation. One potential concern is municipality-level property taxation. While the tax authorities' discount rates are unrelated to local governments' property tax schemes,[20] secondary-homeowners may benefit from per-house exemption thresholds. These favor a strictly convex allocation of housing wealth into primary *and* secondary housing. It is thus conceivable

[18]Upon construction, houses are typically categorized as either housing (primary or secondary) or recreational housing by the Norwegian Tax Administration. While tax values for primary and secondary housing are estimated using a hedonic pricing model, recreational housing is assigned a value shortly after construction, which is inflated by using nationwide multiples up until 2010. After 2010, the assigned values have remained fixed, and are typically thought to severely understate the true market value. Older dwellings in areas with high cumulative house price growth since the date of construction are particularly likely to be undervalued.

[19]Keeping total housing wealth fixed, it may have become more or less lucrative to allocate this wealth into two or more distinct housing units.

[20]In Norway, effective local property tax rates rarely exceed 0.5% and many municipalities do not collect property taxes. While *some* municipalities began using the tax authorities' assessment values for property taxation as of 2015 (they were either not allowed or strongly discouraged during 2010–2014, see discussion in Ring 2020), the change in discount rates would not affect the values provided to municipalities, as these are not discounted.

that we identify effects from households that are paying less in property taxes. However, municipality level property taxation has been in place for decades, and there were no trend-breaking changes in 2012. Hence, the lack of pre-trends in Figure 2 is reassuring, and suggests that our DiD strategy will address this issue by taking out a baseline effect in 2012. Furthermore, if property taxation lowers giving through an income effect, this would lead to an *upward* bias in our estimates (i.e., toward zero). Given our findings, this is not a material concern in terms of the qualitative conclusions.

Price effects. Finally, it is worth noting why potential house price effects of the reform do not affect how we interpret the findings. Most importantly, price effects do not lead to additional income effects that can explain our findings. Any price effect simply decreases the attractiveness of households' undoing the treatment of the discount-rate change by liquidating their housing position. If they sell, some of the benefits (lower tax bill) is offset by a lower sales price. We find that it is useful to think of the income or wealth effects of the reform in terms of a decision tree. If households never liquidate their secondary-housing position, the income effect is driven only by higher wealth tax payments. If households do liquidate, the wealth-tax income effect ceases and the price effect materializes. Importantly, the two effects are not at play simultaneously. This means that price effects may make the income effects more persistent—but not larger than what is implied by having to pay higher wealth taxes. Secondly, price effects are likely limited. Recall that a given house is categorized as primary or secondary based on its current rather than potential use. If (current) primary and secondary homes are homogenous, there should not be any price effect. However, following the reductions in the valuation discount rates, ownership in secondary housing becomes less attractive for the subset of households who anticipate being above the wealth-tax threshold.[21] Thus, to the extent that secondary homes are more likely to be re-sold as secondary homes, due to their particular location or features, we would expect a negative house-price capitalization effect.

5 The Own-Price Elasticity of Charitable Giving

We estimate the own-price elasticity of giving using a bunching design. This estimate both informs our model in section 2 and is a key input to determining optimal tax incentives (Saez, 2004). We enrich this analysis by studying elasticity heterogeneity in terms of income and wealth, and we study whether households' exposure to wealth taxation affects their own-price elasticity.

[21] 42% of secondary-home owners paid a wealth tax as of 2018. Among these wealth-tax-paying secondary-home owners, if we consider secondary-housing wealth to be the marginal asset class subject to the wealth tax, approximately 66% of it was subject to the wealth tax. In other words, the presence of the wealth-tax threshold shielded about 72%=1-42%×66% of taxable secondary housing wealth from taxation.

5.1 Bunching Methodology

As described in section 3.3, charitable giving is deductible in the portion of the income tax base that is subject to a tax rate, τ_t^g, of 22–28%. This specific tax base is subject to a flat tax rate. This means that the effective discount on charitable giving is independent of over-all income. Importantly, deductions are subject to a cap. The presence of a cap on giving deductions creates a setting in which the marginal after-tax price of giving jumps at a pre-specified threshold.

The bunching methodology exploits the fact that the marginal after-tax price of giving jumps from $1-\tau_t^g$ to 1 at the exemption cap, K_t and allows us to estimate the giving elasticity,

$$e = \frac{\Delta G^*/K^*}{\Delta \log(1-\tau^g)}, \tag{16}$$

where ΔG^* is the reduction in giving of the marginal buncher who is at an interior optimum at the exemption cap, K^* (i.e., the kink). In the modeling framework in section 2, this compensated own-price elasticity is a fixed parameter and equal to $-\varepsilon$.

The bunching mass is denoted B. By construction (see Saez 2010 and Kleven 2016 for graphical intuition), B equals $\int_{K^*}^{K^*+\Delta G^*} h_0(G)dG$, where $h_0(G)$ is the counter-factual (absent a kink) probability density function of giving. We apply the standard approximation

$$B = \int_{K^*}^{K^*+\Delta G^*} h_0(G)dG \approx -h_0(K^*)\Delta G^*. \tag{17}$$

Dividing through by K^*, we may write the (approximated) relative change in the giving of the marginal buncher as

$$\frac{\Delta G^*}{K^*} = \frac{-B}{h_0(K^*)K^*} \equiv \frac{-b}{K^*}. \tag{18}$$

This is equation represents one of the central insights in the bunching literature, namely that the marginal buncher's response to the kink is proportional to the excess mass at the kink.

We empirically estimate b, which we refer to as the bunching estimate, using the methodology in Chetty, Friedman, Olsen, and Pistaferri (2011).[22] The empirical analog of K^* is the (average) exemption cap for giving denominated in the same units (NOK 100) as the empirical giving bins.[23] We write our estimated compensated own-price elasticity as

$$\hat{e} = \frac{-\hat{b}/\bar{K}\cdot 100}{-\log(1-\tau^g)}, \tag{19}$$

where we have used that $\Delta \log(1-\tau^g) = \log(1) - \log(1-\tau^g) = -\log(1-\tau^g)$. In our main

[22]See Seim (2017) for another study that combines the Saez (2010) and Chetty et al. (2011) methodologies.

[23]Thus $K^* = \bar{K}_t/100$. Alternatively, we could multiply $\hat{b}$ by the width of the earnings bins (NOK 100), and let K equal the threshold in NOK.

approach, we pool observations across years. We use K_t to sort households into bins and calculate $\hat{b}$, but use the across-year averages for K_t and τ_t^g, which are denoted without t subscripts, to compute $\hat{e}$ according to equation (19).

5.2 Bunching Results: The Own-Price Elasticity of Giving

Panel A of Figure 3 provides descriptive evidence by plotting the frequency of different giving amounts. We pool data across years, and see that the spikes in frequencies coincide with the tax-deduction caps. The values of these caps are indicated by the vertical orange lines.

Panel B provides more formal evidence of bunching. We now sort taxpayers based on how much they gave relative to the deduction cap, K_t, applicable for that year. A value of 1000 on the x-axis indicates that the taxpayer donated between NOK 1000 to NOK 1099 more than the cap. Since it is common to donate round-numbered amounts, and donation-exemption caps are round numbers, we adjust the frequencies for round-number bunching.[24] The dotted blue line (at the bottom of Panel B) shows the adjusted frequency, while the solid green line describes the counterfactual frequency. The counterfactual density function is calculated by estimating a 5th order polynomial on all observations outside the bunching region, $BR_t \equiv [K_t - 1000, K_t + 1000]$, measured in NOK.

The estimated $\hat{b}$ is 23.61. This number says that there are 2,361% excess givers at the kink. Inserting $\hat{b} = 23.61$, $\bar{K}/100 = 202.40$, and $\tau^g = 0.27$ into equation (19) then produces an elasticity estimate of

$$\hat{e} = \underset{(0.02)}{-0.37} \,. \tag{20}$$

The implied estimate for ε (see section 2) is thus 0.37.

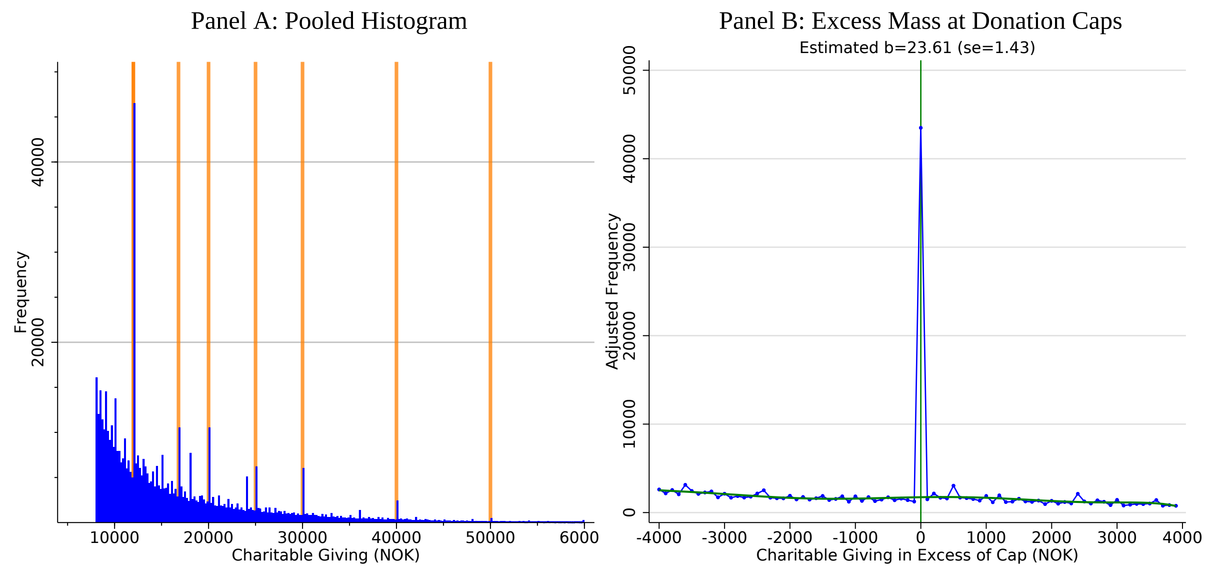
Own-price elasticity estimate relative to other findings. Our own-price elasticity of -0.37 is considerably smaller than the elasticity of around -1 found in several analyses based on U.S. data. Finding a smaller elasticity in Norway than in the U.S. is reasonable as a U.S. price elasticity reflects both real giving responses as well as itemization responses, where the latter reflects whether taxpayers choose to deduct charitable giving (Meer and Priday, 2020).[25]

[24] This is done by first deducting the mean frequency, at the "giving-bin-year" level, in a leave-me-out fashion. For round-number bins, defined as multiples of NOK 1,000, this involves calculating the mean frequency across other years in which the deduction cap was different. Then to obtain a baseline frequency, absent round-number bunching, the mean frequency of two adjacent bins is added. If the resulting adjusted frequency is below the mean of the two adjacent bins, which occurs for a handful of bins, the value is set to the mean of the adjacent bins. Frequencies are then calculated at the bin level by aggregating across sample years. This adjustment procedure lowers the estimated bunching elasticity by 12%.

[25] The self-reporting aspect is also present in the U.K., where Almunia et al. (2020) document an intensive margin elasticity of only -0.2. However, in the U.K., the after-tax price is lowered by a combination of tax deductibility and governmental matching of private donations. Beyond the different research designs, the possibility that taxpayers value matching less than deductions may explain the different findings (see, e.g., Karlan and List 2007).

Figure 3: Sensitivity of Charitable Giving to Deductibility Cap

Notes: The vertical orange lines, from left to right, in Panel A, represent the deductibility caps for 2012–2013, 2014, 2015, 2016, 2017, and 2017, respectively. The average amount of charitable giving at the kink point in panel B is NOK 20,240, and the bin width is NOK 100. The implied price elasticity is -0.37. In Panel B, the frequency is adjusted for round-number (thousands) bunching. standard errors (se) are obtained from a 200-repetition bootstrap procedure.



It is unlikely that our elasticity estimate is low due to the absence of income effects in our bunching design (see discussion below). In section 6.1, we use our calibrated model to calculate an implied uncompensated elasticity of -0.38.

Compensated or uncompensated elasticity. Despite the large change in the relative price of giving at the threshold, intuition suggests that the income effect of the threshold has a limited impact on the elasticity estimates. To see this, consider the households counterfactually located far beyond the exemption cap in Panel B of Figure 3. Absent the exemption cap, these households would pay NOK 4,000 times 27% less in tax. This is about NOK 1,100 (USD 180). Multiplying this by our estimated wealth-tax income effect coefficient (MPG) of 0.011, we would expect the total income effect here to only be NOK 12 (USD 2). This implied income effect is thus much too small to have a meaningful effect on the estimated elasticity. Although the interpretation of implied elasticity estimates as reflecting compensated effects is subject to notable caveats (Blomquist et al. 2021), we adopt the convention of considering our bunching estimate as a compensated elasticity.[26] This implies that our estimate of $\hat{e}$ equals (the negative of) the preference parameter, ε, from Proposition 3 in section 2.

We also note that $\hat{e}$ is by construction a *locally* estimated elasticity: it rationalizes observed giving behavior of individuals near the exemption cap. Without structural assumptions, such

[26]See also Kleven (2016) for a discussion on the interpretation of bunching estimates as being informative of compensated versus uncompensated price elasticities.

as those imposed in section 2, it is not directly informative of the price elasticity of individuals who either barely give (and are thus far below the cap) or those who give well in excess of the cap. Below, in section 5.3.2, we discuss how our finding that wealth taxation does not affect the price elasticity supports the constant elasticity assumption. We also note that since the deduction cap has varied over time, our estimate is effectively an average local elasticity across giving levels ranging from NOK 12,000 to 50,000 (USD 2,000 to 8,000).

5.3 Regression-based Methodology for Uncovering Bunching Heterogeneity

Before we in the next subsection discuss the relationship between wealth taxation and the tax-price elasticity estimates in a quasi-experimental setting, we provide descriptive evidence on how elasticity estimates vary with respect to income and wealth. To our knowledge, there is limited evidence on heterogeneity in the tax price elasticity of giving that is derived from third-party reported data. This allows us to test the intuitive notion that higher-income or higher-wealth individuals are less price elastic without having to address the concern that wealthier individuals are presumably more likely to itemize or remember to deduct their charitable giving expenses.

We begin by estimating a linear probability model to understand the effect of various characteristics, Z, on the probability to bunch, $\mathbb{P}[G_{i,t} \in BR_t]$. This is done by estimating the following regression equation,

$$\mathbb{1}[G_{i,t} \in BR_t] = \alpha_t + \delta \mathbf{Z}_{i,t} + p(G_{i,t}) + \varepsilon_{i,t}, \tag{21}$$

where α_t takes out year fixed effects and $\mathbf{Z}_{i,t}$ is a vector of characteristics of interest. $p(G_{i,t})$ is a third-order polynomial in the amount of charitable giving, which is essentially a control for bunching being correlated with the amount donated.[27] We run these regressions for observations where $G_{i,t} \in SR_t \equiv [K_t - 10\ 000, K_t + 10\ 000)$,[28] and report the results in Table 3.

5.3.1 Relating Bunching Heterogeneity to Price-Elasticity Heterogeneity

We now discuss how we relate the estimated coefficients for equation (21) to differences in the after-tax own-price elasticity. The estimated relative excess mass of givers at the threshold, $\hat{b}$, can

[27] Roughly, we may think that this correlation problem occurs when the threshold location differs from the mean amount of donations in the sample or estimation region. Since many characteristics correlate with G_i, we control flexibly for the amount of charitable giving, $G_{i,t}$, in order to minimize the risk of picking up spurious correlations with bunching behavior. Of course, we may not control too flexibly for $G_{i,t}$: for example, granular fixed-effect bins are in danger of completely absorbing the dependent variable, the bunching indicator. A third-order polynomial, on the other hand, seems to be a reasonable way to address correlations between G_i and Z_i without absorbing the correlation between Z_i and $\mathbb{1}[G_{i,t} \in BR_t]$.

[28] We consider a wider sample region than in Figure 3 in order to obtain a larger sample. A larger sample will be very useful once we introduce the IV methodology, in which more observations allow us to more precisely estimate the first-stage relationship between secondary housing wealth and wealth-tax exposure.

be rewritten as the relative excess probability of observing an individual at the threshold,

$$\hat{b} = \frac{\hat{P}^a[G_i \in BR] - \hat{P}^{cf}[G_i \in BR]}{\hat{P}^{cf}[G_i \in BR]}, \tag{22}$$

where $\hat{P}^a$ denotes the actual empirical probability of observing anyone in the bunching region, BR, and $\hat{P}^{cf}$ refers to the estimated counterfactual probability. We thus rewrite $\hat{e}$ as

$$\hat{e} = -\frac{\hat{P}^a[G_i \in BR] - \hat{P}^{cf}[G_i \in BR]}{\hat{P}^{cf}[G_i \in BR]} \frac{100}{\overline{K}} \frac{1}{-\log(1-\tau^g)}, \tag{23}$$

where $100/\overline{K} = 1/K^*$. Using this, we estimate the effect of a unit increase in some covariate, $Z_{i,t}$, on e as

$$\widehat{\frac{de}{dZ}} = -\hat{\delta} \frac{1}{\hat{P}^{cf}[G_i \in BR]} \frac{100}{\overline{K}} \frac{1}{\log(1-\tau^g)}. \tag{24}$$

We obtain the estimate for the scaling parameter $\hat{P}^{cf}[G_i \in BR]$ by solving equation (22), using the bunching-sample mean $\hat{P}^a[G_i \in BR] = 5.09\%$ and the estimated $\hat{b}$ from Figure 3. This implies that $\hat{P}^{cf}[G_i \in BR] = \frac{5.09\%}{23.67-1} = 0.2245\%$. We further use $\tau^g = 27\%$, and thus get

$$\widehat{\frac{de}{dZ}} = -\hat{\delta} \frac{1}{0.2245\%} \frac{100}{20\ 240} \frac{1}{-\log(1-0.27)} \approx -\hat{\delta} \times 7. \tag{25}$$

5.3.2 Own-Price Elasticity Heterogeneity Results

Table 3 shows that the probability to bunch (a measure of price sensitivity) is decreasing in age, income, wealth (see column 4). However, these findings correlations, although statistically significant, are economically modest.

Age heterogeneity. We find that 10 year older households are 1 percentage point less likely to bunch, which translates into a

$$10 \cdot \frac{0.1027}{100} \times 7 = 7 \text{ percentage point} \tag{26}$$

lower elasticity (see Appendix equation 25). This is not a negligible correlation, but it is also not particularly large relative to the common baseline elasticity of 1.0. With an average elasticity of -0.37, it would be a fair characterization that even households 20 years younger than the mean are still modestly (in)elastic at -0.51.

Income heterogeneity. Controlling for age and wealth, we find that a 10% higher incomes is associated with a 0.23 percentage point lower elasticity. While statistically significant, this correlation is economically zero.

Wealth-based heterogeneity. When controlling for income and age, we find that wealth is also a predictor of a lower elasticity, but that the effect is very modest: a 10% increase in Net Wealth lowers the elasticity by about 1.4 percentage points.[29]

The finding of no economically important heterogeneity is consistent with the constant elasticity assumption inherent to our model in section 2. It further suggests that preference heterogeneity is limited.

These findings contrast the intensive margin results reported in Bakija and Heim (2011) and Almunia, Guceri, Lockwood, and Scharf (2020), both pointing to *increasing* responsiveness with respect to income.[30] The fact that we find quite different results is likely driven by differences in the reporting regimes. For example, Meer and Priday (2020) find that the main driver of their estimated price elasticity is households' beginning to report charitable giving on the extensive margin, i.e., starting to itemize. In our setting, however, individuals cannot choose whether their donations are reported to the tax authorities, thus the extent to which higher-income taxpayers are more diligent in claiming tax deductions from giving does not play a role.

Table 3: Heterogeneity in the After-Tax Own-Price Elasticity

Notes: The dependent variable is a bunching indicator (multiplied by 100). The unconditional sample mean is 5.09 (%). Market-value net wealth is often negative, hence the log argument is shifted upward by an inflation-adjusted 1 MNOK. The implied effect on the tax-price elasticity can be obtained by multiplying the point estimates by the elasticity multiplier near the bottom of the table. To calculate the multipliers, the sample-specific estimates for b are used (see Figure 3).

	Bunching Probability (%)			
	(1)	(2)	(3)	(4)
$\text{Age}_{i,t}$	-0.0934***			-0.1027***
	(0.0024)			(0.0025)
$\log(\text{Gross Income}_{h,t})$		-0.4950***	0.9747***	-0.3258**
		(0.0646)	(0.1474)	(0.1457)
$\log(\text{Net Wealth}_{h,t})$			-3.1732***	-1.9526***
			(0.3349)	(0.3328)
$f(G_{i,t})$	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Unconditional Probability	5.09%			
$\hat{P}^{cf}[G_i \in BR]$	0.2245%			
Multiplier for Elasticity	7			
R^2	0.2438	0.2398	0.2399	0.2446
N	789820	789820	789820	789820

[29] Since the Net Wealth is shifted by 1 MNOK prior to taking logs, the variation in log net wealth is reduced, and hence the coefficient of -1.9526 is inflated. Thus the true cross-elasticity with respect to wealth is even smaller than 1.4 percentage points.

[30] However, Almunia et al. (2020) find that both price and income elasticities fall with respect to income at the extensive margin of charitable giving.

5.4 Quasi-Experimental Evidence on the Relationship between Wealth Taxation and the After-Tax Own-Price Elasticity

In this section, we provide quasi-experimental evidence on how wealth taxation affects the own-price elasticity of giving. As in subsection 5.3.2, we use a regression-based framework to uncover bunching heterogeneity and map this into differences in the own-price elasticity. The innovation in this section is that we employ the quasi-experimental variation in wealth taxation from section 4 as the source of heterogeneity. This allows us to obtain plausibly causal evidence on the effects of wealth taxation on the own-price elasticity.

This exercise is useful for two reasons. First, given our finding that wealth taxation reduces charitable giving, a natural follow-up question is how a government may use direct tax incentives (e.g., deductibility) to undo the effect of introducing a wealth tax. To answer this question, one needs to know the own-price elasticity of giving. However, it is not obvious that elasticity estimates obtained under a non-wealth-tax regime applies when a wealth tax is in effect.[31] On the one hand, wealth taxation may cause negative income-like effects among givers and cause them to become more price elastic. On the other, givers may become less price elastic because the opportunity cost of giving is lower when any savings are subjected to a wealth tax.

Second, it allows us to test the constant compensated-price elasticity assumption underlying our model in section 2. The modeling assumption of constant compensated price elasticities is ubiquitous in public finance and macroeconomics (e.g. when modeling labor supply with a constant Frisch elasticity). However, it is challenging to discern whether price-elasticity variation is due to differing preferences or is causally driven by differences in income or wealth. For example, it is possible that our finding of no economically important elasticity heterogeneity in subsection 5.3.2 is caused by preference heterogeneity and the causal effect of wealth or income cancelling each other out.

Our quasi-experiment address this issue by plausibly holding preferences constant while obtaining evidence on how varying after-tax wealth affects the compensated price elasticity. More generally, this allows us to address the common concern that bunching estimates are only informative of the price elasticity of bunchers. Those who give well below the bunching threshold are presumably less wealthy if giving is a normal good. Hence, a natural concern is whether less wealthy individuals are more or less elastic. Our setting allows us to test this, because ceteris

[31] We may think of wealth taxation, or capital taxation in general, as affecting the price elasticity of giving through two channels. Firstly, a wealth tax also reduces lifetime wealth. The more of a household's wealth that is subject to the wealth tax, the more is the lifetime after-tax purchasing power reduced by the tax. Given our finding that bunching is negatively correlated with income and wealth, we would expect this intensive margin wealth tax channel to contribute to higher price sensitivity. Secondly, wealth taxation reduces the marginal after-tax rate of return on savings. This essentially lowers the lifetime utility of additional tax savings caused by more charitable giving. Each additional dollar of tax refund is now worth less, since any portion of what is saved now enjoys a lower after-tax rate of return. Thus, this extensive margin effect will lower the price sensitivity of charitable giving. In sum, the extensive and intensive margin effects of wealth tax exposure likely work in opposite directions, and the net effect is ambiguous.

paribus, wealth taxation reduces (after-tax) wealth.

Table 4: Wealth Taxation and the Price Elasticity of Giving: Instrumental Variables Approach

Notes: This table provides the key coefficients from estimating the system of equations in (13)-(14). Standard errors are clustered at the household level. One, two, and three stars indicate statistical significance at the 10%, 5%, and 1% levels. Point estimates may be multiplied by 6.74 to obtain the effect on the magnitude of the price elasticity.

	(1)	(2)	(3)
Dependent variable =	Indicator for Bunching at Deduction Cap × 100		
$\text{wtax}_{h,t}$ (NOK 1,000)	0.050 (0.059)	0.036 (0.066)	
$1[\text{wtax}_{h,t} > 0]$		1.486 (2.321)	
$\text{AWTR}_{h,t}$ (%)			4.423 (7.426)
$\text{MWTR}_{h,t}$ (%)			1.137 (2.516)
sum of coefficients AWTR+MWTR			5.566 (6.143)
rk-F-statistic	40.00	39.33	39.83
N	299019	299019	299019

We present our findings in Table 4. Focusing on column (1), we see that a NOK 1,000 increase in wealth taxes increases the propensity to bunch by 0.05 percentage points. This effect rings rather small, and is statistically insignificant. To grasp the potential economic significance, we use the methodology introduced in section 5.3.1 to map these bunching effects into a price-elasticity effect by multiplying point estimates by 6.74.[32] Hence, considering the effect of a fairly large increase in the annual wealth tax bill of NOK 10,000, we find that

$$\Delta wtax_{h,t} = \text{NOK } 10{,}000 \quad \Rightarrow \quad \Delta \hat{e} = \begin{array}{c} 0.034 \\ (0.040) \end{array}, \tag{27}$$

with the standard error in parenthesis. In column (2), we see that these point estimates are fairly robust to isolating intensive-margin wealth-tax effects by also instrumenting for whether a household pays a wealth tax ($\mathbb{1}[wtax_{h,t} > 0]$).

To obtain a unitless measure of the second-order cross elasticity, we use average and marginal wealth tax rates ($AWTR$ and $MWTR$) as our (instrumented) explanatory variables in column (3). We find that, keeping the marginal tax rate constant, a 0.2 percentage point increase in $AWTR$ (the mean $AWTR$ of wealth tax payers) increases the probability of bunching by about 0.9 percentage points, and hence the own-price elasticity by a modest 0.06.[33]

[32] Previously, the multiplier was 7. We obtain a slightly different multiplier due to differences in sample characteristics. Here, we have that $\hat{P}^a[G_{i,t} \in BR_t] = 5.2837\%$, which implies that $\hat{P}^{cf}[G_{i,t} \in BR_t] = 0.2330\%$. Thus the multiplicative factor becomes 6.74=(1/0.002330)*(100/20240)*(1/ln(1-0.27)).

[33] This is small relative to the knife-edge case where the elasticity takes a value of 1. While it is less small relative

Interestingly, in contrast to our hypothesis, there is no evidence that the compensated own-price elasticity is decreasing in the marginal tax rate. This is what should happen if own-tax or own-price savings are less valuable as the higher $MWTR$ causes households to prefer current rather than future consumption and giving through an intertemporal substitution effect. This finding is, however, conceptually aligned with our earlier finding that a higher $MWTR$ does not cause households to increase current giving—which would also be driven by an intertemporal substitution effect.

In summary, our empirical findings are not inconsistent with the notion that the own-price elasticity is invariant with respect to after-tax wealth. Implicitly, our findings thus support the notion that compensated price elasticities are not causally related to wealth or disposable income. Similarly, we cannot reject the null hypothesis of a constant compensated price inherent in our model in section 2. A natural follow-up question is whether the *uncompensated* price elasticity is sensitive to wealth taxation. In the next section, we use our calibrated model to address this question, and find virtually no effect.

6 Implied Structural Parameters

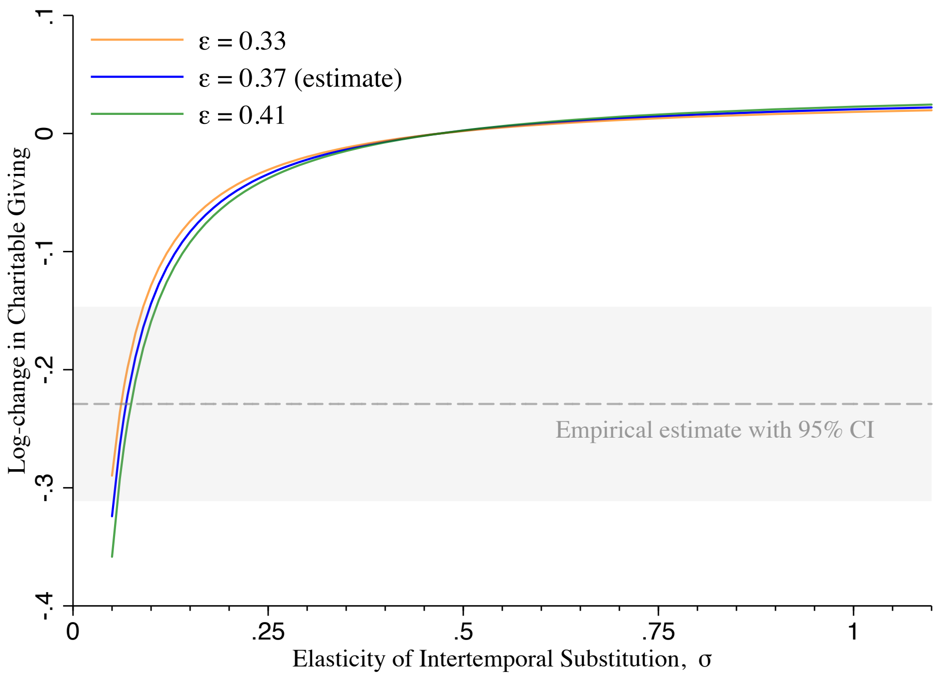
We calibrate our model presented in section 2 to our empirical setting, and contrast theoretical and observed treatment effects in Figure 4.

As we employ a representative agent model, the agent is endowed with the characteristics of the average household from Table 1. We use the precise estimate of ε of 0.37 obtained from bunching at the deductibility cap, and plot theoretical treatment effects for different values of the elasticity of intertemporal substitution (σ). We describe the calibration exercise in more detail in Appendix B.

to our own estimate of 0.37, our estimate is already quite low. For example, Saez (2004) only considers values of 0.5, 1, and 1.5 in calibrating a model of optimal tax deductions on giving.

Figure 4: Comparing Model-based and Empirical Effects of Wealth Taxation on Charitable Giving

Notes: This figure shows model-based treatment effects on charitable giving for combinations of the elasticity of intertemporal substitution (σ) and the absolute value of the compensated own-price elasticity (ε). Using a life-cycle model with endogenous giving that is calibrated to our empirical setting, we plot the effects of unexpected shocks to the after-tax rate. Under our baseline $\varepsilon = 0.37$, we find that $\sigma = 0.065$ replicates our empirical findings. Our calibration is described in more detail in Appendix B; and the main elements are presented in Proposition 1. The shock is a 1 percentage point reduction in the after-tax rate, R. The dashed gray line provides the empirical estimate of the implied effect of changing a proportional wealth tax rate, which is presented in column (4) of Table 2. The middle, blue line provides the theoretical treatment effect assuming that $\varepsilon = 0.37$, corresponding to the bunching evidence in section 5.2. The orange and green lines provide the theoretical effects assuming ε equals the lower or upper bounds of the 95% confidence interval of our bunching design estimate.



Our main finding is that a very low EIS (σ) is needed to replicate our empirical findings. The empirical finding we try to match is the implied effect on log giving of changing a linear (alternatively, proportional) tax on wealth by 1 percentage point, which we found to be 0.229 (see column (4) of Table 2). Figure 4 shows that this requires

$$\sigma = 0.065. \tag{28}$$

This low EIS is very close to recent quasi-experimental findings in, e.g., Best, Cloyne, Ilzetzki, and Kleven (2020), but considerably smaller than most empirical estimates (Havránek, 2015). An interesting observation is that the structural giving elasticity, ε, is almost six times larger than the consumption elasticity, σ.

As Proposition 2 illustrates, this means that giving effects can be large relative to consumption effects even the initial level of giving is relatively low. In terms of the relative economic importance of giving vis-a-vis consumption (measured in terms of expenditures), the high ratio of ε to σ may substantially make up for the fact that the the ex-ante level of giving is small relative to consumption. This can be inferred from the *Weighting* term in Proposition 2, where the effect on giving is scaled up by $\varepsilon g_t/(\varepsilon g_t + \sigma c_t)$.

We verify that the calibrated preference parameters (with $\sigma = 0.065$ and $\varepsilon = 0.37$) also rationalize the change in NOK giving per NOK of wealth taxes of -0.011 from columns (1)-(2) of Table 2. While we chose the EIS that best fits the log-difference effect, the model-implied coefficient on amount of wealth taxes is a very similar -0.012.

6.1 Application of Model I: Uncompensated Own-Price Elasticity

In section 5.2, we estimated an own-price elasticity of -0.37. Importantly, this elasticity identifies the response of marginal bunchers and thus provides a *compensated* price elasticity. This elasticity does not fully answer what would happen to charitable giving if, for example, the tax deductibility was removed. This is because income effects would also play a role: as the tax-incentive is removed, households become poorer and thus give less through an income effect.

Our calibrated model (with $\sigma = 0.065$ and $\varepsilon = 0.37$) allow us to calculate the implied uncompensated price elasticity. We do this by calculating the log-change in giving caused by changing the after-tax price p_s from 0.73 to 1 for $s = t, ..., T$. This results in a

$$\text{Model-implied } \hat{e}^{\text{uncompensated}} = -0.3828, \tag{29}$$

which is quite similar to our compensated elasticity. This implies rather weak income effects of price changes, consistent with the low *level* of giving in our data. However, if we calibrate our model to a 10 times higher level of giving (through increasing κ), the uncompensated elasticity remains modest at -0.4670. Hence, our model implies that our low elasticity estimate relative to the existing literature is unlikely to be driven by the fact that we estimate a compensated as opposed to uncompensated elasticity.

Wealth taxation and the uncompensated own-price elasticity. We also investigate whether our model predicts different elasticities depending on the wealth tax regime. We investigate this by also calculating the uncompensated elasticity in the presence of a 1% proportional (applied to all wealth) wealth tax. We find virtually no effect: the own-price elasticity decreases modestly in magnitude from -0.3828 to -0.3802.

6.2 Application of Model II: The Role of Charitable Giving in Mediating the Effects of Wealth Taxation in a High-Giving Environment

We found empirically that each additional NOK of wealth taxes reduces charitable giving by about 0.011. This is rather small in terms of a crowd-out effect. If governments care about the wealth tax revenue *plus* the amount of charitable giving, the net effect of raising another NOK of wealth taxes is only reduced to 0.989 due to this crowd-out. However, this small effect is in part driven by the low *level* of giving in Norway. Hence, we use our model to investigate what would happen in a high-giving environment. We proceed by recalibrating our model to an agent that gives an amount equal to 5% of gross income, the average fraction reported by List (2011) for the U.S. This is done through increasing κ (see equation 54), and we keep $\sigma = 0.065$ and $\varepsilon = 0.37$.[34] We then calculate the implied level effect on g_t and divide this by the amount raised in wealth taxes, $1\% \cdot s_{t+1}$, where s_{t+1} includes behavioral responses to the tax increase. We find that the

$$\text{Model-implied } MPG \text{ out of wealth taxes in a high-giving environment} = -0.1914. \tag{30}$$

This is more substantial. If governments want to compensate charitable organizations for this crowd-out effect, they effectively face a 20% "tax" on any wealth tax revenues.

We further numerically explore the importance of the EIS in creating this large crowd-out effect. Choosing instead an EIS of 1, which corresponds to log utility of consumption, we find that

$$\text{Model-implied } MPG \text{ out of wealth taxes in a high-giving environment}\Big|_{\sigma=1} = 0.0235. \tag{31}$$

This stark change in both magnitude and sign highlights the importance of pinning down the EIS to in order to model how giving responds to tax reforms that affect the after-tax rate-of-return.

7 Discussion

The public finance literature has devoted significant attention to why and how the personal income tax system can be used to encourage charitable giving (see, e.g., Saez 2004, Diamond 2006, and List 2011). To what extent donation behavior could be influenced by capital taxation, in the form of a wealth, capital income or capital gains tax, has been largely neglected. New evidence thus seems prudent in light of the surging interest for using capital taxation, and wealth taxes in particular, as a policy instrument to address economic inequality, see for example Saez and Zucman (2019b).

To our knowledge, this paper is the first to present empirical evidence on how capital taxation, or wealth taxation in particular, affects charitable giving. Our finding of a negative effect is surprising in the sense that standard preference parameters (e.g., an elasticity of intertemporal

[34] One justification for assuming that the elasticity parameters, σ and ε stay fixed but κ changes is that we may want to think of κ as not being a deep structural parameter but rather something that depends on how the extent of overall government services and redistribution.

substitution of 1) imply a positive effect. Our results thus indicate that the redistributive effects of wealth taxation may be offset by reduced giving.

In order to more concretely guide optimal taxation, we provide the key preference parameters that can explain our empirical findings. These may be more useful than the reduced-form findings since they do not explicitly depend on the peculiarities of the tax code (e.g., the progressivity) or the characteristics of the taxpayers. They may also be used to model the effects of a wide range of tax reforms.

While we find that the crowd-out effect of giving is modest in a NOK for NOK sense, our structural parameters imply that this crowd-out may be economically large in a setting where the ex-ante level of giving is higher, such as the U.S. or the U.K. While this crowding out of giving by itself reduces the benefits of wealth taxation, this crowding-out cannot, structurally, occur in a vacuum: it is driven by a low elasticity of intertemporal substitution. A low EIS in standard frameworks imply low efficiency costs of capital taxation. Our findings suggest that optimal tax frameworks that ignore giving may overstate the attractiveness of more comprehensive capital taxation when the EIS is low and the ex-ante level of giving is high.

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A Model and Proofs

Consider the following optimization problem:

$$\max_{\{c_t, s_{t+1}, g_t\}} \quad \sum_{t=0}^{T} \beta^t \left[\frac{c_t^{1-1/\sigma}}{1-1/\sigma} + \kappa \frac{g_t^{1-1/\varepsilon}}{1-1/\varepsilon} \right], \tag{32}$$

$$\text{such that} \quad c_t = w_t - p_t g_t - s_{t+1} + s_t R_t, \tag{33}$$

where c_t, s_{t+1}, and g_t is the consumption, saving, and charitable giving undertaken in year t. β is the temporal discount factor, σ is the elasticity of intertemporal substitution (the EIS, for consumption) and ε is the giving elasticity. w_t is exogenous income. w_0 may be considered the initial wealth of the agent. p_t is the price of a unit of giving. R_t is the gross after-tax rate of return, net of any wealth taxes. Agents start their optimization problem at $t = 0$ and end their life cycle at $t = T$.

In applying this model to our empirical setting, it will be convenient to assume that agents start their optimization problem at some other time $t > 0$, such as when they face a wealth tax shock. In this case, we can replace time 0 with t and replace T with $T - t$.

A.1 Solving the life-cycle optimization problem.

s_{t+1}-FOC may be written the following ways:

$$c_t^{-1/\sigma} = \beta R_{t+1} c_{t+1}^{-1/\sigma} \quad \Leftrightarrow \quad c_{t+1} = (\beta R_{t+1})^{\sigma} c_t \tag{34}$$

s_t-FOC iteration yields:

$$c_t \quad = \quad \beta^{\sigma t} \Pi_{s=0}^{t} R_s^{\sigma} c_0 \tag{35}$$

g_t-FOC may be written the following ways:

$$c_t^{-1/\sigma} p_t = \kappa g_t^{-1/\varepsilon} \Leftrightarrow c_t = \left(\frac{p_t}{\kappa}\right)^{\sigma} g_t^{\sigma/\varepsilon} \Leftrightarrow g_t = \left(\frac{\kappa}{p_t}\right)^{\varepsilon} c_t^{\varepsilon/\sigma} \tag{36}$$

Substitute in the s_t-FOC iteration into the g_t-FOC, and then the g_0-FOC:

$$g_t \quad = \quad \left(\frac{\kappa}{p_t}\right)^{\varepsilon} c_t^{\varepsilon/\sigma} = \left(\frac{\kappa}{p_t}\right)^{\varepsilon} \beta^{\varepsilon t} \Pi_{s=0}^{t} R_s^{\varepsilon} c_0^{\varepsilon/\sigma} = \left(\frac{\kappa}{p_t}\right)^{\varepsilon} \beta^{\varepsilon t} \Pi_{s=0}^{t} R_s^{\varepsilon} \left(\frac{p_0}{\kappa}\right)^{\varepsilon} g_0 \tag{37}$$

$$= \quad \left(\frac{p_0}{p_t}\right)^{\varepsilon} \beta^{\varepsilon t} \Pi_{s=0}^{t} R_s^{\varepsilon} g_0 \tag{38}$$

Budget constraint iteration yields the present-value condition:

$$\sum_{t=0}^{T} c_t \Pi_{s=0}^{t} R_s^{-1} = \sum_{t=0}^{T} w_t \Pi_{s=0}^{t} R_s^{-1} - \sum_{t=0}^{T} p_t g_t \Pi_{s=0}^{t} R_s^{-1}. \tag{39}$$

Now we substitute in the iterated FOC expressions for g_t and c_t.

$$c_0 \sum_{t=0}^{T} \beta^{\sigma t} \Pi_{s=0}^{t} R_s^{\sigma-1} = \sum_{t=0}^{T} w_t \Pi_{s=0}^{t} R_s^{-1} - g_0 \sum_{t=0}^{T} p_t^{1-\varepsilon} p_0^{\varepsilon} \beta^{\varepsilon t} \Pi_{s=0}^{t} R_s^{\varepsilon-1}. \tag{40}$$

We then substitute in the g_0-FOC:

$$g_0^{\sigma/\varepsilon} \left(\frac{p_0}{\kappa}\right)^{\sigma} \sum_{t=0}^{T} \beta^{\sigma t} \Pi_{s=0}^{t} R_s^{\sigma-1} = \sum_{t=0}^{T} w_t \Pi_{s=0}^{t} R_s^{-1} - g_0 \sum_{t=0}^{T} p_t^{1-\varepsilon} p_0^{\varepsilon} \beta^{\varepsilon t} \Pi_{s=0}^{t} R_s^{\varepsilon-1}. \tag{41}$$

This expression provides the initial level of giving, g_0, that solves the optimization problem. All other endogenous variables then follow from the FOCs.

Simplified problem. Now, we simplify and set $R_t = R$ and $p_t = 1$ $\forall t$.

$$g_0^{\sigma/\varepsilon} \left(\frac{1}{\kappa}\right)^{\sigma} \frac{(\beta^{\sigma} R^{\sigma-1})^{T+1} - 1}{\beta^{\sigma} R^{\sigma-1} - 1} = \sum_{t=0}^{T} w_t R^{-t} - g_0 \frac{(\beta^{\varepsilon} R^{\varepsilon-1})^{T+1} - 1}{\beta^{\varepsilon} R^{\varepsilon-1} - 1}. \tag{42}$$

Note that we may substitute in s for 0, and also replace T with $T - s$ to determine the level of giving for some point in time s. The in-text proposition is similar to the simplified expression above but does not assume that p_t is constant over time.

Simplified, infinite-horizon, when $T = \infty$, assuming $\beta^{\varepsilon} R^{\varepsilon-1} < 1$ and $\beta^{\sigma} R^{\sigma-1} < 1$, yields condition:

$$g_0^{\sigma/\varepsilon} \frac{1}{1 - \beta^{\sigma} R^{\sigma-1}} \left(\frac{1}{\kappa}\right)^{\sigma} = \sum_{t=0}^{T} w_t R^{-t} - g_0 \frac{1}{1 - \beta^{\varepsilon} R^{\varepsilon-1}} \tag{43}$$

$$g_0^{\sigma/\varepsilon} \left(\frac{1}{\kappa}\right)^{\sigma} = \left(1 - \beta^{\sigma} R^{\sigma-1}\right) \sum_{t=0}^{T} w_t R^{-t} - g_0 \frac{1 - \beta^{\sigma} R^{\sigma-1}}{1 - \beta^{\varepsilon} R^{\varepsilon-1}} \tag{44}$$

Differentiate

$$\begin{aligned}
\frac{\sigma}{\varepsilon} g_0^{\sigma/\varepsilon-1} \left(\frac{1}{\kappa}\right)^{\sigma} dg_0 \quad &= \quad -(\sigma-1)\beta^{\sigma} R^{\sigma-2} \sum_{t=0}^{T} w_t R^{-t} dR - \left(1 - \beta^{\sigma} R^{\sigma-1}\right) \sum_{t=0}^{T} t w_t R^{-t-1} dR && (45) \\
&- \quad dg_0 \frac{1 - \beta^{\sigma} R^{\sigma-1}}{1 - \beta^{\varepsilon} R^{\varepsilon-1}} && (46) \\
&+ \quad g_0 \frac{(\varepsilon-\sigma)\beta^{\sigma+\varepsilon} - (\varepsilon-1)\beta^{\varepsilon} R^{\sigma+1} + (\sigma-1)\beta^{\sigma} R^{\sigma+1}}{R\left(\beta^{\varepsilon} R^{\varepsilon} - R\right)^2} dR && (47)
\end{aligned}$$

Reorder terms, particularly the last term, and get

$$\left(\frac{\sigma}{\varepsilon} g_0^{\sigma/\varepsilon-1}\left(\frac{1}{\kappa}\right)^{\sigma} + \frac{1-\beta^{\sigma}R^{\sigma-1}}{1-\beta^{\varepsilon}R^{\varepsilon-1}}\right)\frac{dg_0}{dR} = -(\sigma-1)\beta^{\sigma}R^{\sigma-1}\sum_{t=0}^{T} w_t R^{-t} \tag{48}$$

$$- \left(1-\beta^{\sigma}R^{\sigma-1}\right)\sum_{t=0}^{T} t w_t R^{-t-1} \tag{49}$$

$$- g_0\left[\frac{(\varepsilon-1)\beta^{\varepsilon}R^{\varepsilon-2}(1-\beta^{\sigma}R^{\sigma-1})}{(1-\beta^{\varepsilon}R^{\varepsilon-1})^2} - \frac{(\sigma-1)\beta^{\sigma}R^{\sigma-2}}{1-\beta^{\varepsilon}R^{\varepsilon-1}}\right]$$

Now consider this differential equation when $\beta R = 1$:

$$\left(\frac{\sigma}{\varepsilon} g_0^{\sigma/\varepsilon-1}\left(\frac{1}{\kappa}\right)^{\sigma} + 1\right)\frac{dg_0}{dR} = -(\sigma-1)R^{-1}\sum_{t=0}^{T} w_t R^{-t} \tag{50}$$

$$- \left(1-R^{-1}\right)\sum_{t=0}^{T} t w_t R^{-t-1} \tag{51}$$

$$- g_0\left[\frac{(\varepsilon-1)R^{-2}(1-R^{-1})}{(1-R^{-1})^2} - \frac{(\sigma-1)R^{-2}}{1-R^{-1}}\right]$$

After some reordering and cancelling out, we get

$$\left(\frac{\sigma}{\varepsilon}\kappa^{-\sigma} g_0^{\sigma/\varepsilon-1} + 1\right)\frac{dg_0}{dR} = \underbrace{-(\sigma-1)\sum_{t=0}^{T} w_t R^{-t-1}}_{\text{Income v. substitution}} \underbrace{- \left(1-R^{-1}\right)\sum_{t=0}^{T} t w_t R^{-t-1}}_{\text{Human wealth effect}} \underbrace{- \frac{\varepsilon-\sigma}{R^2(1-R^{-1})} g_0}_{\text{Elasticity adjustment}} . \tag{52}$$

The first two terms on the right-hand side are driven by consumption adjustments across periods. The third term says that if giving is more elastic than consumption ($\varepsilon > \sigma$), then current giving drops by even more than what is implied by the first two consumption-related terms. Note that from the intratemporal g_0-FOC, we get that $\kappa^{-\sigma} g_0^{\sigma/\varepsilon} = c_0$. Hence, we can also write

$$\left(\frac{\sigma}{\varepsilon}\frac{c_0}{g_0} + 1\right)\frac{dg_0}{dR} = \underbrace{-(\sigma-1)\sum_{t=0}^{T} w_t R^{-t-1}}_{\text{Income v. substitution}} \underbrace{- \left(1-R^{-1}\right)\sum_{t=0}^{T} t w_t R^{-t-1}}_{\text{Human wealth effect}} \underbrace{- \frac{\varepsilon-\sigma}{R^2(1-R^{-1})} g_0}_{\text{Elasticity adjustment}} . \tag{53}$$

B Calibration

We use Proposition 1 for calibration. We first select a σ, then we enter values for ε, κ, β, $\{w_s\}_{s=t}^{T}$, T, and use the equation to solve for the g_t that would arise under two values of R: R^{base} and $R^{shocked}$, and compute the log difference. We do this for many σ values, and search for the one that gives the closest match to our empirical estimates on the implied effect of a proportional wealth tax rate change.

We set $\varepsilon = 0.37$ in line with our bunching estimate and set $\beta = 0.98$. We set $R^{base} = \beta^{-1}$.

This implies $R \approx 1.02$, which is in line with the low interest rates in Norway during this time period.

We choose a κ from a level calibration. Given, σ and ε, we use the relationship $\kappa^{-\gamma} g_t^{\sigma/\varepsilon} = c_t$ to infer κ. We assume that c_t equals 93% of after-tax income, consistent with the net saving rate of 6–8% found by Fagereng, Holm, Moll, and Natvik (2019) for wealthier households. Gross income is set to the mean amount of gross income, 792,994. We assume a tax rate of 35%. Hence, $\hat{c}_t = 0.93 \cdot 792,994 \cdot (1 - 0.35) = 479,365$. The mean amount of giving in our sample is 4,694 at the individual level, conditional on giving. Multiplying by an average number of household adults of 1.65 and the probability of giving of 0.27, we set $\hat{g}_t = 2,091$. Note these values, $\hat{g}_t$ and $\hat{c}_t$, are only used to calibrate κ, and do not otherwise affect the calibration exercise.

$$\kappa \equiv \hat{c}^{-1/\gamma} \hat{g}^{1/\varepsilon} = 737,484^{-1/\gamma} \cdot 2,091^{1/\varepsilon}. \tag{54}$$

w_t is set to $792,994 \cdot (1 - 0.35)$ + 3,818,223. This is the average yearly income and wealth for households in our sample as of 2012. The average person in our sample is 62. we set $t = 62$ and assume that incomes shrink to 50% over 5 years, driven by an assumed retirement at 67 and a 50% income replacement rate. We set the duration of the life cycle to be $T = 85$.

$$\begin{aligned} w_s &= 792,994 \cdot (1 - 0.40) \\ &- \min(792,994 \cdot (1 - 0.40) \cdot 10\% \cdot (s - t);\ 792,994 \cdot (1 - 0.40) \cdot 50\%), \text{ for } s > t. \end{aligned} \tag{55}$$

C Supplementary Figures and Tables

Figure A.1: Reduced-form Effects on Giving Using Both Data Sources on Giving

Notes: The long panel comes from tax returns and reflects actual amount deducted from the income tax base. The short panel is the total amount of giving that was directly reported by the charitable organizations. The point estimates come from estimating equations (13) and (14), simplifying $f(\cdot)$ to be a year-specific linear function of $MVHS_{h,2012}$ alone.

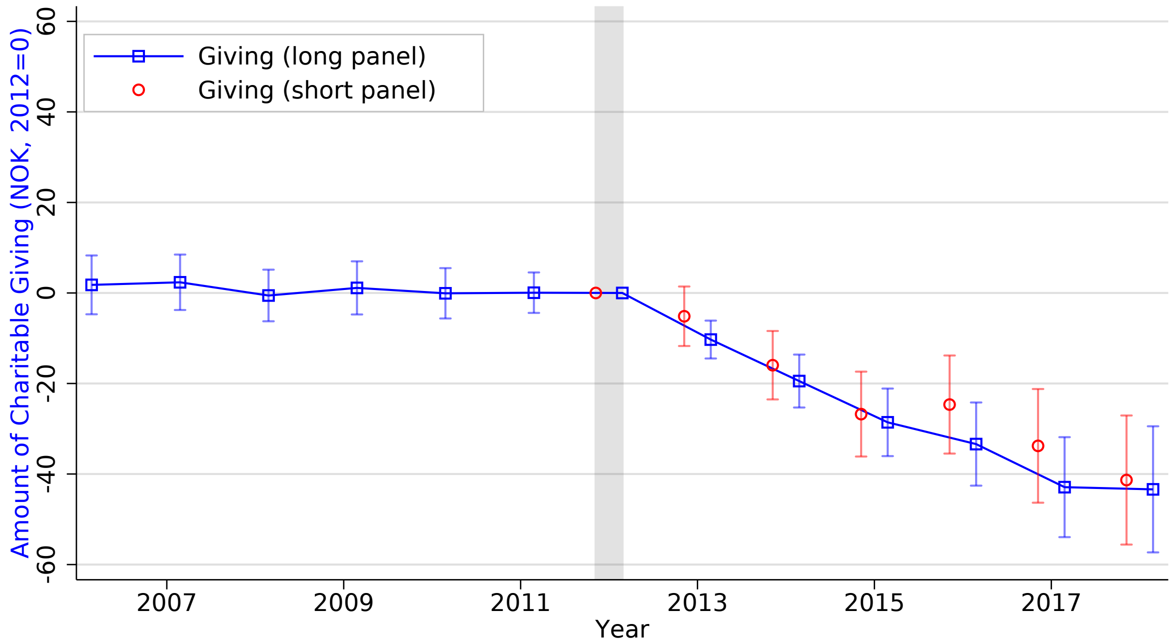

Table A.1: Wealth Taxation and Charitable Giving: Reduced-form Regression Estimates

Notes: The table provides the underlying **reduced-form** coefficients on instruments from estimating the system of equations in (13)-(14). Each b corresponds to a binned range of $TNW_{h,2012} - T_{12}$. Standard errors are clustered at the household level. One, two, and three stars indicate statistical significance at the 10%, 5%, and 1% levels.

	(1)	(2)	(3)	(4)	(5)	(6)
	Amount		log		Growth rate	
	$G_{h,t}$	$G_{h,t}$	$\log G_{h,t}$	$\log G_{h,t}$	$\Delta \log G_{h,t}$	$\Delta \log G_{h,t}$
1[b=-0.5M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	-4.253 (21.427)	-4.253 (21.427)	-0.006** (0.003)	-0.006** (0.003)	0.003 (0.002)	0.003 (0.002)
1[b=-0.4M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	-24.146 (23.857)	-24.146 (23.857)	-0.007** (0.003)	-0.007** (0.003)	0.001 (0.003)	0.001 (0.003)
1[b=-0.3M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	-17.500 (16.776)	-17.500 (16.776)	-0.004 (0.003)	-0.004 (0.003)	0.004* (0.002)	0.004* (0.002)
1[b=-0.2M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	-8.921 (17.960)	-8.921 (17.960)	-0.005* (0.003)	-0.005* (0.003)	0.004 (0.002)	0.004 (0.002)
1[b=-0.1M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	6.866 (17.988)	6.866 (17.988)	0.001 (0.003)	0.001 (0.003)	0.002 (0.002)	0.002 (0.002)
1[b= 0.0M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	-14.938 (18.724)	-14.938 (18.724)	-0.006** (0.003)	-0.006** (0.003)	-0.001 (0.002)	-0.001 (0.002)
1[b= 0.1M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	-60.234*** (22.323)	-60.234*** (22.323)	-0.009*** (0.003)	-0.009*** (0.003)	-0.002 (0.003)	-0.002 (0.003)
1[b= 0.2M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	-14.132 (21.579)	-14.132 (21.579)	-0.005* (0.003)	-0.005* (0.003)	-0.000 (0.003)	-0.000 (0.003)
1[b= 0.3M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	-7.639 (20.047)	-7.639 (20.047)	-0.007** (0.003)	-0.007** (0.003)	-0.001 (0.003)	-0.001 (0.003)
1[b= 0.4M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	-11.851 (16.796)	-11.851 (16.796)	-0.004 (0.002)	-0.004 (0.002)	-0.002 (0.002)	-0.002 (0.002)
1[b= 0.6M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	-20.475 (18.840)	-20.475 (18.840)	-0.004 (0.003)	-0.004 (0.003)	-0.001 (0.002)	-0.001 (0.002)
1[b= 0.8M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	-13.038 (13.255)	-13.038 (13.255)	-0.005*** (0.002)	-0.005*** (0.002)	-0.000 (0.002)	-0.000 (0.002)
1[b= 1.2M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	-43.582*** (16.724)	-43.582*** (16.724)	-0.006*** (0.002)	-0.006*** (0.002)	0.002 (0.002)	0.002 (0.002)
1[b= 1.6M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	-25.364 (18.542)	-25.364 (18.542)	-0.001 (0.002)	-0.001 (0.002)	0.000 (0.002)	0.000 (0.002)
1[b= 2.0M]$\times MVHS_{h,12} \times \mathbb{1}[t > 2012]$	-22.260 (14.435)	-22.260 (14.435)	-0.003** (0.002)	-0.003** (0.002)	0.002 (0.001)	0.002 (0.001)

Table A.2: Wealth Taxation and Charitable Giving: First-Stage Regression Estimates

Notes: The table provides the underlying **first-stage** coefficients on instruments from estimating the system of equations in (13)-(14). Each b corresponds to a binned range of $TNW_{h,2012} - T_{12}$. Standard errors are clustered at the household level. One, two, and three stars indicate statistical significance at the 10%, 5%, and 1% levels.

	(1) 1[wtax$_{h,t}$ > 0]	(2) wtax$_{h,t}$	(3) MWTR$_{h,t}$	(4) AWTR$_{h,t}$
1[b=-0.5M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.04950*** (0.00205)	863.03814*** (65.72379)	0.00045*** (0.00002)	0.00011*** (0.00001)
1[b=-0.4M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.05279*** (0.00220)	961.70899*** (68.79793)	0.00048*** (0.00002)	0.00012*** (0.00001)
1[b=-0.3M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.05937*** (0.00231)	982.77735*** (81.17741)	0.00054*** (0.00002)	0.00013*** (0.00001)
1[b=-0.2M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.07046*** (0.00257)	1174.37831*** (90.01625)	0.00065*** (0.00002)	0.00015*** (0.00001)
1[b=-0.1M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.07790*** (0.00281)	1020.81686*** (79.60634)	0.00072*** (0.00003)	0.00017*** (0.00001)
1[b= 0.0M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.09063*** (0.00339)	1310.84339*** (93.54192)	0.00086*** (0.00003)	0.00019*** (0.00001)
1[b= 0.1M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.06826*** (0.00343)	1312.35489*** (89.47701)	0.00064*** (0.00003)	0.00018*** (0.00001)
1[b= 0.2M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.06093*** (0.00317)	1693.94308*** (99.47321)	0.00055*** (0.00003)	0.00020*** (0.00001)
1[b= 0.3M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.04474*** (0.00321)	1359.53255*** (96.38915)	0.00042*** (0.00003)	0.00018*** (0.00001)
1[b= 0.4M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.02950*** (0.00225)	1683.17799*** (79.32153)	0.00027*** (0.00002)	0.00019*** (0.00001)
1[b= 0.6M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.01685*** (0.00227)	1869.70246*** (97.19695)	0.00016*** (0.00002)	0.00019*** (0.00001)
1[b= 0.8M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.00900*** (0.00160)	2156.12982*** (88.15089)	0.00009*** (0.00002)	0.00020*** (0.00001)
1[b= 1.2M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.00483*** (0.00162)	2191.86670*** (113.68456)	0.00005*** (0.00002)	0.00019*** (0.00001)
1[b= 1.6M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.00635*** (0.00162)	2388.67703*** (134.71304)	0.00007*** (0.00002)	0.00020*** (0.00001)
1[b= 2.0M]×$MVHS_{h,12}\mathbb{1}[t > 2012]$	0.00565*** (0.00088)	2415.38237*** (120.48775)	0.00006*** (0.00001)	0.00018*** (0.00000)

Table A.3: Wealth Taxation and Charitable Giving: IV Growth-Rate Regressions

Notes: The table provides the key coefficients from estimating the system of equations in (13)-(14). $AWTR$ is the average wealth tax rate, defined as the amount of wealth taxes paid divided by TNW. $MWTR$ is the marginal wealth tax rate and equals the nominal wealth tax rate if the household is above the wealth tax threshold and zero otherwise. See Appendix Tables A.1 and A.2 for the underlying reduced-form and first-stage estimates. Standard errors are clustered at the household level. One, two, and three stars indicate statistical significance at the 10%, 5%, and 1% levels.

	(1)	(2)
	Growth rate	
	$\Delta \log G_{h,t+1}$	$\Delta \log G_{h,t+1}$
$\text{AWTR}_{h,t}$		1.718
		(4.471)
$\text{MWTR}_{h,t}$	1.443	0.993
	(1.382)	(1.810)
sum of coefficients		
MWTR + AWTR		2.710
		(3.578)
rk-F-statistic	290.83	285.96
N	3416177	3416177