# Behavioral Responses to Inheritance and Gift Taxation: Evidence from Germany

**Ulrich Glogowsky***
University of Munich
ulrich.glogowsky@econ.lmu.de

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**Abstract**

The desirability of inheritance and gift taxes depends on individuals' tax responsiveness. This paper demonstrates how strongly, and in what way, the German inheritance and gift tax influences taxpayer behavior. To that end, it combines administrative data with cross-bracket tax variation: a convex kink in the tax liability precedes a concave kink. Extending the bunching approach to such double-kinked tax schedules, I document that individuals tailor their taxable wealth transfers to the schedules. One type of response dominates for inheritances: testators engage in testament planning. The magnitude of the testament-planning response is comparable to that of inter vivos gifts. However, neither the overall responses of gifts nor those of inheritances heavily interfere with tax revenue collection: the associated short-run net-of-tax elasticities of taxable wealth transfers lie below 0.1.

*JEL codes*: H2, H20, H21, H24, H26, H31
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# 1 Introduction

Policymakers [OECD 2018], think tanks [Brookings 2020], and economists [Piketty *et al.* 2013] recently proposed inheritance and gift tax hikes to raise revenues and redistribute wealth. A vital step in assessing the proposals lies in pinpointing how such tax increases would affect behavior. Would individuals lower their (taxable) transfers in response to taxation and, if so, how? Would donors, for example, engage in testament planning? Or would recipients misreport their received wealth? Responses like these lessen tax revenue and impede redistribution.[1] In short, they undermine the key goals of taxation. While behavioral responses, hence, shape the desirability of taxes, practical difficulties complicate their quantification [Kopczuk 2013, 2017]: exogenous variation in tax rates is rare, and wealth-transfer data are challenging to find. The effects of inheritance and gift taxes on behavior in general, and the answers to these questions in particular, therefore, are not fully understood.

In this paper, I illuminate how strongly, and through which channels, the German inheritance and gift tax affects the behavior of the wealthy. The German setting serves as a fruitful testing ground as it allows me to tackle the empirical challenges faced. First, it provides rich *administrative data* that contain the universe of transfers for which the authorities assess taxes (2002, 2009–2017). The data cover the top of the wealth-transfer distribution and include detailed information on the estates' composition and distribution. Second, the setting offers an unused type of cross-bracket *variation in tax rates* that, as I show, allows for bunching estimation: an area with significantly higher marginal tax rates characterizes the transition between progressive tax brackets. This creates two kinks in the tax liability (instead of one). There is a convex kink at which the marginal tax rate soars (end of lower bracket & start of transition area) and a concave kink at which it falls again (end of transition area & start of upper bracket). The jumps are substantial and affect the wealthy.

Leveraging this data and variation, I offer two contributions. First, I extend the bunching framework of Saez [2010] and Kleven and Waseem [2013] to double-kinked tax schedules. My point of departure is the two classical bunching approaches that either exploit schedules with single discontinuous increases in marginal tax rates (convex kinks) or average tax rates (notches). Both approaches share a similar idea. If individuals respond to tax incentives, a subset (called bunchers) will avoid the higher tax rate in the upper tax bracket by lowering transfers so as

[1] There are two reasons why such responses matter for redistribution. First, they leave governments with fewer resources for redistribution. Second, if the responses imply that the "wealthy" retain more wealth, they amplify inequality. The reason is that heirs who receive large inheritances tend to save it while those who receive smaller ones rather spend it [Nekoei and Seim 2019].

to “bunch” at or just below the bracket cutoff. Thus, the distribution of taxable transfers will feature an excess mass around the threshold, the amount of which determines the tax base’s net-of-tax elasticity. Notches additionally create a region of strictly dominated choices above the cutoff, creating a hole in the distribution. Building on these insights, I show that the double-kinked case represents a hybrid form of notches and kinks. Depending on their tax responsiveness, bunchers either behave as if the tax schedule would be single-convex-kinked (Scenario 1) or notched (Scenario 2).[2] I discuss how to separate the scenarios and how to estimate elasticities from bunching. As double-kinked schedules appear in different tax and non-tax settings, the derived insights extend beyond the present context.[3]

Second, I apply this approach to the German setting to provide a comprehensive examination of behavioral responses. The first part of the analysis estimates the overall (short-run) impact of the German inheritance and gift tax on taxable wealth transfers at death and also on transfers while alive. The broad bunching estimates can encompass responses of all involved actors (i.e., donors and recipients) and likely mirror evasion and avoidance rather than wealth-accumulation behavior [Kleven 2016, Jakobsen *et al.* 2020].[4] The second part examines the mechanisms driving the overall impacts. It sheds light on whether donors or recipients respond to the tax and highlights the channel through which these responses take place.

The main findings are as follows. The first part of the analysis reveals that the taxes indeed impact taxable transfers. There is noticeable bunching at the convex kinks for both types of transfers. The observed density around the cutoffs amounts up to 14.5 times the expected counterfactual density. Moreover, the responses represent timely adjustments of behavior. They fully materialize within one year (gifts) or three years (inheritances) after tax reforms relocate the bracket cutoffs. Regarding heterogeneity, bunching increases in closer kinship and the size of the wealth transfer. It is also larger for gifts than for inheritances. However, in terms of elasticities, I find only moderate responses. The elasticities for taxable gifts lie consistently below 0.1, and those for inheritances are even smaller. From a policy perspective,

[2] In Scenario 1, bunchers are “sufficiently unresponsive.” They choose points close above the convex kink under linear schedules. From their perspective, the concave kink hence lies at an “unattractively high” transfer level and does not affect their choices. In Scenario 2, “tax-responsive individuals” perceive the transition area’s tax rate as “too high.” They move to the kink or the top bracket.

[3] In Germany, there are various examples for double-kinked schedules, including the student grant schedule or the income tax schedule. The solidarity surcharge imposes a transition area into the latter. Internationally, similar schedules are widespread, one example being the Pakistani income-tax schedule. Another is the earned income tax credit in the U.S. (although the kinks are far apart).

[4] Jakobsen *et al.* [2020] argue that the bunching cannot reflect wealth-accumulation responses to wealth taxes. Similar arguments hold for inheritance taxes: donors can unlikely plan the estate’s exact value (one reason: uncertain death). Hence, targeting cutoffs via wealth accumulation is hard.

this finding implies that the bunching responses do not heavily interfere with tax revenue collection. The result that the bunching increases in closer kinship, paired with optimal inverse elasticity considerations, further suggests lesser taxation of close relatives, a feature implemented in many countries.

The second part of the analysis exploits the detailed data to pinpoint the *mechanisms* through which taxes affect taxable inheritances. The first observation regarding mechanisms is that excess bunching of inheritances is sharp and located exactly at the cutoffs. This finding suggests responses via channels that allow individuals to target taxable inheritances precisely to the thresholds. The behavioral responses, for example, may reflect that heirs illegally underreport their inheritance to bunch at the kinks. Various analyses, however, do not support this hypothesis.[5] Consequently, bunching seems to mirror the donors' choices. Yet, how do donors precisely respond to taxes that apply at the time of death, an event that is uncertain and potentially many years away? They tailor their testaments to the tax code and, hence, engage in testament planning. In particular, donors draw up their testaments so that heirs receive testamentary gifts upon death, and target the gifts' values exactly to the convex kinks.[6] This type of response explains 82% of bunching. As regards magnitude, the elasticities for testamentary gifts are comparable to those for inter vivos gifts; sometimes, they are slightly larger. The similar nature of both types of transfers rationalizes this finding.

To sum up, donors engage in testament planning and adjust their testamentary dispositions.[7] In terms of elasticities, the responses and also those of gifts are moderate, however. The findings are striking: first, they indicate that even donors who actively and who can precisely plan the allocation of their wealth (by making a gift or testament) hardly adjust their transfers to the tax schedule. Second, they imply that even the short-run planning responses tend to be small, though these are usually expected to be the largest [see e.g., Slemrod 1990, 1995]. In a different vein, although my paper estimates short-run elasticities, it has long-run implications: given the small elasticities, the fear that strong bunching responses boost future inequality (via allowing wealthy families to retain their wealth) seems unjustified.

The paper proceeds as follows: Section 2 presents the literature, Section 3 the

[5] I find no evidence that recipients misreport non-financial assets (e.g., real estate), including those kept at home. In contrast, I find bunching of third-party reported assets that cannot be misreported.

[6] Testamentary gifts are bequests of a specific amount of money, a certain amount of property from a specific source, or a specific item. Donors can easily customize them to the tax schedule.

[7] By customizing the methods of Gelber *et al.* [2020a] and Escobar *et al.* [2019], I demonstrate that kinks do not affect the decision to create a testament. Thus, donors seem to adjust the directives contained in their testaments but not their extensive-margin behavior.

institutional context, Section 4 the conceptual framework, Section 5 the estimation strategy and data, and Section 6 the results. Finally, Section 7 concludes the paper.

## 2 Contribution to the Literature

This study contributes to three literature strands: the small empirical public finance literature on inheritance and estate taxation, the methodological bunching literature, and the literature on donors' behavioral motives.[8]

**Inheritance and Estate Taxation:** Two small literature waves have looked into the effects of inheritance and estate taxes. The first wave exploits variation in US estate taxes across states [Holtz-Eakin and Marples 2001] and over time [Slemrod and Kopczuk 2001, Joulfaian 2006] to study how taxation affects wealth accumulation. In a review, Kopczuk [2017] concludes that: "while none of the [empirical] strategies is particularly appealing by the 'post-credibility' revolution standard, interestingly they produce fairly similar estimates [...]." The elasticity of the estate to the net-of-tax rate lies between 0.1 and 0.2.

Equipped with better data and methods, the second wave has made progress in studying (a) wealth-accumulation responses via certain assets, (b) evasion responses under low enforcement, and (c) the use of specific tax-avoidance schemes. For example, Goupille-Lebret and Infante [2018] focus on wealth accumulation. They show that the (notched) inheritance tax in France mildly affects donors' contributions to life insurance plans. Exploiting a quasi-repeal of the Catalan inheritance tax, Montserrat [2019] instead finds that taxes trigger underreporting under low enforcement: heirs misstate self-reported real estate. In a different vein, Escobar *et al.* [2019] highlight that Swedish heirs heavily exploit a specific tax loophole. They utilize a one-time opportunity to reduce their tax liability by transferring part of their inheritance to their children. Other individuals engage in deathbed tax planning [Kopczuk 2007], although not in Sweden [Erixson and Escobar 2020].

As apparent, the effects of wealth-transfer taxes are still understudied. Thus, adding evidence from a new setting (characterized by third-party asset valuation and reporting) is per se a valuable contribution. Further, compared to most studies, my paper has a broader scope: I do not focus on responses of single assets, actors, or avoidance schemes from the onset; instead, my approach uncovers the responses of all involved actors (i.e., donors and recipients) through each of the channels that allow for precise adjustments of taxable transfers (e.g., evasion or avoidance).

[8] More broadly, the paper connects to the literature on wealth taxes [Zoutman 2014, Brülhart *et al.* 2019, Seim 2017, Jakobsen *et al.* 2020] and gift taxes [for an overview, see e.g., Kopczuk 2013].

Moreover, my decomposition analysis highlights the relevance of an undiscovered but potentially widespread response margin: testament planning. I further provide joint estimates for bequests and gifts, making their responses comparable.

Notably, a paper by Sommer [2017] also examines responses to the German wealth-transfer tax using a bunching approach and data for 2007–2011. The overlapping parts of the papers reassuringly deliver similar results: both find small elasticities for inheritances. Furthermore, the bunching of gifts is consistently larger than that of inheritances and also increases in closer kinship.[9] Beyond these similarities, my paper, and also its earlier versions [Glogowsky 2015, 2016], are much more comprehensive. Crucially, I extend the bunching approach to double-kinked tax schedules. With this, I duly account for the nature of the German tax schedule and demonstrate how to estimate elasticities in such a setting. Moreover, I exploit reforms to examine response timing, employ bunching-decomposition techniques to explore channels, customize the methods of Gelber *et al.* [2020a] and Escobar *et al.* [2019] to study the extensive margin of tax planning, and provide results from a complementary laboratory experiment. The combined results guide the interpretation of the elasticities and offer additional insights. For example, they buttress the importance of testament planning and the short-run nature of the responses.

**Bunching Literature:** My paper also extends the conceptual "bunching literature" [for a review, see e.g., Kleven 2016]. As already described, this literature has focused on single convex kinks [Saez 2010, Chetty *et al.* 2011] or notches [Kleven and Waseem 2013] to estimate parameters such as tax-base elasticities. Although they appear in different tax and non-tax contexts, double-kinked schedules have to date received little attention. My contribution is to provide a framework for such schedules that allows us to estimate elasticities, and that translates to other contexts.

**Behavioral Motives:** Some of the results relate to the literature on donors' behavioral motives, as summarized by Kopczuk [2013]. First, my result that testament planning takes place just before death is in line with a denial of death and deathbed planning. Second, many donors die testate, which hints at intentional bequests. Third, the finding that the bunching increases in closer kinship suggests that donors only consider and care about taxes if they shrink close relatives' inheritances. One explanation is an aversion to taxing family property, resulting in tax planning.

[9] There seems to be an inconsistency at first sight: the main graph of Sommer [2017] does not show any bunching of inheritances. However, the graph pools the data over all tax classes, while bunching is limited to close relatives. Indeed, Sommer [2017] also finds bunching for close relatives at the upper kinks, particularly for spouses and children.

## 3 The German Inheritance and Gift Tax

This section highlights the main characteristics of the *German wealth-transfer tax*. Because my analyses focus on the years 2002–2017, I discuss taxation in this period.

**Inheritances:** Taxation of *transfers of wealth at death* takes the form of an inheritance tax, which is paid by heirs. Formally, the taxable inheritance of heir $i$ is:

$$b_i = \alpha_i(E - D) + P_i - X_i + G_i, \quad (1)$$

where $E$ is the estate, $D$ is the debt of the decedent's estate, $\alpha_i$ is $i$'s share of the net-of-debt estate, $P_i$ are testamentary gifts that recipient $i$ inherits, $X_i$ are tax exemptions, and $G_i$ are inter vivos gifts that the heir $i$ has received from the same donor within the past ten years.[10] The inclusion of past gifts in the base ensures that donors cannot avoid taxes by giving gifts in the ten years before death.[11]

Eq. (1) illustrates how the taxable inheritance depends on the donor's decision to create a testament. First, consider passive donors (labeled *intestators*) who allocate their property according to the German intestate succession law. In this case of *statutory succession*, children and spouses are the rightful heirs and receive a statutory share $\alpha_i$ of the estate net-of-debt (i.e., the law determines $\alpha_i$ and $P_i = 0$).[12] Second, consider active donors (labeled *testators*) who deviate from the statutory succession rules by testation and leave *customized successions*. Testators may choose between two forms of transfer upon death. They might name a community of heirs, each of whom receives a freely selectable and individualized proportion $\alpha_i$ of the estate net-of-debt (*proportional inheritance*). Alternatively, they might give testamentary gifts and pass on assets with a specific value $P_i$ to an heir $i$ (*specific inheritance*). Money transfers or transfers of financial assets are ubiquitous examples. Donors might also combine proportional and specific inheritances. Specific inheritances reduce the value of the estate $E$ that is proportionally allocated among heirs.

**Inter Vivos Gifts:** Gifts are also taxed. For inter vivos gifts, $b_i$ in Eq. (1) mirrors the taxable gift, $\alpha_i$ is zero, $P_i$ represents the gift's value, $X_i$ reflects exemptions, and $G_i$ represents previous gifts within the past ten years. Notably, the tax schedules

[10] Table A1 in Appendix A further decomposes taxable transfers into its sub-components, and Tables A2–A4 show the size of the recipients' personal tax exemptions.

[11] Donors can, however, avoid taxes by retiming transfers in the longer run. For example, 11 years before death, a donor may give an inter vivos gift, which will not be part of the inheritance tax base. Because donors are short-sighted and tend to adjust their estates shortly before death [Kopczuk 2007], the literature suggests that such responses are limited.

[12] In the case of a surviving spouse and two children, the spouse receives one-half and each child one-quarter of the estate. More distant relatives inherit only if a donor has no spouse and no children.

for gifts and inheritances are identical. Therefore, a taxable gift and an identically sized taxable inheritance, which a recipient receives instead of the gift, both lead to an identical tax liability.

**Structure of Tax Schedules:** Each taxable inheritance or gift is taxed according to one of three *progressive tax schedules* with seven tax brackets. Which schedule applies depends on the tax class: Class I is for *close relatives*, Class II for *other relatives*, and Class III for *unrelated individuals*.[13] Crucially, these schedules feature transition areas between brackets, creating identifying variation in marginal tax rates. Panel A of Figure 1 demonstrates this cross-bracket variation, considering the 1996–2008 tax schedule for close relatives as an example.[14] It focuses on the first two tax brackets and shows the tax liability as a function of the taxable transfer, expressed in Euro. Within each tax bracket, the liability is a percentage of the taxable transfer. Therefore, without additional regulations, the tax liability would discretely increase at the cutoff (see hypothetical notch). The tax code smooths the transition between brackets, however. Taxable transfers above the threshold are subject to a much higher marginal tax rate, replacing the notch in the tax liability with a sizable *convex kink* (see solid line). Above some transfer level, taxes would be lower when calculated as a percentage of taxable transfers using the second tax bracket's statutory tax rate.[15] The second tax bracket effectively begins at this second cutoff, introducing a substantial *concave kink*. I label the range between both cutoffs as the *transition area* and exploit the underlying tax rate discontinuities for identification.

**Details of Tax Schedules and Reforms:** Panel B depicts the tax schedules for all tax classes and shows how they changed over time. It covers 1996–2017 and presents the marginal tax rates in the first four tax brackets and the three corresponding transition areas (lightly shaded). I focus on these brackets and, hence, on bunching at the first three convex kinks, as the upper brackets do not hold enough observations for a bunching analysis. Tables A2–A4 show the full schedules.

Several details are noteworthy. First, the basic (double-kinked) structure of the tax schedule is identical for all tax classes. Second, taxation is progressive. Third, it favors transfers within families (e.g., close relatives face the lowest tax rates). Fourth, the marginal tax rate changes at the kinks are substantial. At the convex kink (concave kink), the marginal tax rates increase (decrease) by between 25 and

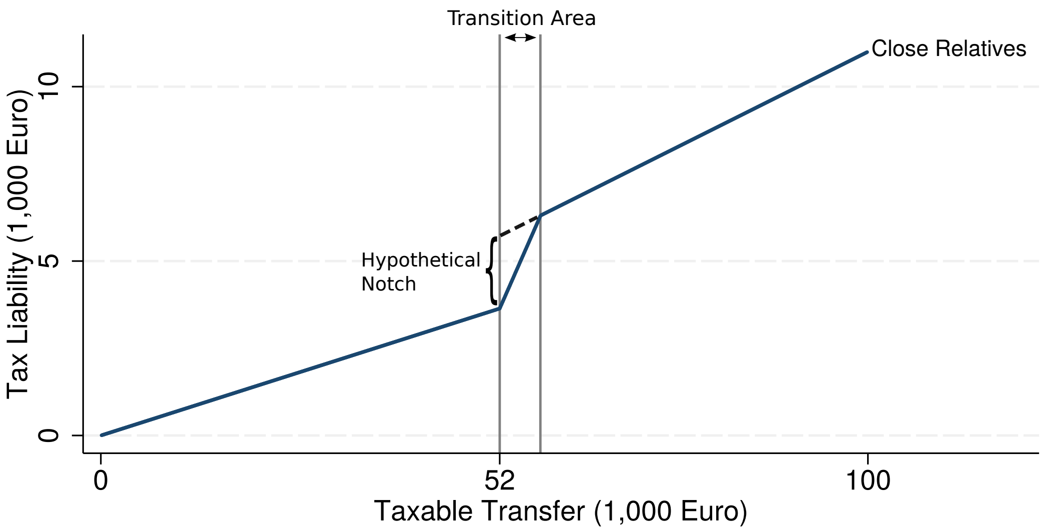
[13] The notes of Tables A2–A4 discuss how the donor-recipient relationship determines the class.

[14] With the introduction of the Euro, the bracket cutoffs were slightly adjusted to round-Euro numbers. For example, before January 2002, the bracket cutoff was 100,000 DM ($\sim$ 51,129 Euro) and 52,000 Euro afterward. All other aspects of the schedules (e.g., the tax rates) remained unchanged.

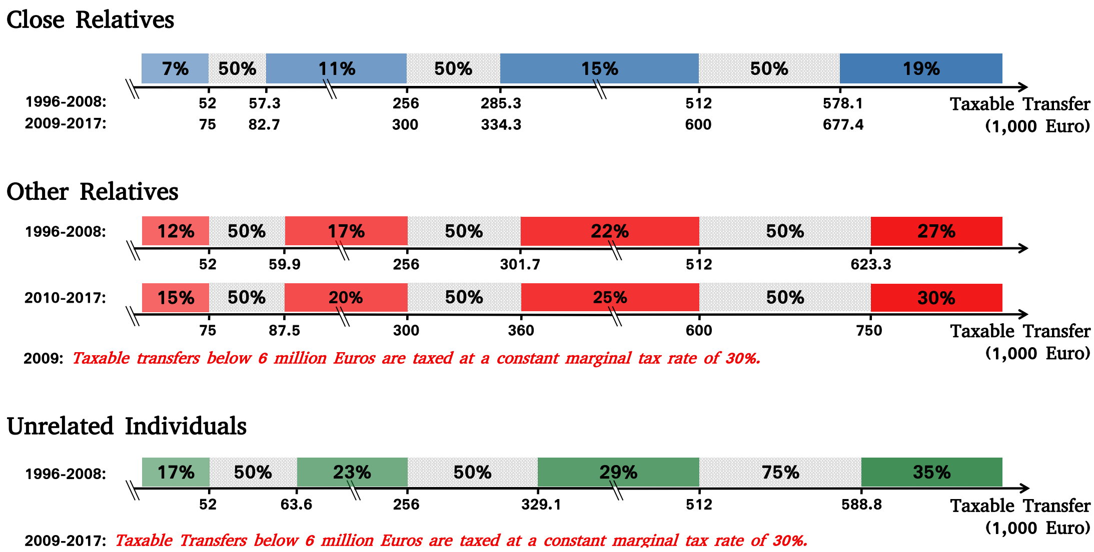
[15] The tax code states the convex kink's location $b_1$. The concave kink's location is $\frac{b_1 \Delta t_1}{\Delta t_1 - \Delta t_2}$, where $\Delta t_1$ ($\Delta t_2$) is the tax-rate change between the transition area (second bracket) and the first bracket.

## Figure 1: German Inheritance and Gift Tax Schedules

### A. Tax Liability for Close Relatives (1996–2008)




### B. Marginal Tax Rates




***Notes:*** This figure summarizes German inheritance and gift tax schedules. Panel A plots the tax liability as a function of the taxable transfer for close relatives. It focuses on the 1996–2008 tax schedule and the first two tax brackets. More generally, Panel B depicts the tax schedules for all tax classes and shows how taxation has changed over time. It covers 1996–2017 and presents marginal tax rates in the first four tax brackets and transition areas (lightly shaded). The tax administration implemented two reforms. The first reform, in 2009, shifted the tax bracket cutoffs for close relatives upwards. It also merged the first four tax brackets for other relatives and unrelated individuals. For these groups, transfers below 6 million Euros became subject to a rate of 30%. The second reform reintroduced the tax brackets for other relatives in 2010. With the introduction of the Euro, the bracket cutoffs were also slightly adjusted to round-Euro numbers. For example, before 2002, the first bracket cutoff was 100,000 DM (∼ 51,129 Euro) and 52,000 Euro afterward.

46 (20 and 40) percentage points. Fifth, after 2008, the tax authorities reformed the tax schedules twice. The first reform in January 2009 shifted the bracket cutoffs for close relatives upwards without changing the tax rates. Simultaneously, it modified the schedules for other relatives and unrelated individuals. Specifically, the reform merged the first four brackets for these groups and applied a constant tax rate of 30% to transfers below six million Euros. The second reform reintroduced the first four tax brackets for other relatives starting from January 2010. Compared to the 1996–2008 schedule, the new system introduced higher tax rates and cutoffs.

**Tax Literacy:** Individuals' tax literacy is arguably high. In about 95% of all the cases in which donors made a testament, they hired a tax consultant. Moreover, a complementary laboratory experiment suggests that individuals find it easy to gather and understand information on the schedules (see Appendix C for details). In this study, time-constrained subjects received internet access and written information on three imaginary inheritance cases.[16] The cases differed in the amount inherited: a hypothetical taxable inheritance fell into either the first tax bracket, the first transition area, or the second tax bracket. The subjects' task was to collect information on the inheritance tax bill and to calculate the corresponding tax rates. Despite lacking monetary incentives, 71.1% of the subjects correctly solved all the cases. Actual donors and recipients, who face high stakes and have more time, should be even better at collecting tax-relevant information.

**Enforcement:** Enforcement is powerful. First, there is comprehensive third-party information reporting. For example, all financial institutions third-party report financial assets to the tax authorities (over 57% of total inheritances). Registry offices, courts, local authorities, and notaries also third-party report relevant information (such as the existence of real estate or business assets). Second, the German tax law requires financial institutions to freeze all of the donors' assets after they die, and heirs need a certificate of inheritance or a power of attorney to claim their inheritance. Third, as part of the Money Laundering Act, banks perform checks on transactions and report suspicious cases to the authorities.[17] Due to these measures, misreporting and concealment of most assets is risky or even impossible.

**Assessment and Valuation:** Registry offices automatically report deaths to the tax authorities, and financial institutions subsequently third-party report a donor's

[16] The sample consists of 322 students studying in fields ranging from engineering to social sciences or business. The subjects had 15 minutes to answer nine questions regarding these cases.

[17] For example, in 2002 (2017), they had to report cash receipts above 10,225 Euro (15,000 Euro), wire transfers above 10,225 Euro (15,000 Euro), and multiple receipts for smaller amounts.

assets. Within three months, recipients must inform the tax offices of received transfers. If the offices infer from the third-party- and self-reported information that the transferred wealth likely exceeds tax exemptions, they request a tax return. The tax offices also determine the value of non–third-party reported assets (such as real estate or business assets) based on market values (see details in Appendix D). They use the day of death (inheritances) or day of transfer (gifts) for valuation.

# 4 Conceptual Framework

Focusing on wealth-transfer taxes, this section extends the bunching framework to double-kinked tax schedules and shows how to identify elasticities from bunching.

## 4.1 Preferences

A continuum of donors decides how much pre-tax wealth $b$ to transfer to a recipient.[18] $T(b)$ depicts the tax schedule. Each donor obtains utility from transferring wealth, for example, due to altruism [Barro 1974, Laitner 1997, Kopczuk 2013]. Wealth transfers also impose convex utility costs on donors [Piketty and Saez 2013, Kopczuk 2013]. For example, transfers might have opportunity costs: donors cannot use transferred wealth for other purposes.[19] There also might be resource costs, such as the costs of sheltering transfers from taxation [Londoño-Vélez and Ávila-Mahecha 2018]. Thus, donors trade off the transfer's utility *gains* and *costs*.

The standard isoelastic utility specification employed in the bunching literature reflects such a trade-off in a stylized way [Kleven 2016]:

$$u = b - T(b) - \frac{\rho}{1+1/\varepsilon} \cdot \left(\frac{b}{\rho}\right)^{1+1/\varepsilon}. \tag{2}$$

The term $b - T(b)$ models the donor's utility from transferring (net-of-tax) wealth. By contrast, the convex function $\rho/(1+1/\varepsilon) \cdot (b/\rho)^{1+1/\varepsilon}$ represents utility costs. Hereby, the parameter $\varepsilon$ refers to the net-of-tax elasticity of the taxable transfer, which, by assumption, is *homogeneous* in the population. Furthermore, $\rho$ reflects the potential transfer (i.e., the transfer in the absence of taxes).

## 4.2 Effects of Single-Kinked Tax Schedules

Assume that $\rho$ is smoothly distributed in the population, and that donors face a linear tax schedule $T_0(b) = t \cdot b$ with the proportional tax rate $t$. Then, transfers also

[18] Therefore, the framework assumes that donors and not recipients respond to taxes. My results suggest that this is an adequate conceptualization in the German context (see Section 6).

[19] Alternative uses include own consumption or transfers to other recipients.

follow a smooth density distribution $h_0(b)$.[20] Next, consider a reform that introduces the single-kinked tax schedule:

$$T_1(b) = t \cdot b + \Delta t_1 \cdot (b - b_1) \cdot \mathbb{1}(b > b_1), \tag{3}$$

with $\Delta t_1 > 0$ and $\mathbb{1}(\cdot)$ as indicator variable. The reform's consequences are as follows. Donors with pre-reform transfers $b \in (b_1, b_1 + \Delta b^S]$ avoid the higher marginal tax rates above $b_1$ by reducing their transfer to the kink at $b_1$. Among all bunchers, the marginal buncher at a single kink $S$ lowers transfers the most by $\Delta b^S$, where $\Delta b^S$ increases in $\varepsilon$. These responses lead to a spike in the transfer density at $b_1$, which is called excess bunching. The size of the spike allows us to trace out $\Delta b^S$, which, in turn, enables us to recover the elasticity $\varepsilon$ [Saez 2010].

### 4.3 Effects of Double-Kinked Tax Schedules

A second reform replaces $T_0(b)$ with a schedule that features a transition area:

$$T_2(b) = t \cdot b + \Delta t_1 \cdot (b - b_1) \cdot \mathbb{1}(b_1 < b \leq b_2) + \Delta t_2 \cdot b \cdot \mathbb{1}(b > b_2), \tag{4}$$

with $\Delta t_1 > \Delta t_2$. The transition area introduces two kinks: A convex kink at $b_1$ (where the marginal tax rate increase from $t$ to $t + \Delta t_1$) and a concave kink at $b_2$ (where it decreases from $t + \Delta t_1$ to $t + \Delta t_2$). This schedule also induces bunching at $b_1$. Donor $D$ is the corresponding marginal buncher under this double-kinked schedule. However, two scenarios lead to different elasticity formulas.

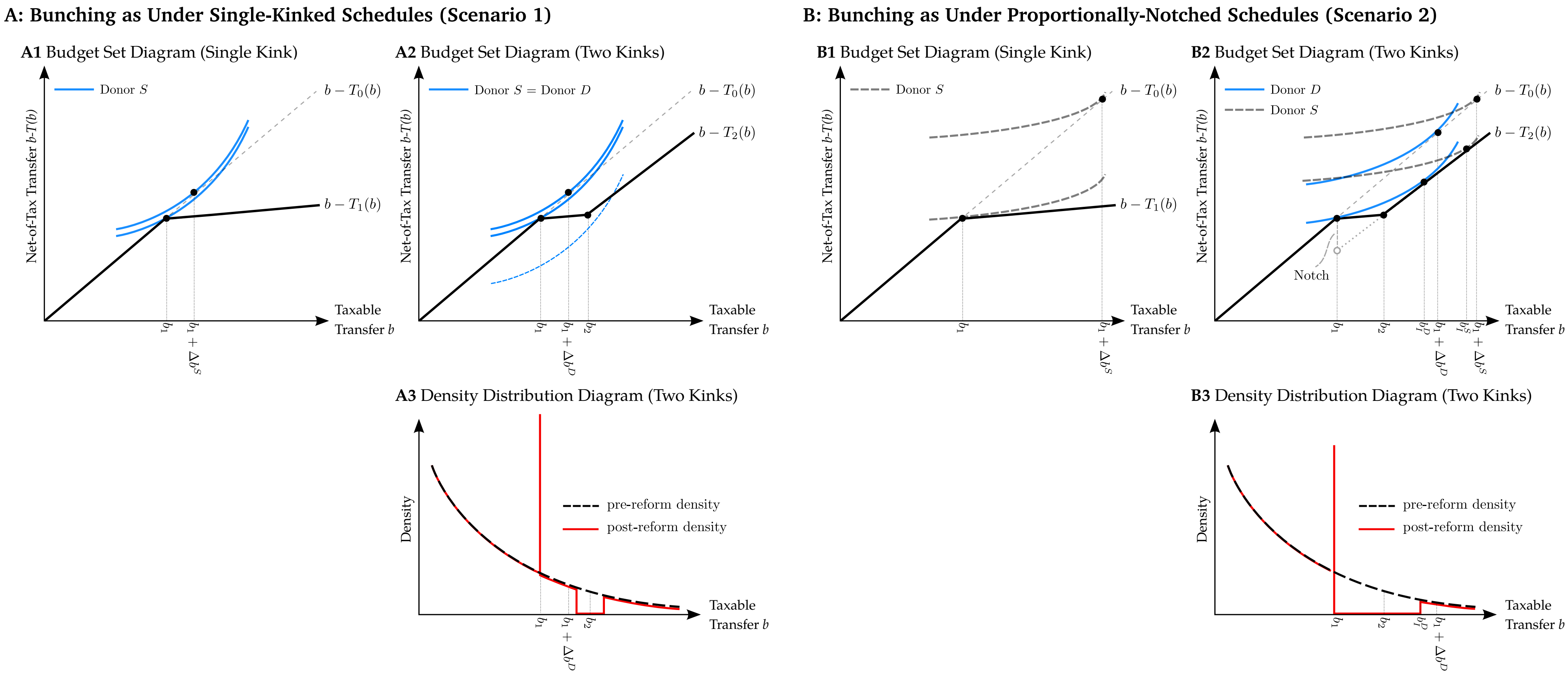
**Scenario 1:** In Scenario 1, bunchers who face the schedule with transition area $T_2(b)$ behave as if it would contain only one convex kink $T_1(b)$. Panel A of Figure 2 demonstrates this case. For comparison, Panel A1 shows the implications of the single-kinked schedule $T_1(b)$ in a budget set diagram. It illustrates that the marginal buncher at a single kink $S$ reduces taxable transfers by $\Delta b_1^S$. Panel A2 introduces a concave kink at $b_2$. Intuitively, from the perspective of the donors who bunch at a single kink, the budget line above the second cutoff $b_2$ is irrelevant. Donor $S$, for example, would lose utility by choosing post-reform transfers above $b_2$ on $T_2(b)$ (see exemplary dashed indifference curve in Panel A2). She, hence, would keep bunching. In fact, $S$ corresponds to the marginal buncher $D$ under $T_2(b)$ and $\Delta b^S = \Delta b^D$. To sum up, the concave kink leaves the bunching incentives and, in turn, the amount of bunching unaffected. Panel A3 shows the associated distribution.[21]

Because bunching is unchanged, Saez's [2010] standard elasticity formula for

[20] Maximization of utility for transfers yields $b = \rho \cdot (1 - t)^\varepsilon$ under $T_0(b)$. Given a smooth distribution of $\rho$, $b$ will also be smoothly distributed under $T_0(b)$.

[21] Standard models also predict holes in the density around the concave kink $b_2$ [Saez 2010].

## Figure 2: Behavioral Responses to Double-Kinked Tax Schedules




***Notes:*** This figure shows behavioral responses to double-kinked tax schedules created by transition areas. Panel A considers Scenario 1. As a comparison, Panel A1 illustrates how donors respond to introducing a single convex kink in a budget set diagram. Further, Panels A2 and A3 depict responses to double-kinked tax schedules in a budget set and density distribution diagram. The person that is the marginal buncher of a single-kinked schedule $S$ is, simultaneously, the marginal buncher of a double-kinked schedule $D$. Panel B focuses on Scenario 2. Again, Panel B1 considers a single convex kink and Panels B2 and B3 focus on the double-kinked tax schedule. In Scenario 2, the marginal buncher is a different donor under a single-kinked and double-kinked schedule. Donor $S$ ($D$) refers to the marginal buncher under a single- (double-)kinked schedule.

single kinks identifies the elasticity in Scenario 1 (see derivation in Appendix E.2):

$$\varepsilon_1 = \frac{\ln\left[1 + \frac{\Delta b^D}{b_1}\right]}{\ln\left[\frac{1-t}{1-t-\Delta t_1}\right]}. \tag{5}$$

To estimate the elasticity, one usually exploits that the excess mass at the kink $B/h_0(b_1)$ approximates $\Delta b^D$, where $B$ denotes total bunching at $b_1$, and $h_0(b_1)$ reflects the counterfactual density at the kink [Saez 2010].

**Scenario 2:** In Scenario 2, depicted in Panel B, the bunchers respond to $T_2(b)$ just as to a proportionally-notched schedule: $T_3(b) = t \cdot b + \Delta t_2 \cdot b \cdot \mathbb{1}(b > b_2)$. The key differences between single-kinked (Panel B1) and double-kinked (Panel B2) schedules are: first, donors with pre-kink transfers $b \in (b_1 + \Delta b^D, b_1 + \Delta b^S]$ only bunch when facing a single-kinked schedule. They prefer interior points above $b_2$ under $T_2(b)$. For example, the marginal buncher $S$ bunches under $T_1(b)$ but moves to the interior point $b_I^S$ when facing $T_2(b)$ (cp., Panels B1 and B2). Second, and consequently, the number of bunchers under $T_2(b)$ is smaller than under $T_1(b)$. Third, the amount of bunching in Scenario 2 is identical to that under a proportionally-notched schedule that replaces the transition area with the dotted line shown in Panel B2. Intuitively, from the bunchers' perspectives, the budget line in the transition area $(b_1, b_2]$ is irrelevant as the associated tax rate is "unattractively high." Fourth, as with notches, the marginal bunchers $D$ under $T_2(b)$ are indifferent between $b_1$ and the point $b_I^D$. Fifth, there is a hole in the post-kink density between $b_1$ and $b_I^D$ (see Panel B3).

Given the equivalence, Kleven and Waseem's [2013] elasticity formula for proportional notches applies to Scenario 2 (see derivation in Appendix E.2):

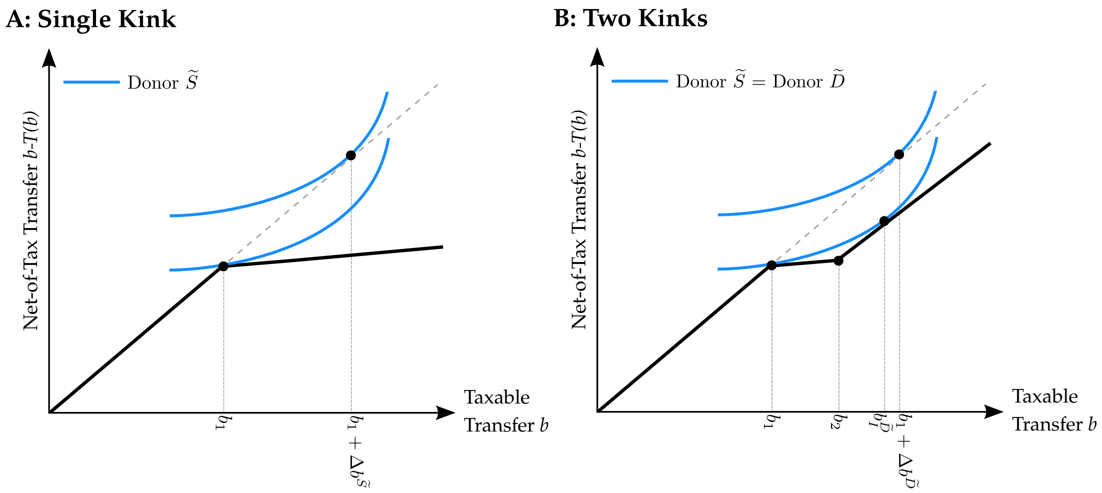
$$\left[\frac{1}{1+\Delta b^D/b_1}\right] - \frac{1}{1+1/\varepsilon_2}\left[\frac{1}{1+\Delta b^D/b_1}\right]^{1+1/\varepsilon_2} - \frac{1}{1+\varepsilon_2}\left[1 - \frac{\Delta t_2}{1-t}\right]^{1+\varepsilon_2} = 0. \tag{6}$$

As for notches and single kinks, the excess mass around the cutoff $B/h_0(b_1)$ approximates $\Delta b^D$. Thus, we can, once again, recover elasticities from excess bunching.

**Separating the Scenarios:** Which scenario materializes depends on the donors' tax responsiveness. To demonstrate why this is the case, consider the marginal buncher at a single kink $S$. The curvature of this donor's indifference curves above $b_1$ decreases in $\varepsilon$ (see details in Appendix E.3). In Scenario 1, depicted in Panel A2 of Figure 2, the homogeneous elasticity $\varepsilon$ lies below a knife-edge value $\tilde{\varepsilon}$. The indifference curve of $S$ is then bent so distinctly above $b_1$ that she strictly prefers the kink over any interior point on $T_2(b)$.[22] By contrast, in Scenario 2, the indifference

[22] Intuitively, due to her rather low tax responsiveness, $S$ locates close above $b_1$ under the linear tax schedule. Then, the tax reform affects transfers that, from her perspective, are irrelevantly high.

**Figure 3: Knife-Edge Case That Separates the Scenarios**




***Notes:*** This figure shows the knife-edge case in which donors' elasticity $\varepsilon$ corresponds to knife-edge elasticity $\widetilde{\varepsilon}$. Panel A (Panel B) illustrates behavioral responses to a single- (double-)kinked schedule in a budget set diagram. Donor $\widetilde{S}=\widetilde{D}$ is the marginal buncher whose elasticity corresponds to the knife-edge value.

curve of $S$ above $b_1$ is so flat that she prefers an interior point $b_I^S$ on $T_2(b)$ over $b_1$ (see Panel B2 of Figure 2). Scenario 2 applies for $\varepsilon > \widetilde{\varepsilon}$.[23] The knife-edge scenario is an intermediate case (see Figure 3): When facing $T_2(b)$, the single-kink marginal buncher $\widetilde{S}$ with $\varepsilon = \widetilde{\varepsilon}$ neither prefers $b_1$ (as in Scenario 1) nor an interior point above $b_1$ (as in Scenario 2). Instead, she is indifferent between $b_1$ and $b_I^{\widetilde{D}}$ (see Panel B).

**Elasticity:** To sum up, the elasticity becomes:

$$\varepsilon = \begin{cases} \varepsilon_1 & \text{if} \quad \varepsilon_1 \leq \widetilde{\varepsilon} \qquad \text{(Scenario 1)} \\ \varepsilon_2 & \text{if} \quad \varepsilon_1 > \widetilde{\varepsilon} \qquad \text{(Scenario 2)}, \end{cases} \tag{7}$$

where $\varepsilon_1$ follows from Eq. (5), $\varepsilon_2$ results from Eq. (6), and the expression $1-t+\widetilde{\varepsilon}\cdot\Delta t_1 = (1-t-\Delta t_2)^{1+\widetilde{\varepsilon}}/(1-t-\Delta t_1)^{\widetilde{\varepsilon}}$ implicitly defines the cutoff elasticity. Appendix E.3 derives $\widetilde{\varepsilon}$ and proves its existence. The more extreme the transition area, the likelier Scenario 2 will occur: $\widetilde{\varepsilon}$ ceteris paribus falls in $\Delta t_1$ and $t$, and it rises in $\Delta t_2$.

**Extensions:** I present several extensions. First, Appendix E.4 allows for heterogeneous elasticities. In this case, my approach identifies the elasticity for the *average* marginal buncher who lowers transfers by $E[\Delta b_\varepsilon^D]$, where $\Delta b_\varepsilon^D$ reflects the response at level $\varepsilon$.[24] Second, Appendix E.2 presents a general version of Eq. (6) that holds

[23] Intuitively, due to her "high enough" tax responsiveness, $S$ chooses so large pre-reform transfers that she cares about the reform that affects transfers above $b_1$. Instead of bunching, she avoids the transition area by moving to the top bracket.

[24] This even holds for the case in which some donors are in Scenario 1 and others in Scenario 2.

for all schedules with tax-rate plateaus (not only the German case). Third, for generality, the baseline model is unspecific about the response margin. Appendix E.1 presents alternative utility functions that leave the elasticity formulas unchanged but are explicit about the margin (e.g., misreporting). Fourth, Appendix E.5 allows for imprecise control over the transfers. Due to the kinks' substantial sizes, bunching still appears even with very little control and small elasticities. Fifth, the reduced-form approach of Saez [2010] (Kleven and Waseem [2013]) can be used to estimate elasticities for Scenario 1 (Scenario 2) without parametric reliance.[25]

# 5 Estimation Strategy and Data

## 5.1 Estimation Strategy

As the elasticity depends on the excess mass $B/h_0(b_1)$, elasticity estimation requires approximation of bunching $B$ and the counterfactual density without kinks $h_0(b_1)$. My paper follows Chetty *et al.* [2011] to estimate these quantities.

**Counterfactual Density:** I calculate the density of taxable transfers $n_i$ for each taxable-transfer bin $z_i$ with bounds $[z_i - \zeta/2, z_i + \zeta/2)$ and estimate the regression:

$$n_i = \sum_{j=0}^{q_1} \beta_j \cdot (z_i)^j + \sum_{j=L}^{U} \gamma_j \cdot \mathbb{1}[z_i = j] + \sum_{j=0}^{q_2} \delta_j \cdot \mathbb{1}\left[\frac{z_i}{10,000} \in \mathbb{N}\right] \times (z_i)^j + u_i, \quad (8)$$

where $\mathbb{1}[\cdot]$ are indicators, and $\mathbb{N}$ is the set of natural numbers. This model expresses the wealth-transfer distribution as a polynomial of degree $q_1$, indicators for bins in the excluded range $[L, U]$ around the convex kink point, and interactions between round-number dummies for multiples of 10,000 Euro and a polynomial of order $q_2$.[26] The counterfactual density in bin $z_i$ is: $\hat{n}_i = \sum_{j=0}^{q_1} \hat{\beta}_j \cdot (z_i)^j + \sum_{j=0}^{q_2} \hat{\delta}_j \cdot \mathbb{1}\left[\frac{z_i}{10,000} \in \mathbb{N}\right] \times (z_i)^j$. Standard errors follow from a residual-bootstrap procedure.

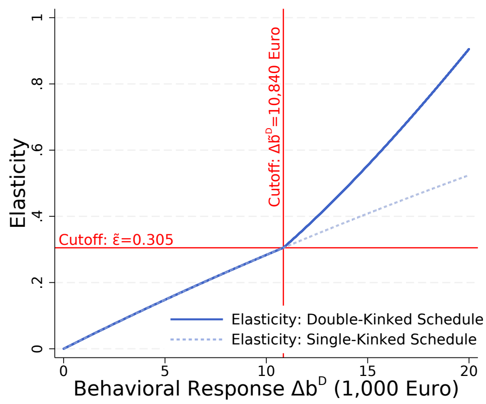
**Excess Bunching:** The standard excess mass measure is: $\hat{B} = \sum_{i=L}^{U}(n_i - \hat{n}_i)$. Further, I obtain a measure of excess mass that is comparable across different kinks, $\hat{b}$. It scales $\hat{B}$ by the average counterfactual density in $[L, U]$: $\hat{b} = \hat{B}/(\sum_{i=L}^{U} \hat{n}_i/N)$, with $N$ being the number of bins in the range $[L, U]$. Intuitively, $\hat{b}$ reflects the average number of bins by which marginal bunchers reduce their taxable wealth transfer for bunching. The measure translates into the behavioral response: $\Delta\widehat{b}^D \approx \hat{b} \times \zeta$.

[25] In my case, the reduced-form and structural approaches provide similar estimates.

[26] I choose the excluded range $[L, U]$ based on the step-wise procedure proposed by Bosch *et al.* [2020]. Furthermore, I select $q_1$ and $q_2$ using a combination of the $BIC$ and $MSE$. The underlying regressions include dummies for bins around the cutoff to account for diffuse bunching.

**Scenario and Elasticity:** The double-kink elasticity formula (7) depends on the scenario. Thus, estimations of elasticity require scenario selection. Considering the pre-2009 schedule for close relatives, Figure 4 exemplifies that I can choose the scenario based on the single-kink elasticity formula (5), the knife-edge elasticity $\widetilde{\varepsilon}$, and an estimate of the marginal buncher's response $\Delta b^D$. To show this, the solid line depicts the double-kink elasticity $\varepsilon$ as a function of $\Delta b^D$, and the dashed line represents the single-kink elasticity $\varepsilon_1$. Moreover, the horizontal line marks the knife-edge elasticity $\widetilde{\varepsilon}$, and the corresponding response is $\Delta \widetilde{b}^D$. Two insights build the basis for scenario selection: one is that, in Scenario 1 ($\varepsilon < \widetilde{\varepsilon}$), the elasticity for the double-kinked schedule $\varepsilon$ equals $\varepsilon_1$. The second is that $\varepsilon_1$ is a strictly monotone increasing function of $\Delta b^D$. Thus, once $\varepsilon_1$ is larger than $\widetilde{\varepsilon}$, Scenario 2 applies.

**Figure 4: Elasticity as Function of Behavioral Responses**




***Notes:*** This figure demonstrates the scenario-selection strategy, considering the pre-2009 schedule for close relatives. The solid line shows the double-kink elasticity $\varepsilon$ as a function of the marginal buncher's behavioral response $\Delta b^D$, and the dashed line depicts the single-kink elasticity $\varepsilon_1$. $\widetilde{\varepsilon}$ refers to the knife-edge elasticity and $\Delta \widetilde{b}^D$ to the corresponding behavioral response.

Building on these insights, I select the scenario and estimate elasticities as follows.[27] First, I obtain an estimate of the response $\Delta \widehat{b}^D$ from the excess mass. Second, I use this estimate to calculate $\widehat{\varepsilon}_1$. Third, to select the relevant scenario, I compute $\widetilde{\varepsilon} - \widehat{\varepsilon}_1$ and evaluate whether this statistic is greater (Scenario 1) or smaller (Scenario 2) than zero. Fourth, having identified the scenario, I estimate the elasticity $\widehat{\varepsilon}$ based on $\Delta \widehat{b}^D$. In Scenario 1, I plug $\Delta \widehat{b}^D$ into Eq. (5); otherwise, Eq. (6) applies.

## 5.2 Data

The study draws on *administrative data* from the Federal Statistical Office, which are well-suited for a bunching study. First, the coverage is broad. My dataset in-

[27] Under heterogeneous elasticities, this method identifies values for the average marginal buncher.

cludes the universe of transfers for which the authorities assessed taxes in 2002 and 2009–2017.[28] Second, the population of tax filers included in the data reflects the top 30% of the wealth-transfer distribution [Bach *et al.* 2014]. Thus, I focus on the wealthy. Third, the data are extraordinarily detailed, which allows me to examine the responses' nature. For example, they include information on the size, distribution, and asset-composition of the estate. They also allow me to distinguish inheritances from gifts and customized from statutory successions.

As already highlighted, my bunching analyses focus on the first four tax brackets. The corresponding sample includes 376 thousand gifts (relatives: 302K; unrelated: 74K) and 1.3 million inheritances (relatives: 823K; unrelated: 443K) for 553 thousand communities of heirs. The inheritance and gift subsamples differ in nature. For example, while business assets account for 56% of total gifts, total inheritances consist of 57% of financial assets. Also, note that every seventh heir receives specific inheritances only. Table A5 in Appendix A reveals the sample's central properties by decomposing taxable transfers into their components.

# 6 The Effects of Wealth-Transfer Taxes

This section analyzes bunching graphically (Subsection 6.1) before studying the nature of the responses (Subsection 6.2) and their size (Subsection 6.3).

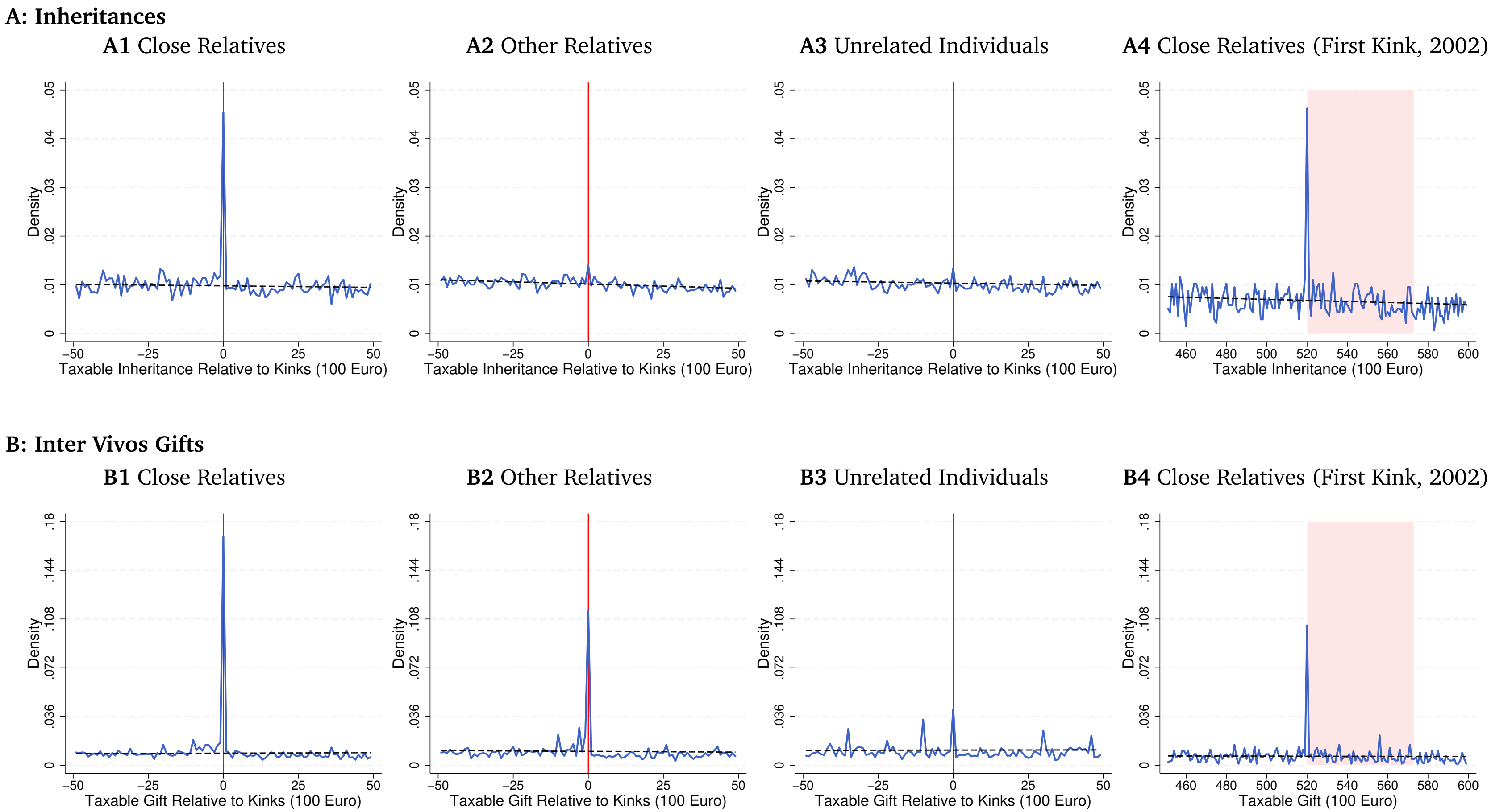
## 6.1 Overall Bunching Responses

**Inheritances:** Panel A of Figure 5 plots densities of *taxable inheritances* for close relatives (Panel A1), other relatives (Panel A2), and unrelated individuals (Panel A3) around the convex kink points. To highlight the key messages in condensed form, the figures pool the data over the first three convex kink points (falling into the first four brackets) and all available years (2002, 2009–2017). To that end, they recenter taxable inheritances $b$ to the nearest convex kink point $b_1$, group observations into 100 Euro bins on the recentered variable $b - b_1$, and plot the implied bin density (solid lines). The panels also depict estimated counterfactual distributions (dashed lines). Further, as an example, Panel A4 shows one disaggregated density for close relatives in 2002. The shaded area marks the transition area.

The following insights emerge from Panel A. First, Panel A1 illustrates that the density function of inheritances for close relatives exhibits a substantial spike at the kink point. The excess mass is sharp, suggesting that individuals precisely respond

[28] Because the tax administration assesses taxes if they expect that the wealth transfer exceeds tax exemptions, the universe of tax assessments does not overlap with the universe of transfers.

**Figure 5: Distributions Around Kinks for Inheritances and Inter Vivos Gifts**




***Notes:*** This figure displays pooled distributions of taxable inheritances (Panel A) and taxable inter vivos gifts (Panel B) separately for close relatives (Panels A1 and B1), other relatives (Panels A2 and B2), and unrelated individuals (Panels A3 and B3). The vertical lines mark the convex kink points (normalized to zero). The panels also include the estimated counterfactual distributions (dashed lines), obtained as the predicted values of a regression that fits polynomials of order $q_1$ to the binned data. The regressions exclude observations in a range around the kink. Section 5 details the estimation strategy. Bin width: 100 Euro.

to taxes. Second, in contradiction to Scenario 2, the distribution does not feature a hole above the convex kinks surrounding the transition area.[29] Separate analyses of each kink and year buttress this finding. For example, Panel A4 depicts substantial mass in the transition area in 2002. Taken at face value, the absence of such holes indicates that Scenario 1 applies. Third, Panels A1 to A3 point to a pronounced heterogeneity across tax classes. I find noticeable bunching for close relatives but no bunching for the other two tax classes.[30] This heterogeneity, paired with standard inverse elasticity considerations, suggests taxing close relatives at lower rates.

**Inter Vivos Gifts:** Panel B of Figure 5 complements the bunching analysis for inheritances with a similar one for *inter vivos gifts*. The evidence confirms the heterogeneity of bunching according to kinship: there is substantial bunching for close relatives, somewhat smaller bunching for other relatives, and minimal bunching for unrelated individuals. Again, bunching is exceptionally sharp (see Panels B1 and B2), and there is no hole in the distribution in the transition area (see Panel B4).

**Role of Tax Incentives:** To verify that the bunching reflects responses to taxes, I first exploit that the reform in 2009 shifted the bracket cutoffs for close relatives upwards (see Figure 1). If bunching mirrors reactions to taxes, an excess mass of taxpayers should appear at the kinks' new locations following the reform. To test this idea, Figure 6 shows densities around the pooled post-reform kink points for close relatives. Panel A focuses on inheritances realized before 2009 (dotted line), in 2009 and 2010 (dashed line), or after 2010 (solid line). Panel B considers gifts. Note that the pre-2009 densities reflect 2002 data only. Furthermore, all the following disaggregated results rely on a wider bin width of 500 Euro.[31]

The figure provides two insights. First, for both transfer types, bunching at the new thresholds appears only after the reform. This result indicates that the bunching reflects responses to the schedule. Second, the excess mass at the new kinks timely emerges after the reform, suggesting that it reflects short-run responses relevant to assessing the reform's revenue effects. Notably, already in 2009, the density of taxable gifts features a spike at the new cutoffs, which does not increase over time. Inheritances also respond in good time: bunching fully unfolds after two years and does not grow in subsequent years.[32] Additionally, Figure B.4 in Appendix B presents

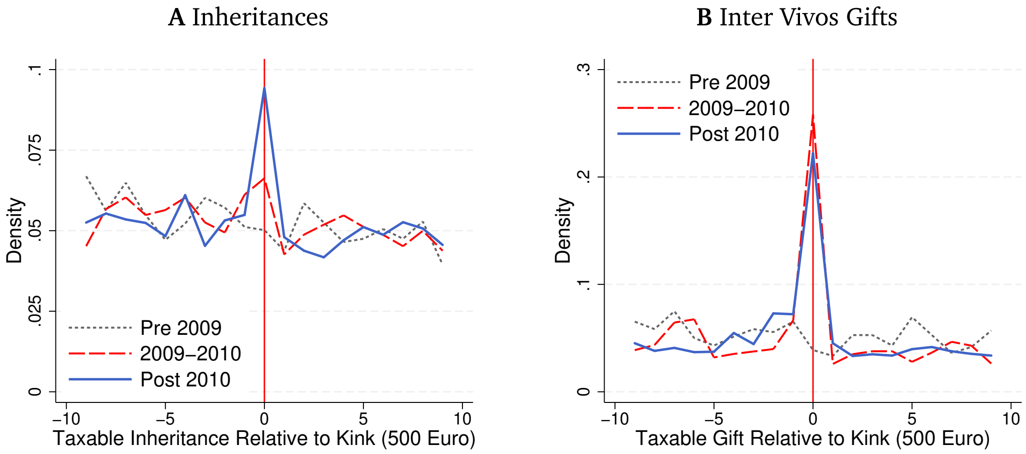
[29] In line with the literature's standard result, I also find little evidence of holes in the distribution around the second, concave kinks [see e.g., Saez 2010, Kleven and Waseem 2012, Kleven 2016].

[30] Figure B.3 in the Appendix further explores this heterogeneity and highlights that bunching occurs only if donors have at least one child.

[31] Except for 2002, I am not allowed to publish disaggregated densities with narrower bin widths.

[32] The finding that inheritances respond somewhat slower than gifts is intuitive. Bunching of in-

**Figure 6: Distributions Around the Post-2009-Reform Kinks**




***Notes:*** This figure shows bunching responses to tax reforms for close relatives. In 2009, a first tax reform shifted the tax bracket cutoffs (and, hence, the kinks) for close relatives upwards (see Figure 1). Panel A depicts the pooled densities (pooling across kinks) around the newly introduced cutoffs for inheritances realized before 2009 (dotted line), in 2009 and 2010 (dashed line), or after 2010 (solid line). Equivalently, Panel B focuses on inter vivos gifts. The vertical lines mark the convex kink points (normalized to zero). Bin width: 500 Euro.

a similar analysis for the reform in 2010. The evidence shows that the bunching of gifts for other relatives only appeared after the kinks' reintroduction in 2010.[33]

**Amount of Bunching:** The kinked schedules induce bunching of inheritances (for close relatives) and gifts (for close or other relatives). Figure 7 compares the amount of bunching for these responsive groups. It depicts the bunching parameter $\hat{b}$ for inheritances (Panel A) and gifts (Panel B), the period before (diamonds) and after (circles) the reform in 2009, and across kinks (abscissa). Due to small sample sizes, the analyses for the pre-2009 period and for other relatives focus on the first kink.[34]

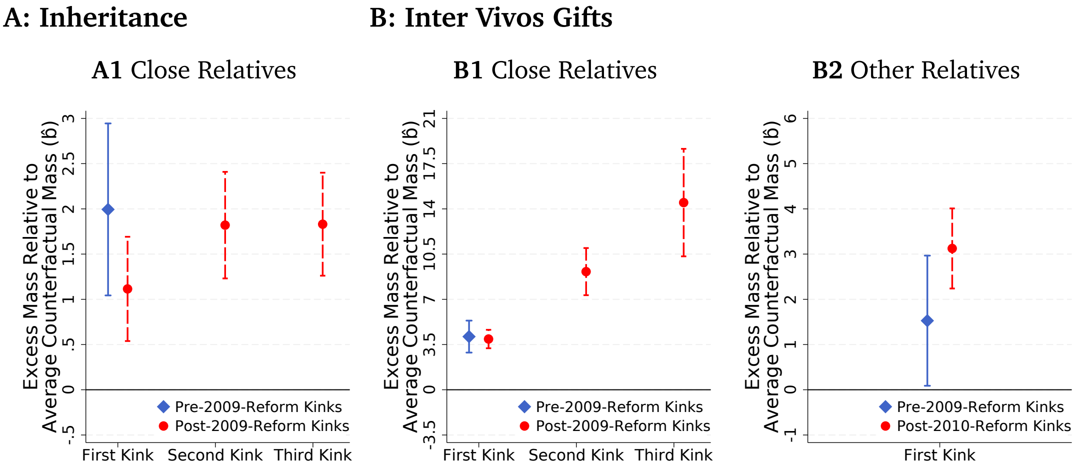
The figure demonstrates that $\hat{b}$ lies between 1.1 and 14.5. Around the cutoff, there is, hence, up to 14.5 times the expected counterfactual density. The estimates are heterogeneous: in addition to the heterogeneity in kinship, excess bunching for gifts is much larger than for inheritances. Furthermore, the excess mass at the upper two cutoffs tends to be larger than at the first one (particularly for gifts).

heritances reflects testament planning (see Subsection 6.2). Even if donors adjust their testaments immediately after the reform, it takes until their death for the responses to materialize. Instead, gifts are not conditioned upon death, and there is no similar lag.

[33]Further, Figure B.5 in Appendix B shows no excess mass at the pre-reform kinks after the reform.

[34]Because I only possess data for one pre-2009 reform year, the median number of inheritances (gifts) per bin in the estimation window around the second kink is only 7 (4), and around the third kink 2 (1). Furthermore, donors rarely give large gifts to other relatives. Thus, the corresponding median number of gifts per bin for the second (third) kink is also low and amounts to 5 (1).

**Figure 7: Excess Bunching at Convex Kinks**




***Notes:*** This figure shows the amount of excess bunching at the convex kinks in the pre-reform (diamonds) and post-reform (circles) distributions. It focuses on inheritances of close relatives (Panel A1), gifts of close relatives (Panel B1), and gifts of other relatives (Panel B2). These are the groups for which Figure 5 reveals bunching. Due to small samples, the analyses for the pre-2009 period and other relatives focus on the first kink. The excess-bunching measure $\hat{b}$ reflects the excess mass around the kink relative to the average counterfactual mass around the kink. The confidence intervals rely on a residual-bootstrap procedure. Section 5 details the estimation strategy. Bin width: 500 Euro.

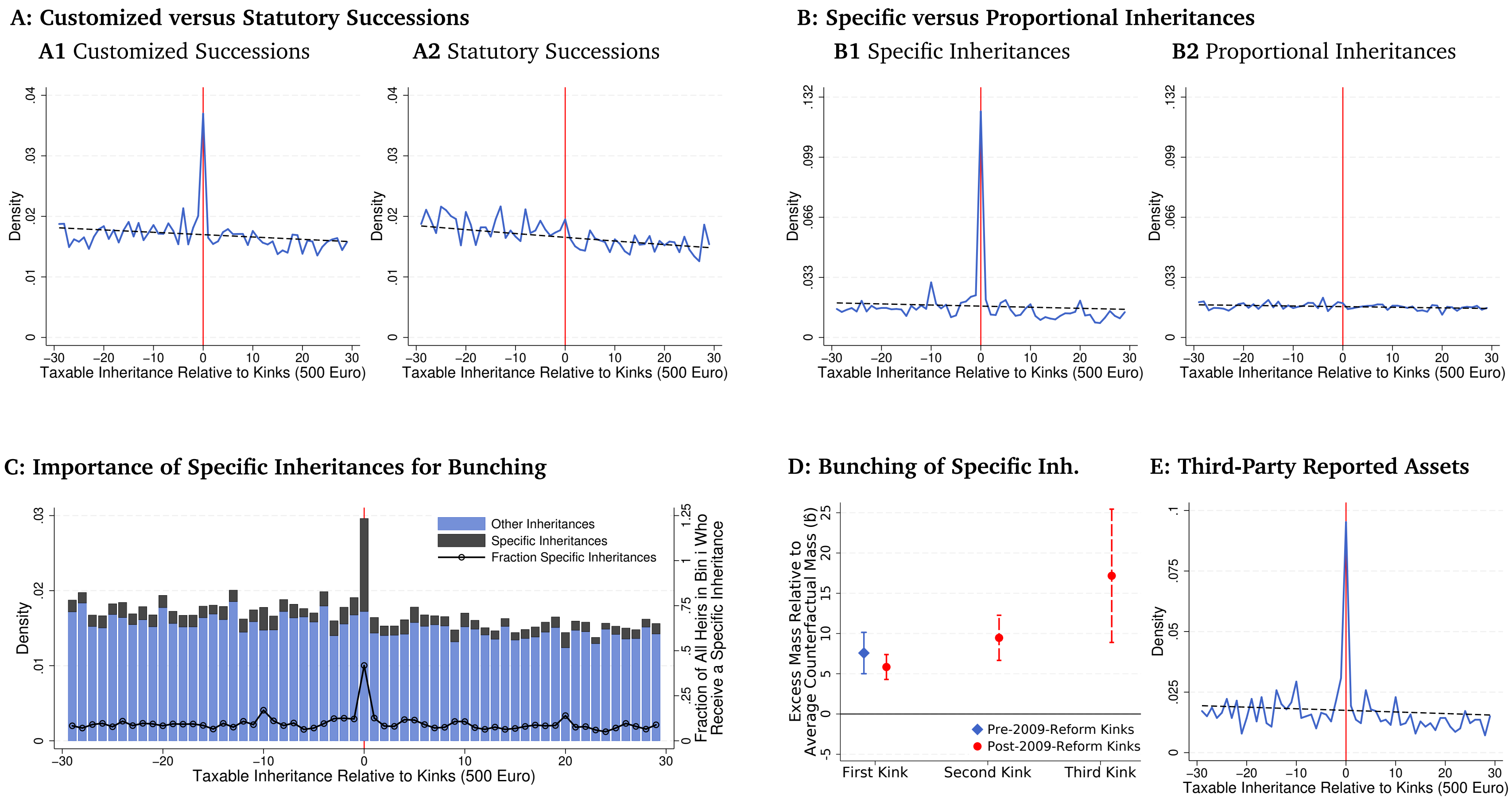
This finding, though, disappears if I evaluate the size of the responses in terms of elasticities (see Subsection 6.3). On a different note, despite variation in the point estimates, bunching in 2002 is statistically indistinguishable from the later years.

## 6.2 Decomposition of Responses to Inheritances Taxes

Taxes on inheritances apply at death (an uncertain event) and affect two parties with incentives to adjust behavior (donors and recipients). Hence, it is natural to ask who and, given the uncertainty, how individuals respond to taxes. This subsection indicates that the bunching of inheritances reflects testament planning by donors.

**Role of Customized Successions:** The first step in highlighting the role of testaments is studying the heterogeneity in bunching in regard to whether donors deviate from the statutory succession rules by creating a testament (i.e., they *customize successions*) or not (i.e., they leave *statutory successions*). To that end, Panel A of Figure 8 decomposes the pooled distribution of taxable inheritances for close relatives (Panel A1 of Figure 5) into customized successions (58% of transfers) and statutory successions (42%). As apparent from the figure, only customized successions exhibit bunching ($\hat{b} = 1.6$, $s.e. = 0.22$). Put differently, there is no bunching if the donors' wealth is distributed according to the intestate succession law.

## Figure 8: Decomposition of Bunching for Inheritances




***Notes:*** This figure decomposes the bunching of inheritances for close relatives. Panel A pools the taxable inheritance distributions across the first three convex kinks and over all years (solid lines) and splits the sample by whether a donor deviates from the statutory succession rules by testation (Panel A1) or not (Panel A2). Panel B considers the sample of testators and further splits it by whether a particular heir receives a specific (Panel B1) or a proportional inheritance (Panel B2). Panel E focuses on donors who possess third-party reported assets only. The vertical lines mark the kink points (normalized to zero). The panels also include the estimated counterfactual distributions (dashed lines), obtained as the predicted values of a regression that fits polynomials of order $q_1$ to the binned data. The regressions exclude observations in a range around the kink. Panel C decomposes the pooled taxable inheritance distribution into specific inheritances (upper bars) and all other types of inheritances (lower bars). It also shows the bin-specific fraction of recipients who receive specific inheritances $f_i$ only (solid line). Panel D shows excess bunching of specific inheritances at the first three convex kinks in the pre-reform (diamonds) and post-reform distributions (circles). The measure of excess bunching $\hat{b}$ reflects the excess mass around the kink in proportion to the average counterfactual mass around the kink. Confidence intervals rely on a residual-bootstrap procedure. Section 5 details the estimation strategy. Bin width: 500 Euro.

**Role of Specific Inheritances:** I continue the decomposition analysis with a breakdown of customized successions. The analysis proceeds in three steps. The first step splits the pooled distribution of *customized successions* for close relatives (Panel A1 of Figure 8) into *specific inheritances* (Panel B1) and *proportional inheritances* (Panel B2). There is bunching if heirs only receive testamentary gifts with particular values (i.e., specific inheritances). Conversely, there is no excess mass if they inherit individualized percentages of the estate (i.e., proportional inheritances).

The second step highlights the role of specific inheritances for overall bunching. Panel C breaks down the *overall* distribution of taxable inheritances (Panel A1 of Figure 5) into specific inheritances (upper bars) and all other inheritances (lower bars), consisting of statutory successions and proportional inheritances. It also shows the fraction $f_i$ of closely related heirs in bin $z_i$ who receive specific inheritances (solid line). Except for the kink, the fraction $f_i$ revolves around 0.09. Instead, at the kink, it peaks at 0.42. This finding indicates that individuals exploit specific inheritances excessively (compared to other inheritance types) to target the kink.[35] Appendix F further exploits a method to estimate the share of overall bunching explained by the over-frequent adjustments of specific inheritances and estimates it to be 82%.

The third step determines the amount of specific inheritance bunching for close relatives (Panel D). The bunching parameter $\hat{b}$ varies between 5.8 (first kink) and 17.8 (third kink) and is statistically different from zero.

**Misreporting Versus Testament Planning:** Bunching of specific inheritances can reflect (a) post-death misreporting by heirs or (b) testament planning by testators. Next, I study each of these channels, starting with underreporting of assets that need to be *valued* (i.e., agricultural, forestry, business, and real estate assets). Underreporting should lead to a drop in these assets' median values at the kink [Brockmeyer 2014]. Instead, Figures B.1 and B.2 in Appendix B reveal (for all tax classes and for close relatives) that the median values smoothly evolve around the kinks. As that the tax offices assess these assets' values, this finding is plausible.[36]

*Valuables kept at home* might be more prone to underreporting, as the tax offices might be unable to track them. This asset category includes items that are not deposited in financial institutions (e.g., cash, jewelry), movables (e.g., paintings, collections), and inventory (e.g., household appliances, dishes). However, two pieces

[35]If individuals bunch at the kink but do not "over-frequently" adjust specific inheritances for that purpose, the fraction $f_i$ should evolve smoothly in the bunching range (counterfactual scenario). If individuals instead disproportionately often bunch through lowering specific inheritances, $f_i$ peaks in the bunching range compared to the counterfactual ratio (see Appendix F for details).

[36]An instrumental-variable approach in the spirit of Londoño-Vélez and Ávila-Mahecha [2018] confirms this graphical finding.

of evidence jointly suggest that misreporting of valuables cannot explain bunching. First, as previously established, the bunching mirrors adjustments of specific inheritances. Second, however, below 1% of specific inheritances consist of valuables, and such items do not cluster at the kink.[37] Thus, they cannot account for bunching.

Next, I indirectly probe if bunching mirrors the testators' decisions. To that end, I examine if there is bunching even if misreporting by heirs is impossible. The excess mass then must reflect donors' behavior. Panel E of Figure 8 considers transfers by testators who customize successions and possess *financial assets* only (i.e., 34% of all testators). Because financial institutions third-party report assets and freeze the decedents' accounts upon their death, recipients of these transfers cannot underreport or hide their inheritance. Furthermore, the value of financial assets is unambiguous and impossible to manipulate. Nevertheless, the figure reveals considerable clustering for close relatives at the cutoffs.[38] Combined, the findings indicate that the responses mirror the donors' testamentary decisions instead of misreporting.

**Extensive-Margin Responses:** Kinks might trigger extensive-margin testament-planning responses. Inspired by Gelber *et al.* [2020a] and Escobar *et al.* [2019], I note that extensive-margin responses affect the relationship between the probability of creating a testament and taxable statutory successions. The probability features a discontinuous increase at the convex kink point (if testaments do not have fixed costs) or a kink (fixed costs).[39] I demonstrate that neither is the case (see Appendix G). The extensive margin of testament planning, thus, seems negligible. Donors also do not add additional heirs to their wills. In sum, they seem to adjust their testamentary dispositions but not their extensive-margin decisions.

## 6.3 Elasticities

This subsection combines the bunching evidence with my conceptual framework to identify the relevant scenario and to estimate elasticities. Table 1 reports the results. Column 1 shows the transition areas' locations and Column 2 the jumps in the marginal tax rates at the convex kink $\Delta t_1$. The remaining columns outline the bunchers' responses for inheritances (Columns 3–5), specific inheritances (Columns 6–8), and gifts (Columns 9–11). Particularly, for each transfer type the table depicts

[37]There is a special tax exemption for these items (currently: 53,000 Euro). Hence, the low share might imply that a few heirs receive such items above the exemption. Alternatively, almost all heirs may hide their valuables. In both cases, kinks should not trigger additional bunching.

[38]This type of response, for example, may reflect that donors bequeath a particular amount of money as a testamentary gift or buy life insurance with premiums that they customize to the kink.

[39]Intuitively, some donors prefer the statutory allocation of their estate under a linear tax schedule but deviate from this allocation by testation once their statutory heir is taxed at a higher rate.

## Table 1: Behavioral Responses and Elasticities

| | | | Inheritances | | | Specific Inheritances | | | Inter Vivos Gifts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Transition Area $b_1 - b_2$ | Jump in MTR $\Delta t_1$ | Distance to Knife-Edge Elasticity $\widehat{\varepsilon}_1 - \widetilde{\varepsilon}$ | Response $\Delta \widehat{b}^D$ | Elasticity $\widehat{\varepsilon}$ | Distance to Knife-Edge Elasticity $\widehat{\varepsilon}_1 - \widetilde{\varepsilon}$ | Response $\Delta \widehat{b}^D$ | Elasticity $\widehat{\varepsilon}$ | Distance to Knife-Edge Elasticity $\widehat{\varepsilon}_1 - \widetilde{\varepsilon}$ | Response $\Delta \widehat{b}^D$ | Elasticity $\widehat{\varepsilon}$ |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| **A Close Relatives** | | | | | | | | | | | |
| *Pre-2009-Reform Period* | 52K – 57.3K | 0.43 | 0.27 | 997*** (243) | 0.031*** (0.007) | 0.19 | 3,787*** (655) | 0.115*** (0.019) | 0.24 | 2,057*** (316) | 0.064*** (0.010) |
| *Post-2009-Reform Period* | 75K – 82.7K | 0.43 | 0.29 | 557*** (147) | 0.012*** (0.003) | 0.24 | 2,919*** (395) | 0.062*** (0.008) | 0.26 | 1,963*** (182) | 0.042*** (0.004) |
| | 300K – 334.3K | 0.39 | 0.36 | 910*** (150) | 0.005*** (0.001) | 0.34 | 4,730*** (715) | 0.027*** (0.004) | 0.34 | 4,571*** (465) | 0.026*** (0.003) |
| | 600K – 677.4K | 0.35 | 0.46 | 915*** (145) | 0.003*** (0.000) | 0.43 | 8,585*** (2,112) | 0.027*** (0.007) | 0.44 | 7,242*** (1,061) | 0.023*** (0.003) |
| **B Other Relatives** | | | | | | | | | | | |
| *Pre-2009-Reform Period* | 52K – 59.9K | 0.38 | 0.49 | 294 (279) | 0.010 (0.010) | 0.48 | 687* (363) | 0.024** (0.012) | 0.48 | 764** (367) | 0.026** (0.012) |
| *Post-2009-Reform Period* | 75K – 87.5K | 0.35 | 0.59 | 180** (74) | 0.005** (0.002) | 0.58 | 706*** (218) | 0.018*** (0.005) | 0.56 | 1,562*** (226) | 0.039*** (0.006) |

***Notes:*** This table summarizes the responses of taxable inheritances, taxable specific inheritances, and taxable inter vivos gifts to wealth-transfer tax kinks. It shows the location of the transition area $b_1 - b_2$ (Column 1), the jumps in the marginal tax rates at the convex kink point $\Delta t_1 = t_1 - t$ (Column 2), the scenario-selection statistic $\widehat{\varepsilon}_1 - \widetilde{\varepsilon}$ (Columns 3, 6, and 9), the estimated responses of the marginal buncher to the double-kinked tax schedule in Euro $\Delta \widehat{b}^D$ (Columns 4, 7, and 10), and the estimated elasticities $\widehat{\varepsilon}$ (Columns 5, 8, and 11). Part A (Part B) focuses on transfers between close relatives (other relatives). See Tables A2–A4 for a comprehensive definition of the tax classes and Section 5 for a detailed description of the estimation strategy. The numbers in brackets show bootstrap standard errors. Stars indicate significance levels: ***= 1% level, **= 5% level, and *= 10% level. Bin width: 500 Euro.

the scenario-selection statistic $\widehat{\varepsilon}_1 - \widetilde{\varepsilon}$, the estimated response of the marginal buncher $\Delta\widehat{b}^D$ in Euro, and the elasticity $\widehat{\varepsilon}$.

**Scenario Selection:** According to Table 1, Scenario 1 is relevant (i.e., the average marginal buncher responds as to single kinks): the scenario-selection statistic lies between 0.27 and 0.59 for inheritances, 0.19 and 0.58 for specific inheritances, and 0.24 and 0.56 for gifts. Thus, even for specific inheritances (the most responsive type of transfer), Scenario 1 reassuringly would still apply if the elasticities were at least 0.19 higher. This finding is well in line with the visual evidence that, as previously discussed, also indicates the relevance of Scenario 1. Consequently, I base all my elasticity estimates on the first-scenario formula (5).

**Behavioral Responses:** Table 1 transforms the responses into monetary values and elasticities. The results are as follows. First, donors reduce taxable inheritances by 180–997 Euro to bunch at the cutoff (or 0.15%–1.92%), specific inheritances by 687–8,585 Euro (or 0.95%–7.28%), and gifts by 764–7,242 Euro (or 1.21%–3.96%). The values are precisely estimated. Second, the underlying elasticities are moderate, however: they lie in the intervals 0.003–0.031 for inheritances, 0.018–0.115 for specific inheritances, and 0.023–0.064 for gifts. Third, in line with the bunching evidence, the elasticities increase in closer kinship and are larger for gifts than for inheritances. Fourth, however, the responses of testamentary gifts are equally sized to those of inter vivos gifts (sometimes even slightly larger). The fact that testamentary and inter vivos gifts are similar in nature rationalizes this finding. Testament planners actively and intentionally bequeath, while gift givers actively and intentionally transfer wealth while alive. Fifth, although the amount of bunching is larger at the two upper kinks, the corresponding elasticities tend to be smaller.[40] Given that all elasticity estimates are moderate (as are, hence, the differences), this heterogeneity is perhaps not a first-order concern. Instead, the key message is that donors are relatively unresponsive.

# 7 Conclusion

This paper introduces a bunching framework for double-kinked tax schedules and exploits it to examine the effects of the German inheritance and gift tax. The key results are that (a) kinks trigger short-run estate planning responses, which (b) are moderate in terms of elasticities. Because these type of responses are typically expected to be the most distinct, the findings are striking.

[40] The technical reason is that the percentage decrease in transfers at the upper kinks is less pronounced, resulting in lower elasticities.

From a policy perspective, moderate elasticities suggest that the short-run responses do not heavily interfere with tax revenue collection. The implied linear revenue-maximizing tax rates are greater than 0.9 (see Appendix I). At the same time, my paper highlights an efficiency problem of transition areas. Schedules with transition areas create large marginal-tax-rate discontinuities that distort donors' behavior despite small elasticities. For example, I estimate that donors reduce testamentary gifts by up to 7.28% and inter vivos gifts by up to 3.96% due to the kinks. A smoothing of the schedules might be Pareto improving [Bierbrauer *et al.* 2020].

Besides providing overall elasticity estimates, my paper offers further insights. First, my results highlight the importance of testament planning through testamentary gifts, an undiscovered response margin. Related evidence emerges from studying extensive-margin responses. Donors do not adjust their decision to create a last will but rather their testaments' contents. Second, additional insights emerge from comparing inheritances and gifts in an integrated framework. The responses of inter vivos gifts are larger than that of inheritances. One potential explanation is that gifts reflect intentional and planned transfers, while inheritances do not always have these properties (many donors die intestate). Indeed, once I focus on testators who intentionally leave testamentary gifts, I find comparable responses. Third, the paper provides insights on donors' motives. As indicated by the analysis of reforms, the majority of testament planning occurs shortly before death. This finding is in line with a denial of death. Further, the heterogeneity in kinship suggests that donors only consider and care about taxes if they shrink close relatives' inheritances.

Although I study the German setting, some of the results might be relevant to other contexts. For example, inheritance and estate tax systems usually pair bracket-wise taxation with intestate succession laws and the right to testate. It is natural to expect testament-planning responses in these environments as well. Other findings might be more setting specific. Particularly, elasticities typically depend on the institutional environment [Slemrod 1990, 1995]. The German setting is, for example, one with ubiquitous third-party reporting and asset valuation by tax offices. More porous tax systems with easy-to-use loopholes (e.g., Sweden) and self-assessment of assets (e.g., Catalonia) likely induce stronger distortions. Furthermore, in contexts without evasion and planning opportunities, taxes may trigger large real responses (which are not my paper's focus). In my view, more systematic evidence on the role of institutional features is needed. Furthermore, elasticities might be heterogeneous across the wealth-transfer distribution. While my paper focuses on the distributions' top 30%, little evidence exists for the remainder. In conclusion, much research remains to be done, and I hope that my paper will be part of a broad agenda.

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# Online Appendix
## (not for publication)

# A Tables

**Table A1: Decomposition of Taxable Transfers**

| Concept | Definition |
|---|---|
| 1. Estate ($E$) | |
| Agricultural & Forestry Assets | Domestic and foreign agricultural and forestry assets |
| Real Estate | Domestic and foreign real estate values |
| Business Assets | Domestic and foreign business assets |
| Other Assets | Securities, equity shares, capital claims, bank deposits, building savings deposits, interests, tax refund claims, other receivables, insurances, death benefits, pensions and other recurring payments, other rights, cash♣, precious metals♣, jewelry ♣, beads♣, coins♣, household items♣, other tangible movable property♣ |
| 2. Debt of decedent's estate ($D$) | Loan debts, tax liabilities, other liabilities |
| 3. Specific Inheritances ($P_i$) | Agricultural & forestry assets, real estate, business assets, other assets |
| 4. Previous Gifts ($G_i$) | Gifts from the same donor within the past 10 years |
| 5. Tax Exemptions ($X_i$) | Personal tax exemption, special exemption for partners and children, exemptions for enterprises, exemption for household inventory or other movable items, exemption for landed property, exemption for donations to charitable bodies or political parties |

***Notes:*** The table shows the decomposition of taxable transfers. For inheritances, the taxable transfer is $b_i = \alpha_i(E-D) + P_i + G_i - X_i$, where $\alpha_i$ is heir $i$'s share of the estate net-of-debt. A testator might leave a proportion of $E-D$ to $i$ (proportional inheritance) and/or may also bequeath specific assets or liabilities to $i$ (specific inheritance). In general, testators are able to allocate every asset or liability that is part of the estate to specific recipients. For inter vivos gifts, we have $\alpha_i = 0$. ♣marks self-reported assets.

**Table A2: Inheritance and Gift Tax Schedules (1996-2008)**

| | **Close Relatives** | | **Other Relatives** | | **Unrelated Individuals** | |
|---|---|---|---|---|---|---|
| | Upper bound (1,000 Euro) | Marginal Tax Rate | Upper bound (1,000 Euro) | Marginal Tax Rate | Upper bound (1,000 Euro) | Marginal Tax Rate |
| Bracket 1 | 52.00 | 7% | 52.00 | 12% | 52.00 | 17% |
| *Transition area* | 57.33 | 50% | 59.88 | 50% | 63.56 | 50% |
| Bracket 2 | 256.00 | 11% | 256.00 | 17% | 256.00 | 23% |
| *Transition area* | 285.26 | 50% | 301.71 | 50% | 329.14 | 50% |
| Bracket 3 | 512.00 | 15% | 512.00 | 22% | 512.00 | 29% |
| *Transition area* | 578.06 | 50% | 623.30 | 50% | 588.80 | 75% |
| Bracket 4 | 5,113.00 | 19% | 5,113.00 | 27% | 5,113.00 | 35% |
| *Transition area* | 5,870.48 | 50% | 5,707.53 | 75% | 6,015.29 | 75% |
| Bracket 5 | 12,783.00 | 23% | 12,783.00 | 32% | 12,783.00 | 41% |
| *Transition area* | 15,006.13 | 50% | 14,464.97 | 75% | 15,522.21 | 75% |
| Bracket 6 | 25,565.00 | 27% | 25,565.00 | 37% | 25,565.00 | 47% |
| *Transition area* | 29,399.75 | 50% | 27,756.29 | 75% | 28,632.80 | 75% |
| Bracket 7 | — | 30% | — | 40% | — | 50% |

| | Partner | Descendants | Ancestors | All Other Relatives | All Unrelated Individuals |
|---|---|---|---|---|---|
| Exemption Inheritances (1,000 Euro) | 307 | 205 | 51.2 | 10.3 | 5.2 |

***Notes:*** This table displays the tax schedules of the German inheritance and gift tax for the period 1996-2008. With the introduction of the Euro, the bracket cutoffs were slightly adjusted to round-Euro numbers. For example, before January 2002, the bracket cutoff was 100,000 DM ($\sim$ 51,129 Euro) and 52,000 Euro afterwards. All other aspects of the schedules (e.g., the tax rates) remained unchanged. As apparent from the table, the statutory tax rates depend on the donor-recipient relationship and the value of the taxable transfer. The table also includes the personal tax exemptions for inheritances granted to children and partners of the deceased. The classification of the donor-recipient relationships is as follows. *Partner*: spouse; *Descendants*: (step)child, (step)grandchild; *Ancestors*: parent, grandparent; *Other Relatives*: sibling, niece, stepparent, parent-in-law, child-in-law, divorcee; *Unrelated*: earmarked transfers, life partner, others.

**Table A3: Inheritance and Gift Tax Schedules (2009)**

| | Close Relatives | | Other Relatives | | Unrelated Individuals | |
|---|---|---|---|---|---|---|
| | Upper bound (1,000 Euro) | Marginal Tax Rate | Upper bound (1,000 Euro) | Marginal Tax Rate | Upper bound (1,000 Euro) | Marginal Tax Rate |
| Bracket 1 | 75.00 | 7% | 6,000.00 | 30% | 6,000.00 | 30% |
| *Transition area* | 82.69 | 50% | 10,800.00 | 75% | 10,800.00 | 75% |
| Bracket 2 | 300.00 | 11% | — | 50% | — | 50% |
| *Transition area* | 334.29 | 50% | | | | |
| Bracket 3 | 600.00 | 15% | | | | |
| *Transition area* | 677.42 | 50% | | | | |
| Bracket 4 | 6,000.00 | 19% | | | | |
| *Transition area* | 6,888.89 | 50% | | | | |
| Bracket 5 | 13,000.00 | 23% | | | | |
| *Transition area* | 15,260.87 | 50% | | | | |
| Bracket 6 | 26,000.00 | 27% | | | | |
| *Transition area* | 29,900.00 | 50% | | | | |
| Bracket 7 | — | 30% | | | | |

| | Partner | Descendants | Ancestors | All Other Relatives | All Unrelated Individuals |
|---|---|---|---|---|---|
| Exemption Inheritances (1,000 Euro) | 500 | 400 | 100 | 20 | 20 |

***Notes:*** This table displays the tax schedules of the German inheritance and gift tax for 2009. As apparent from the table, the statutory tax rates depend on the donor-recipient relationship and the value of the taxable transfer. The table also includes the personal tax exemptions for inheritances granted to children and partners of the deceased. The classification of the donor-recipient relationships is as follows. *Partner*: spouse; *Descendants*: (step)child, (step)grandchild; *Ancestors*: parent, grandparent, other descendants of child; *Other Relatives*: sibling, niece, stepparent, parent-in-law, child-in-law, divorcee, parent, grandparent; *Unrelated*: earmarked transfers, life partner, others.

## Table A4: Inheritance and Gift Tax Schedules (2010-2017)

| | **Close Relatives** | | **Other Relatives** | | **Unrelated Individuals** | |
|---|---|---|---|---|---|---|
| | Upper bound (1,000 Euro) | Marginal Tax Rate | Upper bound (1,000 Euro) | Marginal Tax Rate | Upper bound (1,000 Euro) | Marginal Tax Rate |
| Bracket 1 | 75.00 | 7% | 75.00 | 15% | 6,000.00 | 30% |
| *Transition area* | 82.69 | 50% | 87.50 | 50% | 10,800.00 | 75% |
| Bracket 2 | 300.00 | 11% | 300.00 | 20% | — | 50% |
| *Transition area* | 334.29 | 50% | 360.00 | 50% | | |
| Bracket 3 | 600.00 | 15% | 600.00 | 25% | | |
| *Transition area* | 677.42 | 50% | 750.00 | 50% | | |
| Bracket 4 | 6,000.00 | 19% | 6,000.00 | 30% | | |
| *Transition area* | 6,888.89 | 50% | 6,750.00 | 75% | | |
| Bracket 5 | 13,000.00 | 23% | 13,000.00 | 35% | | |
| *Transition area* | 15,260.87 | 50% | 14,857.14 | 75% | | |
| Bracket 6 | 26,000.00 | 27% | 26,000.00 | 40% | | |
| *Transition area* | 29,900.00 | 50% | 28,437.50 | 75% | | |
| Bracket 7 | — | 30% | — | 43% | | |

| | Partner | Descendants | Ancestors | All Other Relatives | All Unrelated Individuals |
|---|---|---|---|---|---|
| Exemption Inheritances (1,000 Euro) | 500 | 400 | 100 | 20 | 20 |

***Notes:*** This table displays the tax schedules of the German inheritance and gift tax for the period 2010-2017. As apparent from the table, the statutory tax rates depend on the donor-recipient relationship and the value of the taxable transfer. The table also includes the personal tax exemptions for inheritances granted to children and partners of the deceased. The classification of the donor-recipient relationships is as follows. *Partner*: spouse, life partner (since 12/14/2010); *Descendants*: (step)child, (step)grandchild; *Ancestors*: parent, grandparent, other descendants of child; *Other Relatives*: sibling, niece, stepparent, parent-in-law, child-in-law, divorcee, dissolved civil partnerships (since 12/14/2010), parent, grandparent; *Unrelated*: earmarked transfers, life partner (until 12/14/2010), others.

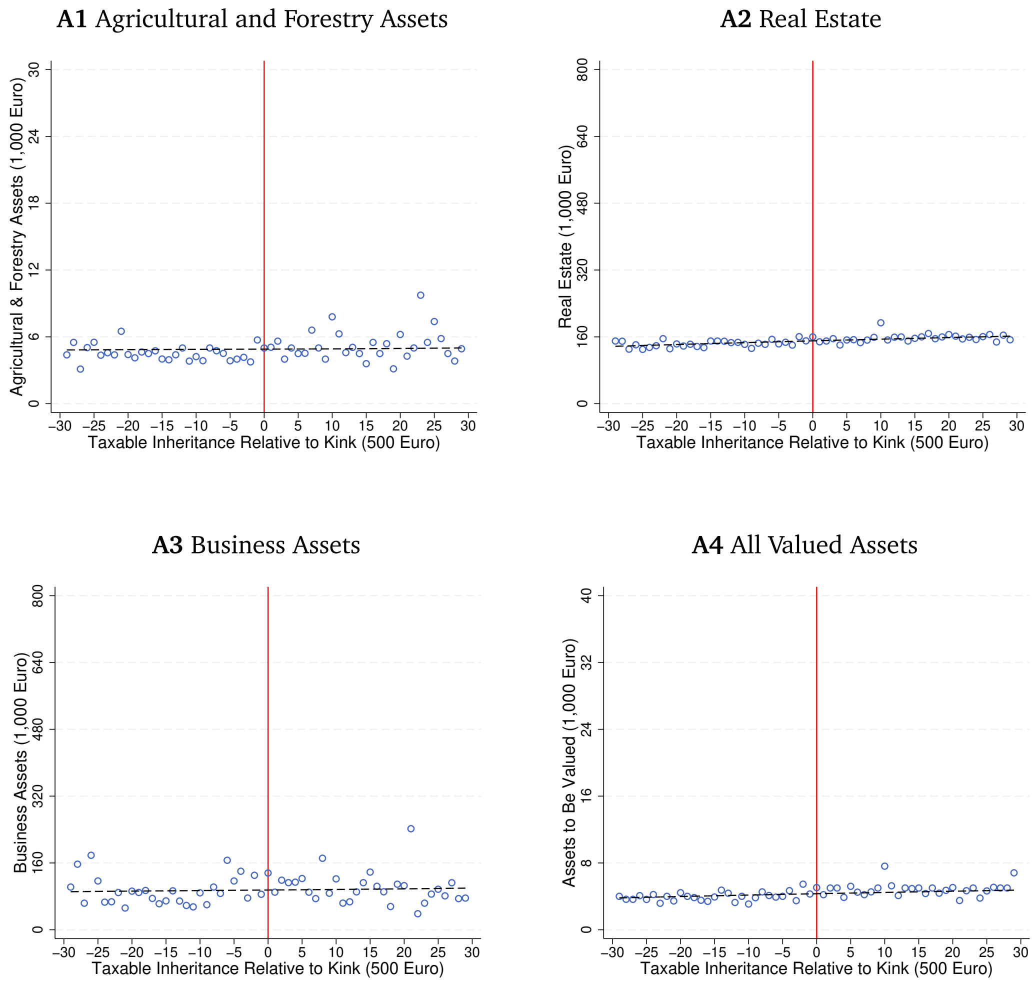
**Table A5: Summary Statistics**

| | Mean (1) | Std. Dev. (2) |
|---|---|---|
| **A Inheritances** ($N^C = 271{,}095$; $N^O = 551{,}874$; $N^U = 443{,}234$) | | |
| Proportional Inheritances | | |
| Estate ($E$) | 515.0 | 3,882.3 |
| Debt of Decedent's Estate ($D$) | 140.5 | 1,707.8 |
| Proportion of the Estate in % ($\alpha_i$) | 47.5 | 37.1 |
| Specific Inheritances ($P_i$) | 47.7 | 1,947.7 |
| Previous Inter Vivos Gifts ($G_i$) | 16.6 | 116.6 |
| Tax Exemptions ($X_i$) | 180.4 | 3,339.3 |
| **B Inter Vivos Gifts** ($N^C = 210{,}339$; $N^O = 91{,}618$; $N^U = 73{,}929$) | | |
| Inter Vivos Gifts ($P_i$) | 1,181.5 | 19,980.1 |
| Previous Inter Vivos Gifts ($G_i$) | 128.7 | 460.4 |
| Tax Exemptions ($X_i$) | 1,203.9 | 19,946.5 |

***Notes:*** The table decomposes taxable transfers into their components and presents summary statistics (arithmetic means and standard deviations). The sample consists of transfers for which a tax assessment has been done in 2002 and 2009-2017 that fall in the first four tax brackets. Taxable inheritances are calculated as $b_i = \alpha_i(E - D) + P_i + G_i - X_i$, where $\alpha_i$ is heir $i$'s share of the estate net-of-debt. For inter vivos gifts, we have $\alpha_i = 0$. The proportion of the estate is measured in %. All the other values are measured in 1,000 Euro. The number of transfers given to close relatives is $N^C$, to other relatives $N^O$, and to unrelated individuals $N^U$.

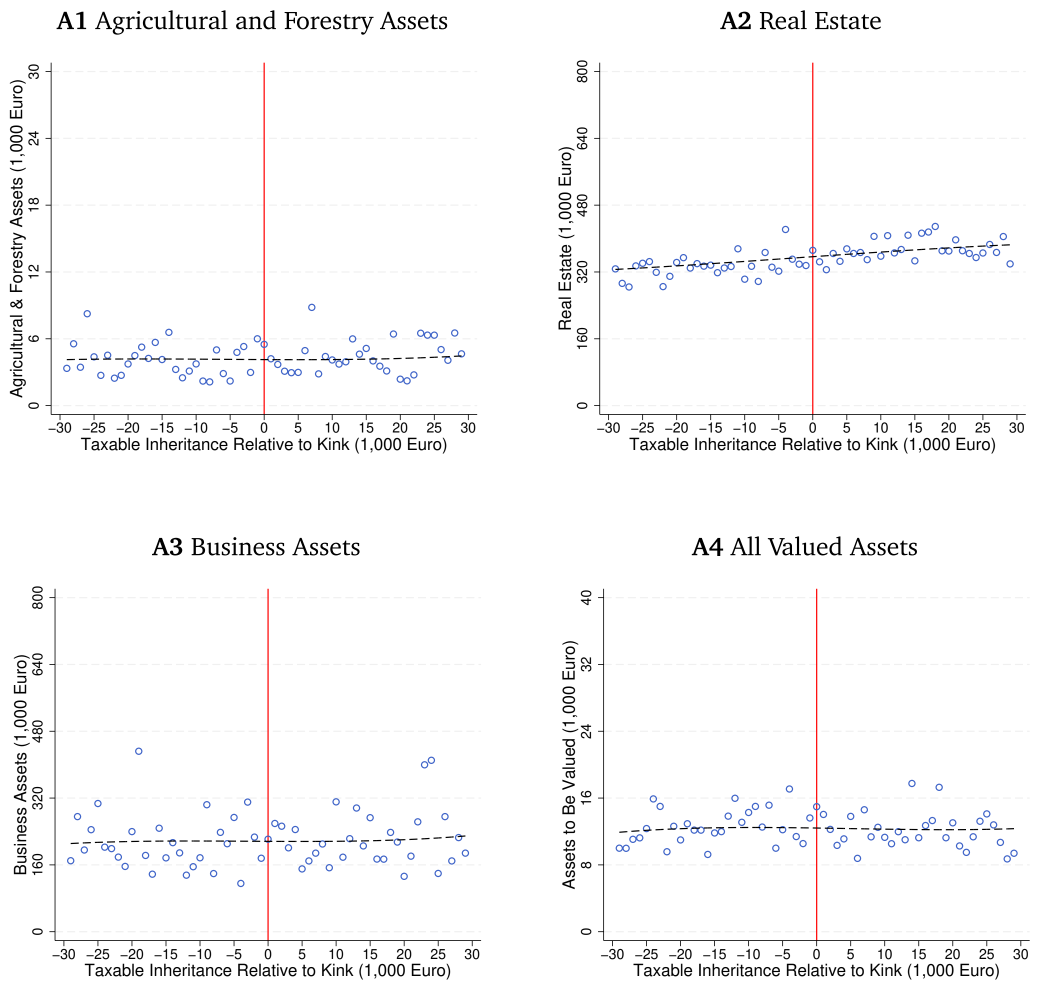
# B Figures

**Figure B.1: Underreporting of Valued Assets (All Tax Classes)**



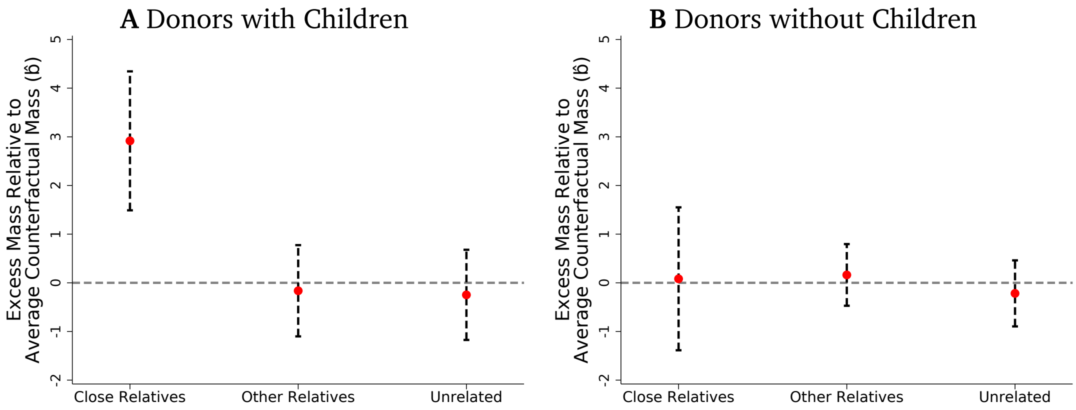

***Notes:*** This figure examines if heirs move to the kink by underreporting agricultural and forestry assets, real estate, or business assets. Sample: transfers to close relatives, other relatives, and unrelated individuals. If heirs underreport these assets, their reported values should be lower in the bunching region. To study if this is indeed the case, the figure recenters taxable inheritances to the nearest convex kink, groups the data into 500 Euro bins on the recentered variable, calculates bin-specific median values for different asset category (conditional on positives), and plots the results (circles: bin-specific median). The figure also shows median counterfactual assets without kinks (dashed line), obtained as the predicted values of a regression that fits polynomials of order $q_1$ to the binned data. The vertical line marks the kink point (normalized to zero). Panel A1 focuses on agricultural and forestry assets, Panel A2 on real estate, and Panel A3 on Business assets. Panel A4 calculates the sum over these three asset categories and plots the resulting median values. The results are identical for mean values.

## Figure B.2: Underreporting of Valued Assets (Close Relatives)




***Notes:*** This figure examines if heirs move to the kink by underreporting agricultural and forestry assets, real estate, or business assets. Sample: transfers to close relatives. If heirs underreport these assets, their reported values should be lower in the bunching region. To study if this is indeed the case, the figure recenters taxable inheritances to the nearest convex kink, groups the data into 1,000 (instead of 500) Euro bins on the recentered variable (to account for the higher variability in the data), calculates bin-specific median values for different asset category (conditional on positives), and plots the results (circles: bin-specific median). The figure also shows median counterfactual assets without kinks (dashed line), obtained as the predicted values of a regression that fits polynomials of order $q_1$ to the binned data. The vertical line marks the kink point (normalized to zero). Panel A1 focuses on agricultural and forestry assets, Panel A2 on real estate, and Panel A3 on business assets. Panel A4 calculates the sum over these three asset categories and plots the resulting median values. The results are identical for mean values.

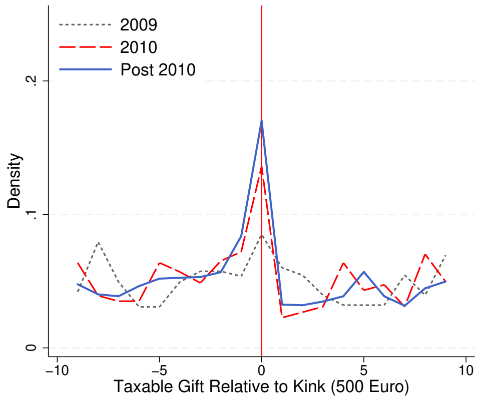
**Figure B.3: The Role of Children for Bunching**




***Notes:*** This figure shows the amount of excess bunching of inheritances at the first pre-2009-reform kink for testators with (Panel A) and without kids (Panel B). The measure of excess bunching $\hat{b}$ reflects the excess mass around the kink in proportion to the average counterfactual mass around the kink. The confidence intervals rely on a residual-bootstrap procedure. Section 5 details the estimation strategy. Bin width: 500 Euro.

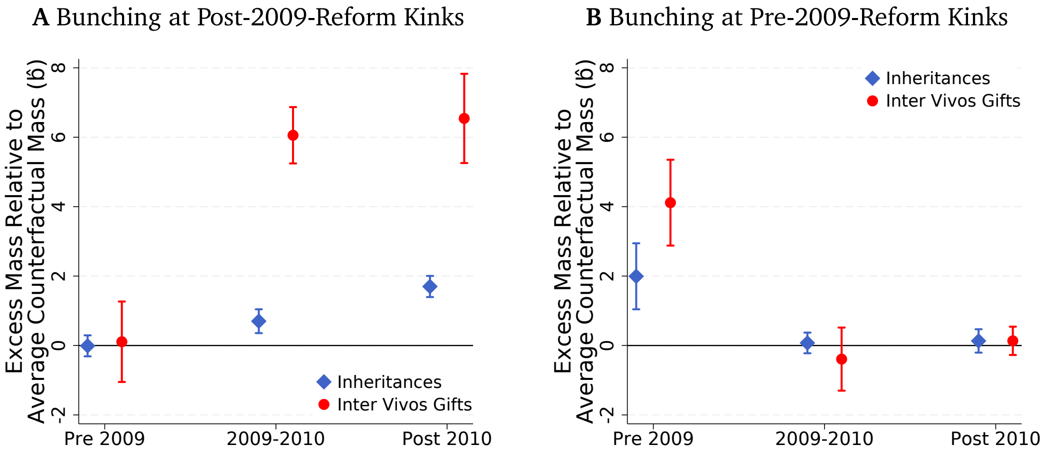
## Figure B.4: Distributions Around Post-2010-Reform Kinks for Other Relatives

Inter Vivos Gifts



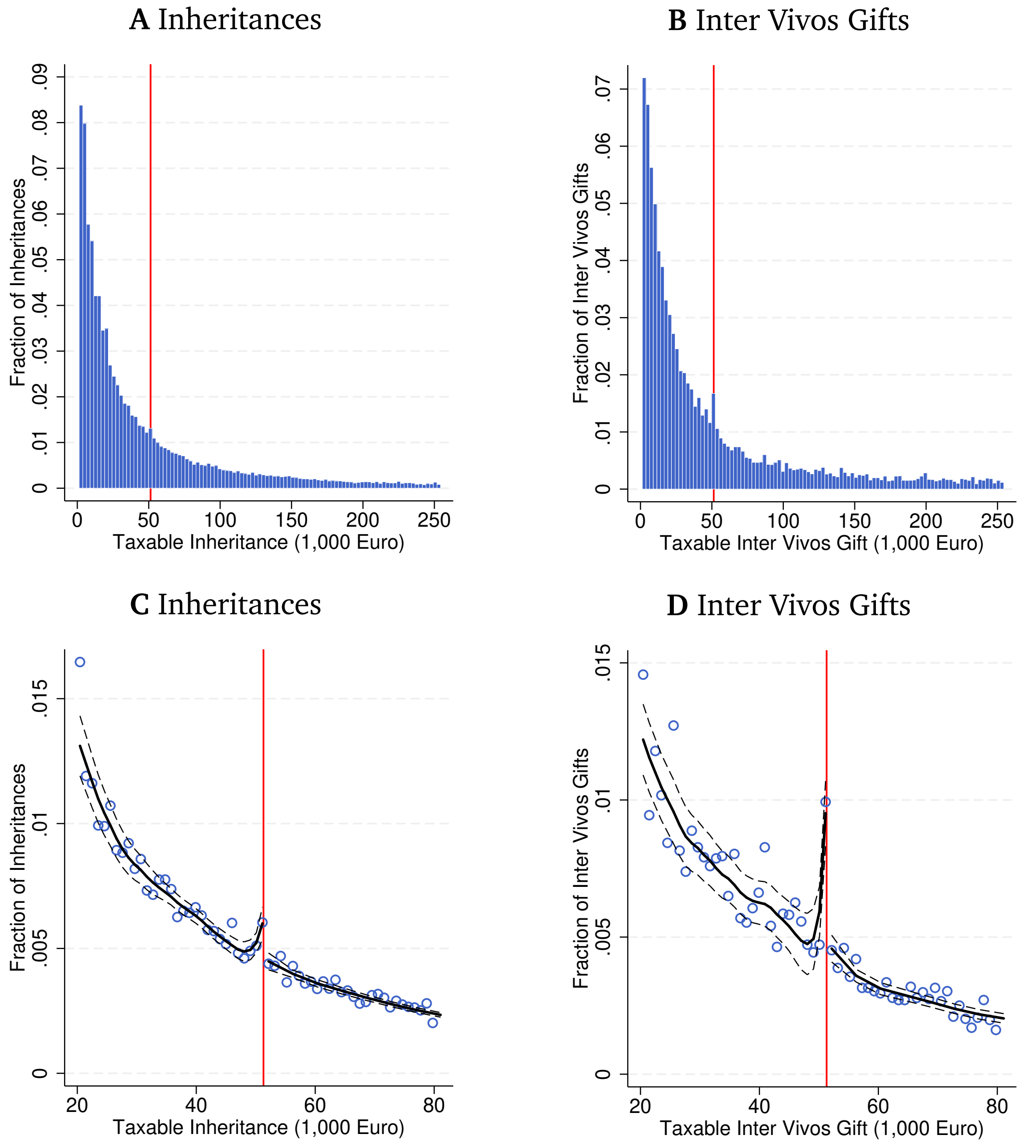

***Notes:*** This figure shows bunching responses to tax reforms for other relatives and inter vivos gifts. A first reform in 2009 abolished the tax brackets for other relatives. In 2010, a second tax reform reintroduced the tax brackets and, hence, the kinks (see Figure 1). The figure depicts the pooled densities (pooling across kinks) around the newly introduced cutoffs for gifts in 2009 (dotted line), 2010 (dashed line), and after 2010 (solid line). Bunching appears only after the reintroduction of the kinks. Because there is no bunching of inheritances for other relatives, the figure does not present results for this type of transfer. Bin width: 500 Euro.

## Figure B.5: Bunching at the Post-2009-Reform and Pre-2009-Reform Kinks




***Notes:*** This figure shows the amount of excess bunching of inheritances (diamonds) and gifts (circles) at the post-2009-reform kinks (Panel A) and the pre-2009-reform kinks (Panel B). The measure of excess bunching $\hat{b}$ reflects the excess mass around the kink in proportion to the average counterfactual mass around the kink. The figure present estimates of $\hat{b}$ for the pre-2009-reform period, 2009/2010, and the post-2010 period. This sample split allows me to study how fast bunching dissolves (emerges) at the old (new) kink points after the reform. For example, the 2009-2010 estimates of $\hat{b}$ in Panel B imply that, after the reform, the excess mass immediately disappears (i.e., it is not statistically different from zero). The confidence intervals rely on a residual-bootstrap procedure. Section 5 details the estimation strategy. Bin width: 500 Euro.

**Figure B.6: Overall Distributions Around First Kink (2002)**




***Notes:*** This figure pools the data for 2002 across all tax classes to exemplify overall distributions around the first kink. Panel A shows the empirical distribution of taxable inheritances and Panel B the distribution of taxable inter vivos gifts for the first two tax bracket (bin width 2,500 Euro). Panels C and D zoom in on the distributions around the 52,000 Euro cut-off (bin width 1,000 Euro). The panels in the second row also include smooth distribution estimates obtained from local linear regressions on the binned data (solid black lines). The underlying local linear regressions allow for jumps at the cut-off, include 3rd-order polynomials, and use triangle kernels. The dashed black lines represent 95% confidence bands. The vertical red lines mark the 52,000 Euro kink point.

# C Survey on Tax Literacy

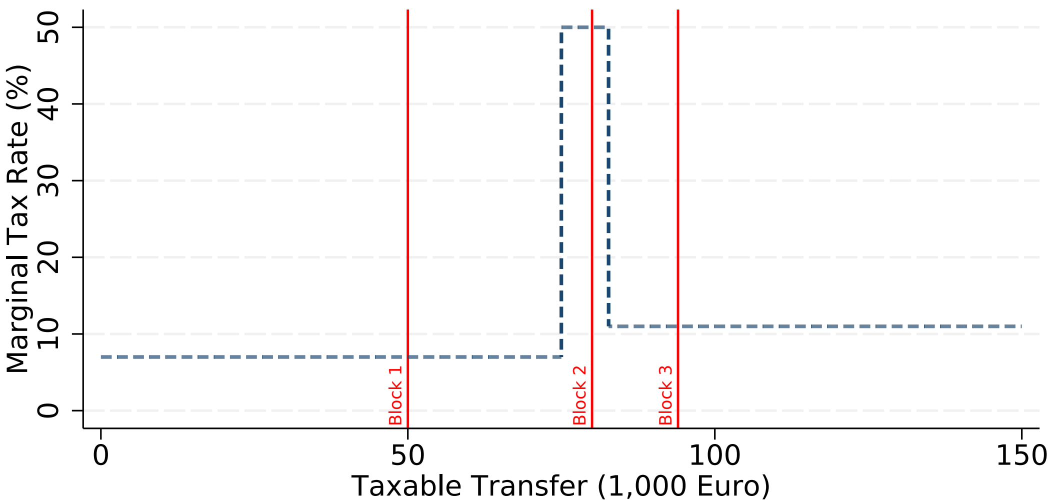
As in any analysis of tax responses, the bunching analysis implicitly assumes that the involved individuals are aware of the tax incentives. In particular, they need to understand the basic structure of the tax schedules. In practice, administrative data are naturally not including information on the donors' and the recipients' tax literacy. I can, however, at least run studies in separate samples to investigate the extent to which highly time-constraint (non-tax paying) individuals can gather and understand tax-relevant information. The underlying idea of this approach is simple: If individuals who do not face real tax incentives can collect and process tax-relevant information, actual donors and recipients, who face very high stakes, should be able to accomplish the same task.

**Design** As part of a laboratory experiment [Cagala *et al.* 2020], I implemented a survey to examine whether individuals can gather and understand tax-relevant information under time constraints. The design was as follows. After subjects entered the laboratory, the experimenter informed them that the session consisted of two parts. The first part is of relevance for this study and consisted of a questionnaire on inheritance taxation. In particular, individuals received written information on a hypothetical inheritance case; see below for details. They then got 15 minutes to answer nine questions concerning the calculation of the German inheritance tax. Importantly, they got internet access and were allowed to answer the questions through a web search. I, thus, imitated a natural scenario that taxpayers face when informing themselves about tax issues. The second part was a standard cheating experiment in the spirit of Abeler *et al.* [2019]. Subjects did not know the contents of the second part when they answered the questionnaire.

**Further Details** The following details are essential to note. First, individuals received a show-up fee of 4 Euros and an additional fixed payment of 4 Euros for completing the questionnaire. I decided against a performance-based payment scheme to test whether even individuals who do not face powerful monetary incentives can collect and understand tax-relevant information. Second, the experiment took place in the Laboratory for Experimental Research, Nuremberg. The Sessions lasted 45 minutes. Third, the sample consists of 322 students who graduated in different fields, ranging from engineering over business to social sciences.

**Questionnaire** The questions related to a hypothetical inheritance case realized in 2017. Figure C.1 shows the relevant tax schedule for this year.[41] The case was briefly introduced as follows: "In 2017, Claudia inherits private wealth from her deceased husband (i.e., she receives neither business assets nor real estate)." The subjects then answered three blocks of questions. Block 1 contained questions about the tax schedule in the first tax bracket. In particular, subjects researched and calculated Claudia's tax liability for a taxable wealth transfer of 50,000 Euro and 50,100 Euro. They also calculated what percentage of the additional 100 Euros must be paid as a tax. Block 2 asked similar questions about the transition area, and Block 3 referred to the second tax bracket. Figure C.3 contains the precise instructions, the questions, and the solutions.

**Figure C.1: Marginal Tax Rates for Close Relatives (2017)**



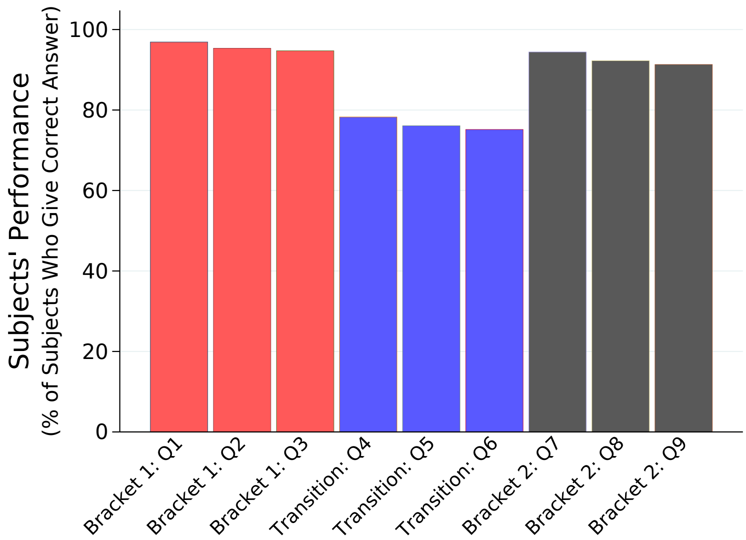

***Notes:*** This figure depicts the marginal tax rates for close relatives in 2017. The marginal tax rate increases from 7% to 50% and subsequently falls to 11%.

**Results** 229 subjects (71.1% of all subjects) solved all questions correctly (i.e., they did not make any mistake). Given the implemented time constraint of fifteen minutes (1.6 minutes per question), this number is remarkably high. Figure C.2 presents the results in more detail. Each bar in the figure refers to one question and shows the percentage of students who gave the correct answer to this particular question. The red, blue, and gray bars are for Block 1, Block 2, and Block 3,

[41] Of course, I did not present this figure to subjects.

respectively. Subjects performed worse when answering the questions of Block 2 (concerning the transition area). However, even in this case, most of the students gave correct answers. Most importantly, 75.2% of all subjects understood that, in the transition area, each additional Euro is taxed at 50%. 17.7% of all individuals instead believed that the relevant percentage is 11%. Overall, the results suggest that subjects can easily collect information on how much taxes they have to pay. Most of the subjects are also able to calculate the underlying tax rates (in percent). It is natural to expect that actual donors and recipients, who face very high stakes, should be able to gather similar information.

**Figure C.2: Subjects' Performance**




***Notes:*** This figure shows the subjects' question-specific performance. Each bar in the figure refers to one question and shows what percentage of students gave the correct answer to this particular question. The red, blue, and gray bars are for Block 1, Block 2, and Block 3, respectively. The questions Q1, Q2, Q4, Q5, Q7, and Q8 were as follows: "Suppose Claudia inherits private wealth worth $X$ Euro. Please calculate the inheritance tax and indicate your result." The questions Q3, Q6, Q9 took the following form: "What percentage of the additional 100 taxable Euros must be paid as a tax?"

## Figure C.3: Instructions, Questions, and Solutions

**Welcome and thank you for participating in today's session.**

---

**General Information**

Today's show-up fee is 4 Euros. The session consists of two independent parts. In the first part, you will answer a *questionnaire*. For doing so, you will receive a fixed compensation of 4 Euros. The second part is an *experiment*, in which you can earn additional money. You will be paid in cash at the end of the second part of the experiment.

*At the end of the session, you can hand in your written documents anonymously.*

---

**First Part: Questionnaire**

Please answer the following nine questions concerning the calculation of the German inheritance tax. You have 15 minutes to complete this task. You may answer the questions by means of an internet search. Therefore, you get internet access. A calculator is also available.

The questions concern the calculation of the German inheritance tax for the following case: In 2017, Claudia inherits private wealth from her deceased husband (i.e., she receives neither business assets nor real estate).

1. Suppose Claudia inherits private wealth worth 806,000 Euro. Please calculate the inheritance tax. Indicate your result.

$$Tax = (inheritance - exemptions) \cdot t = (806,000 - 756,000) \cdot 0.07$$
$$= 3,500$$

2. Suppose Claudia inherits private wealth worth 806,100 Euro. Please calculate the inheritance tax. Indicate your result.

$$Tax = (inheritance - exemptions) \cdot t = (806,100 - 756,000) \cdot 0.07$$
$$= 3,507$$

3. What percentage of the additional 100 taxable Euros must be paid as a tax?

$$Result = 7\%$$

4. Suppose Claudia inherits private wealth worth 836,000 Euro. Please calculate the inheritance tax. Indicate your result.

$$Tax = kink \cdot t + (inheritance - exemptions - kink) \cdot (t + \Delta t_1)$$
$$= 75,000 \cdot 0.07 + (836,000 - 756,000 - 75,000) \cdot (0.07 + 0.43)$$
$$= 7,750$$

5. Suppose Claudia inherits private wealth worth 836,100 Euro. Please calculate the inheritance tax. Indicate your result.

$$
\begin{aligned}
Tax &= kink \cdot t + (inheritance - exemptions - kink) \cdot (t + \Delta t_1) \\
&= 75,000 \cdot 0.07 + (836,100 - 756,000 - 75,000) \cdot 0.5 \\
&= 7,800
\end{aligned}
$$

6. What percentage of the additional 100 taxable Euros must be paid as a tax?

$$Result = 50\%$$

7. Suppose Claudia inherits private wealth worth 850,000 Euro. Please calculate the inheritance tax. Indicate your result.

$$
\begin{aligned}
Tax &= (inheritance - exemptions) \cdot (t + \Delta t_2) = (850,000 - 756,000) \cdot (0.07 + 0.04) \\
&= 10,340
\end{aligned}
$$

8. Suppose Claudia inherits private wealth worth 850,100 Euro. Please calculate the inheritance tax. Indicate your result.

$$
\begin{aligned}
Tax &= (inheritance - exemptions) \cdot (t + \Delta t_2) = (850,100 - 756,000) \cdot 0.11 \\
&= 10,351
\end{aligned}
$$

9. What percentage of the additional 100 taxable Euros must be paid as a tax?

$$Result = 11\%$$

# D Valuation

The tax offices determine the value of inherited assets at the day of death (inheritance) or the day of transfer (gifts). If heirs disagree with the assessed value, they can file an objection against the notice of assessment. Furthermore, for most assets, valuation is based on current market values. The details are as follows:

**Real Estate:** Depending on the property type, the tax offices use one of the following methods to assess current market values.

- *Comparative-value method:* The value of the property is determined by means of comparable property. Among other things, recent sales of similar property are considered. Examples: condominium ownership, partial ownership, and one- and two-family houses.

- *Income-capitalization method:* The value is determined on the basis of the income yield such as rents. Example: rental property or commercial property.

- *Value-material method:* The value is determined by the replacement value of the object, taking impairing factors such as the wear and tear into account. Examples: property for which comparative values and/or income-capitalization values are unavailable.

**Business Assets:** The tax offices determine the current market values based on the sales of assets within one year before taxation. If there were no sales, they determine the market values based on estimated future profits. The so-called substance value represent the minimum value for the purpose of taxation (i.e., the sum over the current market value of the single assets minus the liabilities).

**Agricultural and Forestry Assets:** The tax offices determine the current market value on the basis of future profits.

**Stocks and Bonds:** The tax offices rely on the stock market price for tax purposes. If stock prices are unavailable, they assess the value similarly as for business assets.

**Bank Balance:** The tax offices rely on the observable bank-balance value for tax purposes.

**Other Assets:** The tax offices rely on the capital value for recurring payments, current market values for movable physical assets, and the par value for receivables and similar assets.

# E Conceptual Framework: Derivations and Extensions

This Appendix discusses details of the conceptual framework. It provides derivations and model extensions. First, for generality, the baseline model is unspecific about the response margin. Subsection E.1 presents alternative utility functions that leave the elasticity formulas unchanged but are explicit about the margin (e.g., misreporting). Second, Subsection E.2 derives the elasticity formulas. This subsection also presents a general version of equation (6) that holds for all double-kinked schedules (not only the German setting). Moreover, it covers reduced-form estimation. Third, Subsection E.3 derives the knife-edge elasticity and proves its existence. Fourth, Subsection E.4 allows for heterogeneous elasticities. In this case, my approach identifies the elasticity for the *average* marginal buncher who lowers transfers by $E[\Delta b_{\varepsilon}^{D}]$, where $\Delta b_{\varepsilon}^{D}$ reflects the response at level $\varepsilon$.[42] Fifth, Subsection E.5 allows for imprecise control over the transfers. Due to the kinks' substantial sizes, bunching still appears even with very little control and small elasticities. Sixth, Subsection E.6 discusses further details of the scenario-selection strategy.

## E.1 Alternative Utility Specifications

For generality, the model outlined in Section 4 is unspecific about the margin through which donors respond to taxes. Subsequently, I introduce utility specifications according to which donors bunch via accumulating less wealth (Subsection E.1.1), misreporting transfers (Subsection E.1.2), or increasing their consumption (Subsection E.1.3). Importantly, the corresponding elasticity formulas are identical to those reported in Section 4.

### E.1.1 Wealth-Accumulation Responses

First, consider a donor who responds to taxes by accumulating less wealth. Assume her utility function is $u(a, b)$, where $b$ refers to the taxable wealth transfer and $a$ denotes a donor's wealth accumulation effort. $u$ represents convex preferences that increase in $b$ due to altruism and decrease in $a$. Each donor is characterized by her level of altruism $\nu$ and her wealth-accumulation skill $\rho$. By assumption, the taxable wealth transfer is $b = \rho a$. Building on this notation, a convenient representation of a donor's utility is:

$$u = \overline{w} + \nu \cdot (\underline{w} + b - T_2(b)) - \frac{\rho}{1 + 1/\varepsilon} \cdot a^{1+1/\varepsilon},$$

[42] This even holds for the case in which some donors are in Scenario 1 and others in Scenario 2.

where $\overline{w} + b$ is the donor's total wealth and $\overline{w}$ refers to the amount of wealth she spends herself. By assumption, $\overline{w}$ is exogenous. The donor's decision to bequeath is, hence, not affecting her own wealth spendings. Instead, she explicitly accumulates wealth for bequest purposes. The second term conceptualizes that the individual is altruistic. The donor puts weight $\nu$ on the recipient's total wealth $\underline{w} + b - T_2(b)$, consisting of the recipient's exogenous wealth endowment $\underline{w}$ plus the net of tax transfers $\underline{b} = b - T_2(b)$. The third term models the donor's disutility of effort provision. The parameter $\varepsilon$ reflects the constant elasticity of the taxable wealth transfer to the net of tax rate. If donors reduce $b$ due to taxation, they effectively accumulate less capital.

#### E.1.2 Misreporting Responses

Altruistic donors may also respond to taxes by reporting less transfers to the tax authority [Londoño-Vélez and Ávila-Mahecha 2018]. Subsequently, I specify preferences in line with this hypothesis. Assume the donor's true, exogenous wealth transfer is $b$. However, because the tax authority does not perfectly observe the true wealth transfer, individuals may misreport it to reduce the recipient's tax burden. Only the reported wealth transfer $b_r$ serves as the tax base. Misreporting, however, imposes a convex resource cost $C(1 - b_r/b) \cdot b$. The intuition of this cost function is simple: On the one hand, the cost of misreporting increases in the misreported share $1 - b_r/b$. On the other hand, the misreporting cost increases in the true transfer $b$. I need to further specify a donor's utility function to derive a structural elasticity formula.[43] Following Londoño-Vélez and Ávila-Mahecha [2018], a convenient utility specification is:

$$u = b - T_2(b_r) - b \cdot \left[ \frac{1}{1+\varepsilon} - \frac{b_r}{b} + \frac{1}{1+1/\varepsilon} \cdot \left( \frac{b_r}{b} \right)^{1+1/\varepsilon} \right].$$

The term $b - T_2(b_r)$ shows that the donor is altruistic: She cares about how much the recipient receives net of taxes. The last term $b \cdot [\cdot]$ reflects the donor's convex resource costs. In this model, the donor, hence, trades off the benefits (higher altruistic utility) and costs (higher resource costs) of misreporting behavior. Higher taxes increase misreporting, as its benefits increase.

[43] All the following functional form assumptions are innocent in the sense that the resulting elasticity formulas approximate the standard reduced-form bunching elasticities (Saez 2010, Kleven and Waseem 2013, Kleven 2016).

### E.1.3 Consumption Responses

In the third model, an altruistic donor decides about how to allocate exogeneous wealth $w$ between own consumption $c$ and transfers to a single recipient $b$ [Barro 1974]. Specifically, a donor's preferences are $u = c + \rho \cdot v(\cdot)$, where $v$ reflects the recipient's utility derived from $b$. The parameter $\rho$ denotes the donor's preferred transfer in the absence of taxes. To derive structural elasticity formulas, I need to parameterize the altruism function $v(\cdot)$. To that end, I impose two main assumptions. First, following the literature [see e.g., Kopczuk 2013, Laitner 1997], I assume that a donor cares about the recipient's net-of-tax wealth $b - T_2(b)$. Particularly, $v(\cdot)$ increases in $b - T_2(b)$. Second, as argued by Khomenko and Schurz [2018], I assume that a donor's altruism is lowered if she deviates from her preferred transfer $\rho$. The following function, that has been previously exploited in the bunching literature [Einav *et al.* 2017, Londoño-Vélez and Ávila-Mahecha 2018], is in line with these assumptions:

$$v(b - T_2(b)) = \frac{b - T_2(b)}{\rho} - \left[ \frac{1}{1+\varepsilon} - \frac{b}{\rho} + \frac{1}{1+1/\varepsilon} \cdot \left( \frac{b}{\rho} \right)^{1+1/\varepsilon} \right].$$

The expression in brackets reflects how deviations from $\rho$ lower altruistic utility. The term takes a value of zero if $b = \rho$ (no deviation implies no reduction of altruism), and it increases in $b/\rho$ (higher deviations imply a higher reduction). In this framework, the donor trades off the transfer's utility gains (higher altruistic utility) and costs (less own consumption). Higher taxes decrease the utility gains of wealth transfers (as the recipient receives less wealth). Consequently, the donor transfers less and consumes more.

## E.2 Elasticity Formulas

In the following, I derive elasticity formulas for both Scenarios. Subsection E.2.1 reintroduces the baseline utility specification used in the main part of the paper, Subsection E.2.2 recalls the tax-schedule definitions, and Subsection E.2.3 repeats some basic notation. Finally, Subsection E.2.4 derives the elasticity formula for Scenario 1 and Subsection E.2.5 focuses on Scenario 2.

### E.2.1 Preferences

A continuum of donors decides how much pre-tax wealth $b$ to transfer to a recipient.[44] $T(b)$ depicts the tax schedule. Each donor obtains utility from transferring

[44] Therefore, the framework assumes that donors and not recipients respond to taxes. My results suggest that this is an adequate conceptualization in the German context (see Section 6).

wealth, for example, due to altruism [Barro 1974, Laitner 1997, Kopczuk 2013]. Wealth transfers also impose convex utility costs on donors [Piketty and Saez 2013, Kopczuk 2013]. For example, transfers might have opportunity costs: donors cannot use transferred wealth for other purposes.[45] There also might be resource costs, such as the costs of sheltering transfers from taxation [Londoño-Vélez and Ávila-Mahecha 2018]. Thus, donors trade off the transfer's utility *gains* and *costs*.

The standard isoelastic utility specification employed in the bunching literature reflects such a trade-off in a stylized way [Kleven 2016]:

$$u = b - T(b) - \frac{\rho}{1+1/\varepsilon} \cdot \left(\frac{b}{\rho}\right)^{1+1/\varepsilon}.$$

The term $b - T(b)$ models the donor's utility from transferring (net-of-tax) wealth. By contrast, the convex function $\rho/(1+1/\varepsilon) \cdot (b/\rho)^{1+1/\varepsilon}$ represents utility costs. Hereby, the parameter $\varepsilon$ refers to the net-of-tax elasticity of the taxable transfer, which, by assumption, is *homogeneous* in the population. Furthermore, $\rho$ reflects the potential transfer (i.e., the transfer in the absence of taxes).

#### E.2.2 Tax Schedules

Subsequently, I introduce several types of tax schedules.

**Linear Tax Schedule:** Denoting a linear tax rate by $t$, a proportional tax schedule reads:

$$T_0(b) = t \cdot b. \tag{9}$$

**Single-Kinked Tax Schedule:** The second schedule features one convex kink at $b_1$:

$$T_1(b) = t \cdot b + \Delta t_1 \cdot (b - b_1) \cdot \mathbb{1}(b > b_1), \tag{10}$$

with $\Delta t_1 > 0$ and $\mathbb{1}(\cdot)$ as indicator variable.

**Double-Kinked Tax Schedule:** Next, I introduce a general double-kinked schedule that nests the German case. There are two kinks. First, there is a convex kink $b_1$ at which the marginal tax rate increases from $t$ to $t + \Delta t_1$. Second, there is a concave kink at $b_2$ at which the marginal tax rate decreases from $t + \Delta t_1$ to $t + \Delta t_2$. The complete schedule reads:

$$\begin{aligned} T_2(b) = tb &+ [\Delta t_1(b - b_1)] \cdot \mathbb{1}(b_1 < b \leq b_2) \\ &+ [\Delta t_1(b_2 - b_1) + \Delta t_2(b - b_2)] \cdot \mathbb{1}(b > b_2), \end{aligned} \tag{11}$$

[45] Alternative uses include own consumption or transfers to other recipients.

where $\mathbb{1}(\cdot)$ are indicator variables. In the German case, $b_2 = b_1 \cdot \frac{\Delta t_1}{\Delta t_1 - \Delta t_2}$. Inserting this expression into equation (11), I obtain the German schedule:

$$T_2(b) = t \cdot b + \Delta t_1 \cdot (b - b_1) \cdot \mathbb{1}(b_1 < b \leq b_2) + \Delta t_2 \cdot b \cdot \mathbb{1}(b > b_2). \qquad (12)$$

**Double-Kinked Tax Schedule:** The last schedule is proportionally notched:

$$T_3(b) = t \cdot b + \Delta t_2 \cdot b \cdot \mathbb{1}(b > b_2). \qquad (13)$$

### E.2.3 Notation

In the following, I will rely on notation introduced in the main part of the paper. The most important definitions are as follows:

- $\varepsilon$: Homogeneous net-of-tax elasticity of the taxable transfer.
- $\widetilde{\varepsilon}$: Knife-edge elasticity that separates both scenario; Scenario 1 applies for $\varepsilon < \widetilde{\varepsilon}$.
- $S$: Marginal buncher under a single-kinked schedule who lowers transfers by $\Delta b^S$.
- $D$: Marginal buncher under a double-kinked schedule who lowers transfers by $\Delta b^D$.
- $\widetilde{S}$ Marginal buncher under a single-kinked schedule with elasticity $\varepsilon = \widetilde{\varepsilon}$ and $\Delta b^{\widetilde{S}}$.
- $\widetilde{D}$: Marginal buncher under a double-kinked schedule with elasticity $\varepsilon = \widetilde{\varepsilon}$ and $\Delta b^{\widetilde{D}}$.

### E.2.4 Elasticity Formula for Scenario 1

**Structural Elasticity:** Assume that $\varepsilon < \widetilde{\varepsilon}$. Given donors' preferences (see Subsection E.2.1) and the schedule $T_2(b)$, I can derive an explicit elasticity formula. For this purpose, consider the marginal buncher $D$ who has $\rho^D(\varepsilon) \equiv b_1 \cdot (1 - t - \Delta t_1)^{-\varepsilon}$. Recall that this person is also the marginal buncher under the single-kinked schedule (i.e., $S = D$). This warm glow type is located at $b_1 + \Delta b^D = b_1 + \Delta b^S = \rho^D(\varepsilon) \cdot (1-t)^{\varepsilon} < b_1 + \Delta b^{\widetilde{D}}$ before the introduction of the transition area. After inserting $\rho^D(\varepsilon)$ into $b_1 + \Delta b^D$, I can rearrange terms and obtain the elasticity locally at $b_1$:

$$\varepsilon = \frac{\ln\left[1 + \frac{\Delta b^D}{b_1}\right]}{\ln\left[\frac{1-t}{1-t-\Delta t_1}\right]}. \qquad (14)$$

While $t$, $\Delta t$, and $b_1$ are known, I can estimate $\Delta b^D$ as described in Section 4.

**Reduced-Form Elasticity:** For infinitesimal values of $\Delta t_1$ and $\Delta b^D$, there is a reduced-form equivalent to the structural elasticity formula [Saez 2010]. To be precise, the local reduced-form elasticity of taxable transfers to the net of tax rate $1-t$

at the kink point $b_1$ is:

$$e = \frac{\frac{\Delta b^D}{b_1}}{\frac{\Delta t_1}{1-t}} \approx \frac{\frac{\Delta b^D}{b_1}}{\ln\left[\frac{1-t}{1-t-\Delta t_1}\right]}. \tag{15}$$

Further, note that $\ln(1+\frac{\Delta b^D}{b_1}) \approx \frac{\Delta b^D}{b_1}$ if $\frac{\Delta b^D}{b_1} \approx 0$. Therefore, if the behavioral response is small relative to the threshold, the reduced-form elasticity and the structural-form elasticity are approximately of the same sizes.

### E.2.5 Elasticity Formula for Scenario 2

**Structural Elasticity for General Double-Kinked Tax Schedules:** If $\varepsilon > \widetilde{\varepsilon}$ (i.e., $b_1 + \Delta b^D > b_1 + \Delta b^{\widetilde{D}}$), Scenario 2 applies. One needs to derive an alternative elasticity formula. I start with presenting a universal elasticity formula that applies to the general double-kinked tax schedules $T_2(b)$ presented in Subsection E.2.2. After that, I focus on a simpler formula for the German tax schedule that replaces a proportional notch with two kinks.

To derive the elasticity formula for Scenario 2, I exploit that the marginal buncher of a double-kinked tax schedule $D$ is indifferent between the points $b_1$ and $b_I^D$ on $T_2(b)$. Labeling the marginal buncher's preference parameter with $\rho^D(\varepsilon)$, I can calculate her utility level at the kink point $b_1$:

$$u(b_1, \rho^D(\varepsilon), \varepsilon) = (1-t)\cdot b_1 - \rho^D(\varepsilon)^{-1/\varepsilon} \cdot \frac{{b_1}^{1+1/\varepsilon}}{1+1/\varepsilon}. \tag{16}$$

By contrast, her utility at $b_I^D$ denotes:

$$u(b_I^D, \rho^D(\varepsilon), \varepsilon) = \Delta t_2 b_2 - \Delta t_1 \cdot (b_2 - b_1) + \frac{1}{1+\varepsilon}\cdot \rho^D(\varepsilon)\cdot(1-t-\Delta t_2)^{1+\varepsilon}. \tag{17}$$

Using (a) that the marginal buncher locates at $b_1 + \Delta b^D = \rho^D(\varepsilon)\cdot(1-t)^\varepsilon$ under $T_0(b)$ and (b) that $u(b_1, \rho^D(\varepsilon), \varepsilon) = u(b_I^D, \rho^D(\varepsilon), \varepsilon)$, I can rearrange terms to obtain:

$$\left[\frac{1}{1+\Delta b^D/b_1}\right]\left[1+\frac{\Delta t_1(b_2-b_1)-\Delta t_2 b_2}{(1-t)b_1}\right] - \frac{1}{1+1/\varepsilon}\left[\frac{1}{1+\Delta b^D/b_1}\right]^{1+1/\varepsilon} - \frac{1}{1+\varepsilon}\left[1-\frac{\Delta t_2}{1-t}\right]^{1+\varepsilon} = 0 \tag{18}$$

This equation specifies the relationship between the elasticity $\varepsilon$, donor $D$'s behavioral response $\Delta b^D$, and the tax schedule characteristics. Given that the tax schedule characteristics are known and the behavioral response $\Delta b^D$ is estimable, one can solve this equation numerically to recover $\varepsilon$.

**Structural Elasticity for the German Tax Schedule:** In Germany, the tax schedule takes a particular form. To avoid a proportional notch, the tax administration introduced a transition area between the tax brackets. In this case, the elasticity formula can be simplified. I note that, in the German case, $b_2 = b_1 \cdot \frac{\Delta t_1}{\Delta t_1 - \Delta t_2}$ and insert this expression into the general tax-schedule equation (11). After some rearrangements, I get $T_2(b) = b \cdot (t + \Delta t_2)$ for $b > b_2$ and, hence, the schedule for the German case. Equipped with this insight, I plug $b_2$ into equation (18) and obtain:

$$\left[\frac{1}{1+\Delta b^D/b_1}\right] - \frac{1}{1+1/\varepsilon}\left[\frac{1}{1+\Delta b^D/b_1}\right]^{1+1/\varepsilon} - \frac{1}{1+\varepsilon}\left[1-\frac{\Delta t_2}{1-t}\right]^{1+\varepsilon} = 0. \tag{19}$$

This expression corresponds to the standard elasticity formula in the case of proportional notches. To see this, compare this equation to equation (5) in Kleven and Waseem [2013]. In Scenario 2, the marginal buncher $D$ behaves precisely as under a proportionally notched schedule.

**Relationship between Elasticity Formulas:** Equation (18) nests Scenario 1. To see this, note that when the marginal buncher only responds to the first and not the second tax rate change ($\Delta t_2 = \Delta t_1$), equation (18) simplifies to:

$$\begin{aligned}\left[\frac{1}{1+\Delta b^D/b_1}\right]\left[1-\frac{\Delta t_1}{1-t}\right] - \frac{1}{1+1/\varepsilon}\left[\frac{1}{1+\Delta b^D/b_1}\right]^{1+1/\varepsilon} \\ - \frac{1}{1+\varepsilon}\left[1-\frac{\Delta t_1}{1-t}\right]^{1+\varepsilon} = 0\end{aligned} \tag{20}$$

Inserting elasticity formula (5) into equation (20), the right hand side becomes zero. Therefore, equation (5) is the solution to equation (18) for $\Delta t_2 = \Delta t_1$. ■

**Reduced-Form Elasticity:** It is also possible to derive reduced-form elasticities for Scenario 2. They are identical to those for notches. A recent note by Kleven [2018] discusses the details.

### E.2.6 Proportionally Notched Schedule Versus Double-Kinked Schedule

When facing a proportionally-notched schedule of the form $T_3(b) = tb + \Delta t_2(b - b_1) \cdot \mathbb{1}(b > b_1)$, the marginal buncher at the notch $N$ is also indifferent between an interior solution $b_I^N$ and the threshold $b_1$. Her utility at the notch is:

$$u(b_1, \rho^N(\varepsilon), \varepsilon) = (1-t) \cdot b_1 - \rho^N(\varepsilon)^{-1/\varepsilon} \cdot \frac{{b_1}^{1+1/\varepsilon}}{1+1/\varepsilon}. \tag{21}$$

By contrast, her utility at $b_I^N$ denotes:

$$u(b_1^N, \rho^N(\varepsilon), \varepsilon) = \left(\frac{1}{1+\varepsilon}\right) \cdot \rho^N(\varepsilon) \cdot (1 - t - \Delta t_2)^{1+\varepsilon}. \tag{22}$$

As shown by Kleven and Waseem [2013], we can use the condition $u(b_1, \rho^N(\varepsilon), \varepsilon) = u(b_1^N, \rho^N(\varepsilon), \varepsilon)$ to derive an elasticity formula for notches. Because $\rho^N(\varepsilon) = \rho^D(\varepsilon)$, equation (21) equals equation (16). Furthermore, for $b_2 = b_1 \cdot \frac{\Delta t_1}{\Delta t_1 - \Delta t_2}$, equation (22) equals equation (17). Therefore, the elasticity formulas for the notched schedule and the German double-kinked schedule (Scenario 2) are identical. ■

## E.3 Knife-Edge Elasticity

In the following, I derive the knife-edge elasticitiy $\tilde{\varepsilon}$ that allows scenario selection and I also prove its existence. For $\varepsilon = \underline{\varepsilon} < \tilde{\varepsilon}$, Scenario 1 applies. For $\varepsilon = \overline{\varepsilon} > \tilde{\varepsilon}$, Scenario 2 is relevant. For simplicity, I consider the German double-kinked schedule.[46] However, similar knife-edge elasticities can be derived for the more general double-kinked schedule in Subsection E.2.2 as well. This section proceeds in three steps. Subsection E.3.1 discusses how the donors' indifference curves depend on the elasticity $\varepsilon$. The provided insights help us to understand why a knife-edge elasticity exists. Subsection E.3.2 derives a formula for the knife-edge value $\tilde{\varepsilon}$. Subsection E.3.3 lays out proof of the existence of a knife-edge elasticity. The proof exploits the results provided in Subsection E.3.1. For comprehension, Subsection E.2.3 might be helpful as it recalls the basic notation.

### E.3.1 Proof: Role of Elasticity for Indifference Curves

One can derive the knife-edge elasticity by studying the behavior of the marginal buncher of the single-kinked tax schedule $S$. Therefore, subsequently, I focus on how the elasticity $\varepsilon$ shapes this donor's indifference curves.

**Marginal Rate of Substitution:** I have defined a donor's utility function as:

$$u = b - T(b) - \frac{\rho}{1+1/\varepsilon} \cdot \left(\frac{b}{\rho}\right)^{1+1/\varepsilon}.$$

At utility level $\hat{u}$, a donor's indifference curve becomes:

$$b - T(b) = \hat{u} + \frac{\rho}{1+1/\varepsilon} \cdot \left(\frac{b}{\rho}\right)^{1+1/\varepsilon}.$$

Given this quasi-linear utility specification, the marginal rate of substitution is:

$$MRS(b,\rho,\varepsilon) = \left(\frac{b}{\rho}\right)^{1/\varepsilon}. \tag{23}$$

Consider donor $S$, the marginal buncher of a tax schedule with one convex kink at $b_1$. This donor's potential transfer is: $\rho^S(\varepsilon) \equiv b_1 \cdot (1-t-\Delta t_1)^{-\varepsilon}$. Consequently, $S$'s marginal rate of substitution is:

$$MRS(b,\rho^S(\varepsilon),\varepsilon) = (1-t-\Delta t_1) \cdot \left(\frac{b}{b_1}\right)^{1/\varepsilon}.$$

[46] It takes the form: $T_2(b) = t \cdot b + \Delta t_1 \cdot (b - b_1) \cdot \mathbb{1}(b_1 < b \leq b_2) + \Delta t_2 \cdot b \cdot \mathbb{1}(b > b_2)$.

Examine two elasticity levels $\underline{\varepsilon}$ and $\overline{\varepsilon}$, with $\overline{\varepsilon} > \widetilde{\varepsilon} > \underline{\varepsilon} > 0$. For each $b > b_1$, I get:

$$MRS(b, \rho^{\overline{S}}(\overline{\varepsilon}), \overline{\varepsilon}) < MRS(b, \rho^{\underline{S}}(\underline{\varepsilon}), \underline{\varepsilon}).$$

**Proof:** By definition, I have:

$$\underline{\varepsilon} < \overline{\varepsilon} \quad \Leftrightarrow \quad 1/\overline{\varepsilon} < 1/\underline{\varepsilon},$$

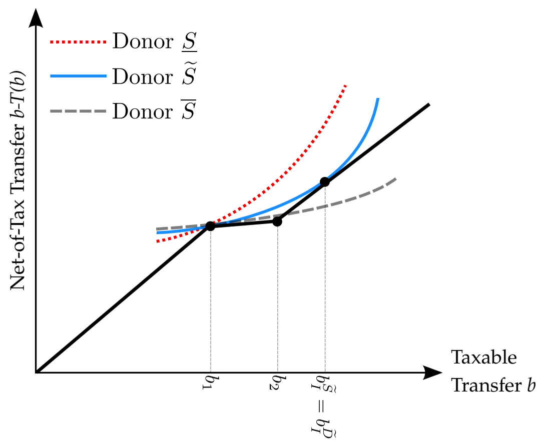
Given the definition of the marginal buncher's marginal rate of substitution, for each $b > b_1$, I, thus, obtain:

$$(1 - t - \Delta t_1) \cdot \left(\frac{b}{b_1}\right)^{1/\overline{\varepsilon}} < (1 - t - \Delta t_1) \cdot \left(\frac{b}{b_1}\right)^{1/\underline{\varepsilon}}.$$

Therefore, as the elasticity $\varepsilon$ increases, the donor $S$'s indifference curve becomes "flatter" above $b_1$. ■

**Graphical Representation:** Figure E.1 shows indifference curves for three donors who (a) are marginal bunchers under a single-kinked tax schedule but (b) who now face a double-kinked tax schedule. The three donors have different elasticities: The

**Figure E.1: Three Marginal Bunchers With Different Elasticities**




*Notes:* The figure shows indifference curves for three donors who (a) are marginal bunchers under a single-kinked tax schedule but (b) who face a double-kinked tax schedule. The elasticity of donor $i \in \{\underline{S}, \widetilde{S}, \overline{S}\}$ corresponds to $\varepsilon \in \{\underline{\varepsilon}, \widetilde{\varepsilon}, \overline{\varepsilon}\}$ with $0 < \underline{\varepsilon} < \widetilde{\varepsilon} < \overline{\varepsilon}$.

elasticity of donor $i \in \{\underline{S}, \widetilde{S}, \overline{S}\}$ corresponds to $\varepsilon \in \{\underline{\varepsilon}, \widetilde{\varepsilon}, \overline{\varepsilon}\}$ with $0 < \underline{\varepsilon} < \widetilde{\varepsilon} < \overline{\varepsilon}$. Figure E.1 demonstrates graphically that the curvature of the marginal buncher's indifference curve above $b_1$ increases in the elasticity.

### E.3.2 Derivation: Knife-Edge Elasticity

**Knife-Edge Case:** Subsection E.3.1 provides a valuable insight that helps us to understand why a knife-edge elasticity exists: The curvature of the marginal single-kink buncher's indifference curve decreases in $\varepsilon$. This is a key insight because it implies that there is a unique knife-edge elasticity $\varepsilon = \widetilde{\varepsilon}$ at which the marginal buncher $S$ is indifferent between the kink $b_1$ and the interior point $b_I^{\widetilde{S}} > b_2$ on $T_2(b)$, where $b_I^{\widetilde{S}} \equiv b_I^{\widetilde{D}}$. This cutoff case separates both scenarios. To see this, consider Figure E.1. Donor $\widetilde{S}$ is the marginal buncher at a single kink whose elasticity is $\varepsilon = \widetilde{\varepsilon}$. If we decrease the elasticity to $\varepsilon = \underline{\varepsilon} < \widetilde{\varepsilon}$, according to equation (23), the marginal buncher's indifference curve will be more bent upwards above $b_1$. Donor $\underline{S}$ exemplifies this case. $\underline{S}$ prefers $b_1$ to any point above $b_2$ on $T_2(b)$ and, hence, keeps bunching. Scenario 1 materializes. By contrast, if $\varepsilon = \underline{\varepsilon} > \widetilde{\varepsilon}$, the marginal buncher's indifference curve becomes less curved above $b_1$ (see e.g., donor $\overline{S}$). Donor $\overline{S}$ prefers an interior point above $b_2$ on $T_2(b)$ over the kink $b_1$. This is Scenario 2.

**Derivation:** We have seen that in the knife-edge case donor $\widetilde{S}$ is indifferent between $b_1$ and $b_I^{\widetilde{S}}$. Using this insight, I can derive the knife-edge elasticity. I proceed in three steps. First, noting that donor $\widetilde{S}$'s transfer under the single-kinked schedule $T_1(b)$ satisfies $b_1 = \rho^{\widetilde{S}}(\widetilde{\varepsilon}) \cdot (1 - t - \Delta t_1)^{\widetilde{\varepsilon}}$, I calculate her utility level at $b_1$:

$$u(b_1, \rho^{\widetilde{S}}(\widetilde{\varepsilon}), \widetilde{\varepsilon}) = \left(\frac{b_1}{1+\widetilde{\varepsilon}}\right) \cdot (1 - t - \widetilde{\varepsilon} \cdot \Delta t_1)$$

Second, I also derive $\widetilde{S}$'s utility at the interior point $b_I^{\widetilde{S}}$. To that end, I further specify the location of the optimal interior-point $b_I^{\widetilde{S}}$: As previously highlighted, $\widetilde{S}$'s transfer under $T_1(b)$ corresponds to $b_1 = \rho^{\widetilde{S}}(\widetilde{\varepsilon}) \cdot (1 - t - \Delta t_1)^{\widetilde{\varepsilon}}$. Furthermore, under the double-kinked schedule, donor $\widetilde{S}$ chooses her interior indifference point $b_I^{\widetilde{S}}$, according to $b_I^{\widetilde{S}} = \rho^{\widetilde{S}}(\widetilde{\varepsilon}) \cdot (1 - t - \Delta t_2)^{\widetilde{\varepsilon}}$. Combining both equations, I rearrange terms and obtain $b_I^{\widetilde{S}} = [(1 - t - \Delta t_2)/(1 - t - \Delta t_1)]^{\widetilde{\varepsilon}}$. Consequently, donor $\widetilde{S}$'s utility level at $b_I^{\widetilde{S}}$ becomes:

$$u(b_I^{\widetilde{S}}, \rho^{\widetilde{S}}(\widetilde{\varepsilon}), \widetilde{\varepsilon}) = \left(\frac{b_1}{1+\widetilde{\varepsilon}}\right) \cdot \frac{(1 - t - \Delta t_2)^{1+\widetilde{\varepsilon}}}{(1 - t - \Delta t_1)^{\widetilde{\varepsilon}}}$$

Third, I exploit the indifference condition $u(b_1, \rho^{\widetilde{S}}(\widetilde{\varepsilon}), \widetilde{\varepsilon}) = u(b_I^{\widetilde{S}}, \rho^{\widetilde{S}}(\widetilde{\varepsilon}), \widetilde{\varepsilon})$ to calculate the equation that describes the knife-edge $\widetilde{\varepsilon}$:

$$1 - t + \widetilde{\varepsilon} \cdot \Delta t_1 = \frac{(1 - t - \Delta t_2)^{1+\widetilde{\varepsilon}}}{(1 - t - \Delta t_1)^{\widetilde{\varepsilon}}}$$

The knife-edge elasticity $\widetilde{\varepsilon}$ is, hence, an implicit function of the characteristics of the tax schedule $t$, $\Delta t_1$, and $\Delta t_2$. It, ceteris paribus, decreases in $t$ and $\Delta t_1$, and it increases in $\Delta t_2$.

### E.3.3 Proof: Existence of Knife-Edge Elasticity

In the following, I prove that there is a unique elasticity value $\tilde{\varepsilon}$ for which the marginal buncher of a single-kinked schedule $\tilde{S}$ is indeed indifferent between the points $b_1$ and $b_I^{\tilde{S}}$ on $T_2(b)$. The logic of the proof is simple. I show that there is an elasticity $\tilde{\varepsilon}$ for which the marginal buncher's marginal rate of substitution equals the slope of the budget set $b - T_2(b) = 1 - t - \Delta t_2$ above $b_2$. If this is the case, $\tilde{S}$'s indifference curve tangents an interior point $b_I^{\tilde{S}}$. The marginal buncher is, hence, indifferent between the points $b_1$ and $b_I^{\tilde{S}}$.

**Proof:** Subsection E.3.1 calculated the marginal rate of substitution of the marginal buncher of a single-kinked tax schedule. Taking the limits of donor $S$'s marginal rate of substitution, I get:

$$\lim_{\varepsilon \to 0} MRS(b, \rho^S(\varepsilon), \varepsilon)|_{b>b_1} = \lim_{\varepsilon \to 0, b>b_1} (1 - t - \Delta t_1) \cdot \left(\frac{b}{b_1}\right)^{1/\varepsilon} = \infty,$$

and:

$$\lim_{\varepsilon \to \infty} MRS(b, \rho^S(\varepsilon), \varepsilon)|_{b>b_1} = (1 - t - \Delta t_1) \cdot \lim_{\varepsilon \to \infty, b>b_1} \cdot \left(\frac{b}{b_1}\right)^{1/\varepsilon} = 1 - t - \Delta t_1.$$

Consequently, given that $\Delta t_1 > \Delta t_2$, there must be a unique elasticity $\varepsilon \equiv \tilde{\varepsilon}$ that implies for $b > b_2$:

$$MRS(b, \rho^{\tilde{S}}(\tilde{\varepsilon}), \tilde{\varepsilon}) = 1 - t - \Delta t_2.$$

■

## E.4 Heterogeneous Elasticities

**Homogeneous Elasticities:** Before considering the case with heterogeneous elasticities, I introduce some notation for the case with homogeneous elasticities. Usually, we describe total bunching in the case of homogeneous elasticities by:

$$B = \int_{b_1}^{b_1 + \Delta b^D} h_0(b) \mathrm{d}b \approx h_0(b_1) \cdot \Delta b^D, \tag{24}$$

where $\Delta b^D$ represents the size of the marginal buncher's behavioral response to $T_2(b)$, and $h_0(b)$ refers to the counterfactual distribution of $b$ under a linear tax schedule. The approximation assumes that the counterfactual density $h_0(b)$ is constant on the bunching segment $[b_1, b_1 + \Delta b^D]$. Given an estimate of the counterfactual density $h_0(b_1)$ at $b_1$, the excess mass of taxpayers at the kink $B/h_0(b_1)$ approximates $\Delta b^D$.

**Heterogeneous Elasticities:** One can easily extend equation (24) such it allows for heterogeneous elasticities [Kleven 2016]. To that end, I introduce two joint distribution. First, the joint distribution of preferred transfers $\rho$ and elasticities $\varepsilon$: $\hat{f}(\rho,\varepsilon)$. Second, the joint pre-kink distribution of wealth transfers $b$ and elasticities $\varepsilon$: $\hat{h}_0(b,\varepsilon)$. Consequently, we get $h_0(b) = \int_\varepsilon \hat{h}_o(b,\varepsilon)\mathrm{d}\varepsilon$. At each elasticity level $\varepsilon$, one can characterize $D$'s response to $T_2(b)$ by $\Delta b^D_\varepsilon$. Given this notation, one can link total bunching $B$ to the average earnings response:

$$B = \int_\varepsilon \int_{b_1}^{b_1+\Delta b^D} \hat{h}_0(b,\varepsilon)\mathrm{d}b\mathrm{d}\varepsilon \approx h_0(b_1)\cdot E[\Delta b^D_\varepsilon]. \quad (25)$$

In this case, the approximation assumes that, for all $\varepsilon$, the counterfactual density $\hat{h}_0(b,\varepsilon)$ is constant in $b$ on the bunching segment $[b_1, b_1+\Delta b^D]$. Next, I discuss what types of parameters one can identify when the tax schedule is double kinked. There are three cases.

**Case 1: $\varepsilon \leq \widetilde{\varepsilon}$ for all donors:** In the first case, the elasticities are heterogeneous but always smaller than the knife-edge elasticity $\widetilde{\varepsilon}$. Put differently, all donors behave as in Scenario 1. Importantly, we are back in the standard case with (a) heterogeneous elasticities and (b) single-kinked tax schedules that has been formally discussed by Saez [2010]. By solving (25) for $E[\Delta b^D_\varepsilon]$ and inserting the result $B/h_0(b_1)$ into (5), we can identify the *average compensated elasticity* at the kink [Saez 2010]. Bunching remains proportional to the average compensated elasticity.

**Case 2: $\varepsilon > \widetilde{\varepsilon}$ for all donors:** Next, the elasticities are always larger than the knife-edge elasticity $\widetilde{\varepsilon}$ such that all donors behave as if they face a proportional notch (Scenario 2). We end up in the second standard case with (a) heterogeneous elasticities and (b) proportionally notched tax schedules introduced by Kleven and Waseem [2013]. When combining the bunching moment $E[\Delta b^D_\varepsilon] = B/h_0(b_1)$ with the second elasticity formula (6), we estimate the *elasticity for the average wealth transfer response* (i.e., the elasticity for the average marginal buncher) as opposed to the average elasticity. The nonlinear nature of equation (6) explains why the elasticity for the average marginal buncher deviates from the average elasticity.

**Case 3: $\varepsilon \leq \widetilde{\varepsilon}$ for some and $\varepsilon > \widetilde{\varepsilon}$ for other donors:** In the third case, some individuals have $\varepsilon \leq \widetilde{\varepsilon}$ while other individuals have $\varepsilon > \widetilde{\varepsilon}$. Again, we are able to estimate the elasticity for the *average wealth transfer response*. To understand why, consider a population with only two types of donors, indexed by $j = 1,2$. Furthermore, assume that, for all elasticities $\varepsilon_j$, the counterfactual density is constant in $b$ on the bunching segment. The elasticity for type $j=1$ ($j=2$) is $\varepsilon_1 < \widetilde{\varepsilon}$ ($\varepsilon_2 > \widetilde{\varepsilon}$). $s_j$ refers to the population share of type $j$. The response of type $j$ to $T_2(b)$ is $\Delta b^D_{\varepsilon_j}$. In this simple case, bunching at $b_1$ is:

$$B = s_1 \cdot \Delta b^D_{\varepsilon_1} \cdot \hat{h}_0(b_1, \varepsilon_1) + s_2 \cdot \Delta b^D_{\varepsilon_2} \cdot \hat{h}_0(b_1, \varepsilon_2)$$

Noting that $h_0(b_1) = s_1 \cdot \hat{h}_0(b_1, \varepsilon_1) + s_2 \cdot \hat{h}_0(b_2, \varepsilon_2)$, I obtain:

$$B = h_0(b_1) \cdot \frac{s_1 \cdot \Delta b^D_{\varepsilon_1} \cdot \hat{h}_0(b_1, \varepsilon_1) + s_2 \cdot \Delta b^D_{\varepsilon_2} \cdot \hat{h}_0(b_1, \varepsilon_2)}{h_0(b_1)} = h_0(b_1) \cdot E[\Delta b^D_{\varepsilon}] \qquad \blacksquare$$

Therefore, the excess mass at the kink $B/h_0(b_1)$ identifies the behavioral response of the average marginal buncher, and I can identify the average marginal buncher's elasticity. The same logic applies to the general case with more than two elasticity values.

## E.5 Setting with Imprecise Control

The presented model assumes that donors can precisely control their taxable wealth transfer. For the sake of completeness, the following complementary analysis discusses the role of imprecise control over the taxable wealth transfer for bunching. I also presents the results of a simple simulation study, highlighting that, due to the kink's substantial size, scattered clustering around the large kinks should appear even under small elasticities and substantial imprecise control (i.e., bunching is not smoothed out). For simplicity, I focus on the single-kinked tax schedule $T_1(b)$. The results for double-kinked tax schedules are identical.

**Theory** Inspired by Saez [1999], in the following, I integrate imprecise control over the taxable transfer into the analysis. To that end, I assume that, in line with equation (2), donors trade off the benefits and costs of wealth transfers. However, the taxable transfer $b$ now consists of two components: First, depending on her wealth transfer preference $\rho$, a donor selects her deterministic wealth transfer, $d$. The second component $\xi$ is a random and uncontrollable wealth transfer shock (with mean zero). Potential sources of imprecise control are, for example, risky, uncertain returns on capital assets or an uncertain point of death [Yaari 1965, Hurd 1989, Friedman and Warshawsky 1990, Mitchell *et al.* 1999]. The taxable wealth transfer becomes $b = d + \xi$.

Under imprecise control, donors choose $d$ as if they would face the expected tax schedule [see Saez 1999]:

$$\hat{T}_1(d) = \int T_1(d + \xi) dF(\xi), \qquad (26)$$

instead of the actual tax schedule $T_1(\cdot)$. The effective marginal tax rate becomes:

$$\hat{T}_1'(d) = \int T_1'(d+\xi)dF(\xi). \tag{27}$$

Because the effective marginal tax rate is the expectation of the actual marginal tax rates $T_1'(\cdot)$, discrete increases in the actual marginal tax rates translate into smooth increases in the effective marginal tax rate at the cutoff. Consequently, instead of sharp bunching at the kink point, we expect to observe more scattered bunching in the form of a hump around the threshold. The more imprecise control an individual faces, the fuzzier is bunching.

**Simulations: Methodology** In the following, I use simulations to explore how the level of imprecise control impacts the shape of the excess mass around the cutoff. The analysis shows that, under substantial imprecise control, even small elasticities still lead to observable bunching, at least if the kink is large. The details of the simulations are as follows:

1. Preferences and Tax: I assume that $\rho$ is beta distributed. This assumption allows me to match the simulated taxable wealth transfer distributions closely to the empirical distribution of taxable wealth transfers.[47] Furthermore, for illustration, I focus on the first kink for close relatives in 2002. Therefore, all values are expressed in Deutsche Mark. In 2002, the marginal tax rate jumped from 0.07 to 0.5 at the taxable inheritance level 100,000 DM.

2. Imprecise control: By assumption, $\xi$ is normally distributed, with the standard deviation $\sigma \in \{2000, 5000, 8000, 10000, 15000, 20000, 25000, 30000\}$ and a zero mean. For a given deterministic transfer $d_0$, the corresponding effective taxable inheritance $b_0$ lies with 95% probability in the interval $[d_0 - 1.96\sigma, d_0 + 1.96\sigma]$. When targeting the kink, individuals have, hence, substantial imprecise control. In the most extreme case ($\sigma = 30{,}000$), the 95%-confidence interval around the cutoff is $[41200, 158800]$. Donors in this interval, hence, face massive taxable wealth transfer shocks up to almost 60% of the kink's size. For comparison, consider the size of one of the most pronounced financial market shocks in Germany: In the wake of the financial crises of 2008, the German stock market (DAX) dropped by 40.4% during that year.

3. Elasticities: I consider the following elasticity values: $\varepsilon \in \{0.11, 0.25, 0.5, 1\}$. The elasticity is, therefore, at least as large as the one for taxable specific

[47] I choose the distribution of $\rho$ such to match the distribution of other taxable inheritances. Furthermore, for simplicity, I set $\nu = 0$. All results can be replicated for $\nu \neq 0$.

inheritances.

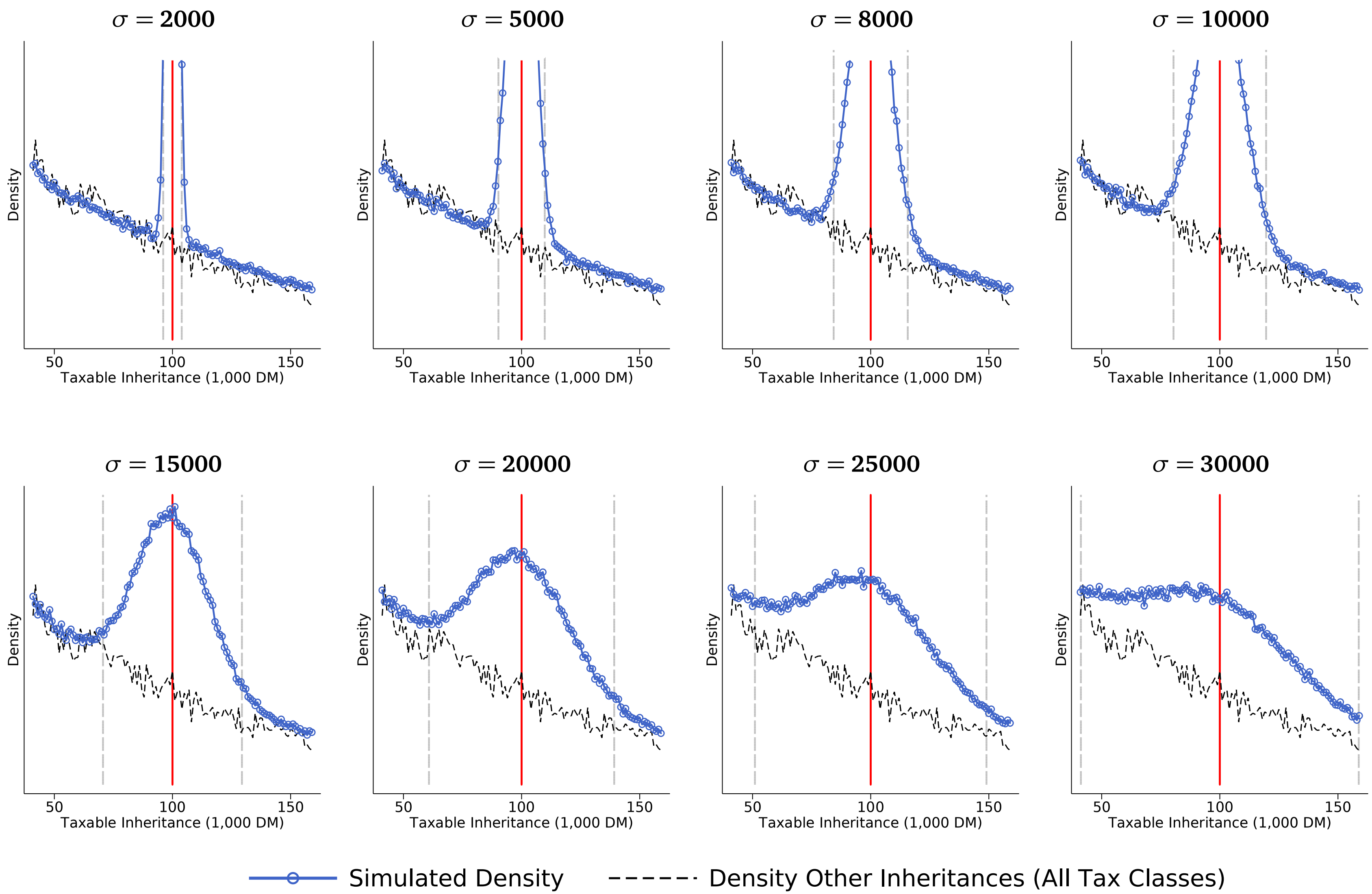
4. Simulation procedure: Considering each $\sigma$-$\varepsilon$ combination separately, I run simulations with $N = 500{,}000$ donors. Particularly, I first compute the expected tax schedule $\hat{T}_1$ along the lines of equation (26). I then solve for the optimal $d$ given $\hat{T}_1$ for each $\rho$. Next, I randomly draw $\xi$ for each individual and obtain the individual taxable inheritance as $b = d + \xi$. The last step plots the resulting distributions of the taxable wealth transfer.

**Simulations: Results** Figures E.2 to E.5 display the simulation results, considering the jump in the marginal tax rate from 7% to 50% at taxable wealth transfer level 100,000 DM. The underlying elasticities in Figure E.2, E.3, E.4, and E.5 are 1, 0.5, 0.25, and 0.11. Each figure presents the results for different values of $\sigma$. The blue lines represent the simulated taxable transfer distribution. The vertical red lines show the kink's location and the vertical grey lines refer to the 95%-confidence intervals for $b_0$. For comparison, the panel also includes the distribution of other taxable inheritances (i.e., inheritances that are not specific inheritances).

The main results of the simulation analysis are as follows. First, large kinks (as implemented in Germany) result in substantial bunching. Second, the larger the elasticity $\varepsilon$ and the lower $\sigma$, the larger and sharper are the humps. Third, even if the level of imprecise control is high and the elasticities are relatively small, humps around the threshold are visible. For example, Figure E.5 shows bunching around the cutoff for donors with $\varepsilon = 0.11$ and $\sigma = 10{,}000$. If we increase $\varepsilon$ to a still small value of 0.25, a smooth hump is even discernible for $\sigma = 20{,}000$ (see Figure E.4). To see why this is remarkable, note that the effective taxable transfer for donors who choose $d_0 = 100{,}000$ lies with a probability of 95% in the interval $[60800, 139200]$. Thus, the corresponding shocks are large and amount up to ±39.2% of the kink's size. If the elasticity is even larger, a higher value of $\sigma = 30{,}000$ does not make the hump entirely disappear.

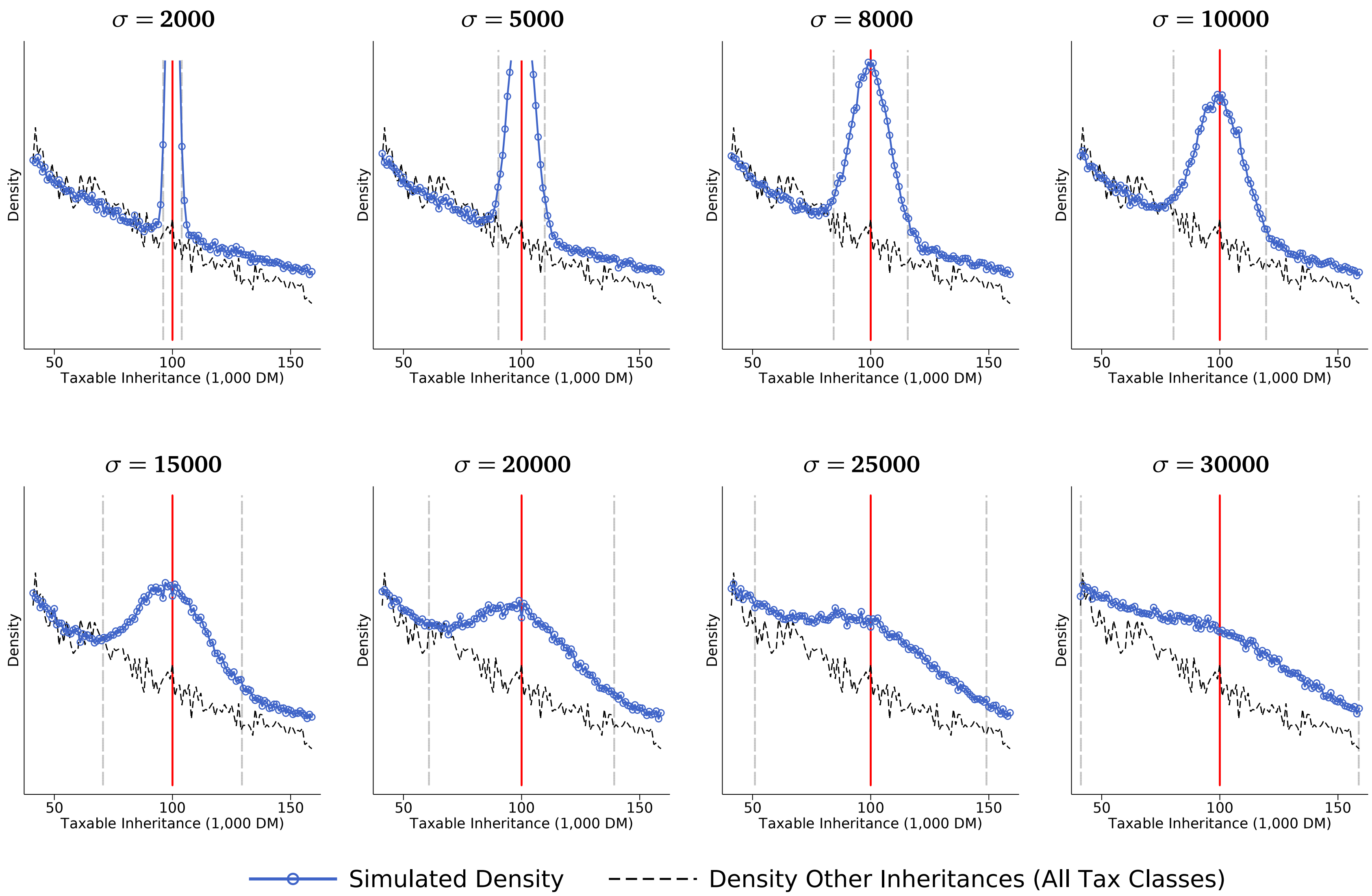
**Discussion** The simulation exercise demonstrates that, due to the kink's substantial size, even a high level of imprecise control does not "smooth out" bunching unless the underlying elasticity is very small. For example, consider an already small elasticity value of $\varepsilon = 0.25$ and a low level of control of $\sigma = 20{,}000$. In this case, the simulations still show a hump around the cutoff. While small elasticities already result in observable bunching responses under imprecise control, larger elasticities imply larger and more visible clustering around the kink.

**Figure E.2: Simulating Imprecise Control (Elasticity: 1)**



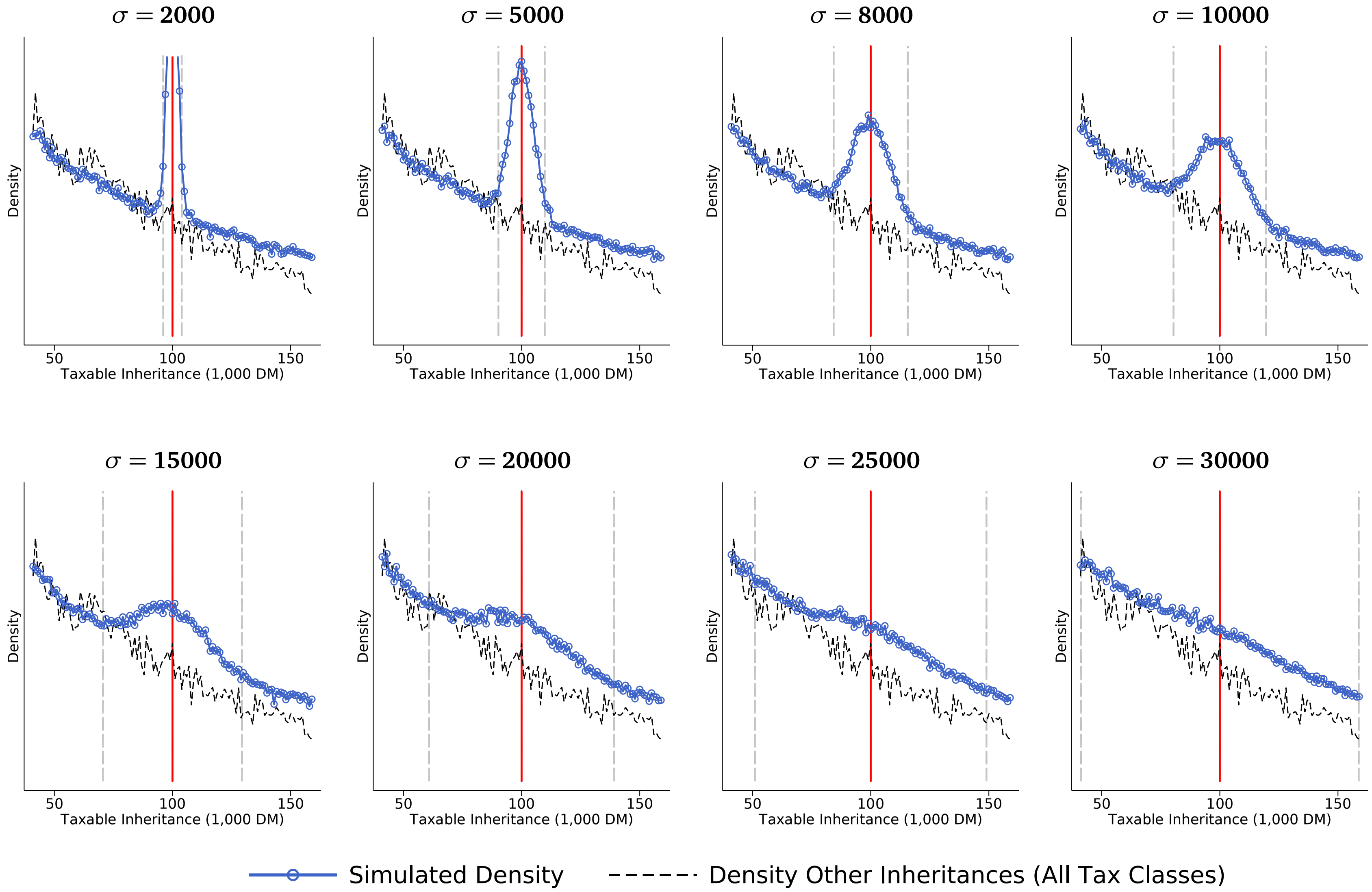

***Notes:*** This figure displays the simulation results, considering the jump in the marginal tax rate from 7% to 50% at taxable wealth transfer level 100,000 DM. The underlying elasticity is 1. By assumption, the random wealth transfer shock $\xi$ is normally distributed, with the standard deviation $\sigma \in \{2000, 5000, 8000, 10000, 15000, 20000, 25000, 30000\}$ and a zero mean. The blue lines represent the simulated taxable transfer distribution. The vertical red lines show the kink's location and the vertical grey lines refer to the 95%-confidence intervals for $b_0$. For comparison, the panel also includes the distribution of other taxable inheritances (i.e., inheritances that are not specific inheritances).

**Figure E.3: Simulating Imprecise Control (Elasticity: 0.5)**



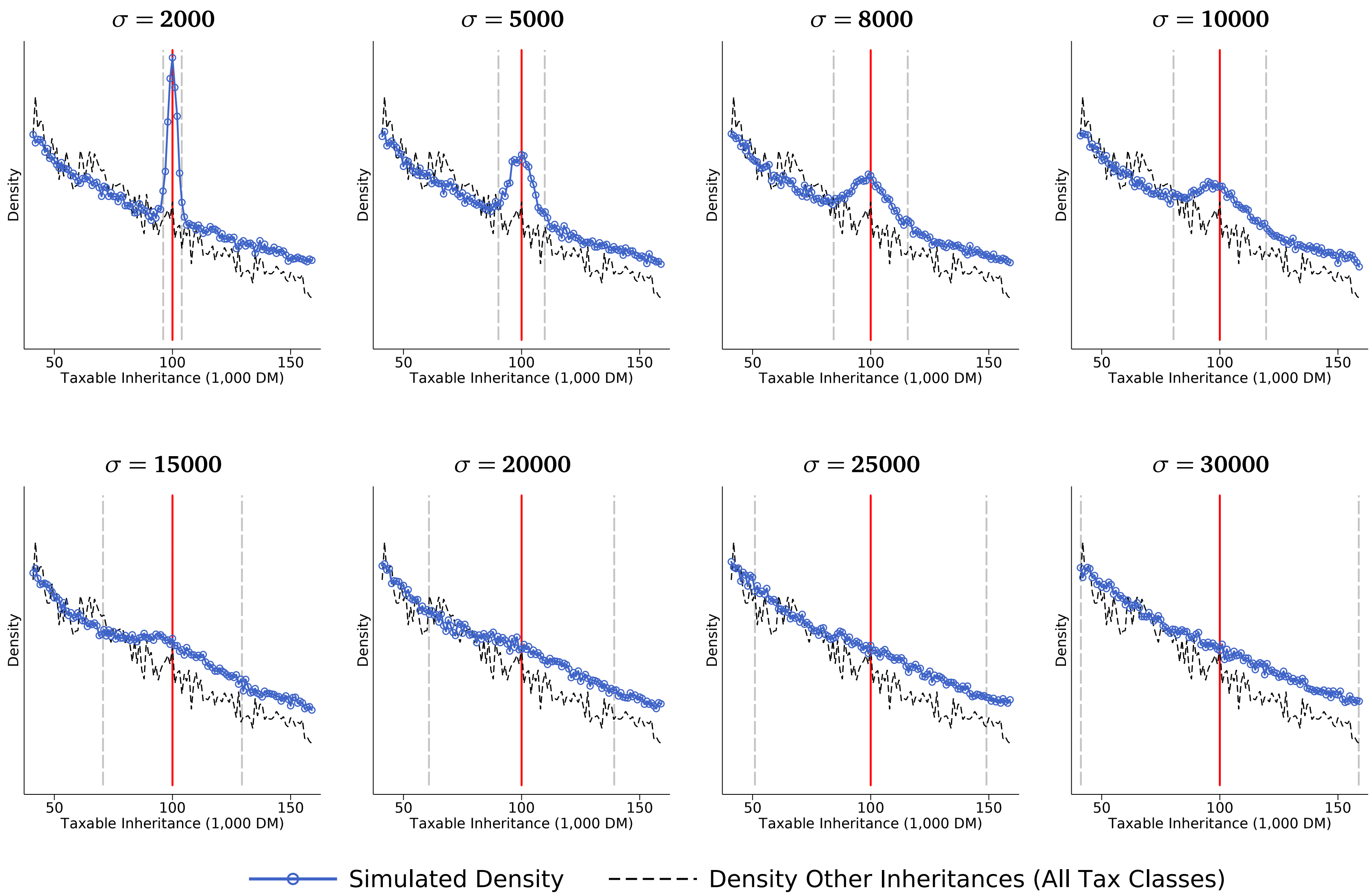

***Notes:*** This figure displays the simulation results, considering the jump in the marginal tax rate from 7% to 50% at taxable wealth transfer level 100,000 DM. The underlying elasticity is 0.5. By assumption, the random wealth transfer shock $\xi$ is normally distributed, with the standard deviation $\sigma \in \{2000, 5000, 8000, 10000, 15000, 20000, 25000, 30000\}$ and a zero mean. The blue lines represent the simulated taxable transfer distribution. The vertical red lines show the kink's location and the vertical grey lines refer to the 95%-confidence intervals for $b_0$. For comparison, the panel also includes the distribution of other taxable inheritances (i.e., inheritances that are not specific inheritances).

**Figure E.4: Simulating Imprecise Control (Elasticity: 0.25)**




***Notes:*** This figure displays the simulation results, considering the jump in the marginal tax rate from 7% to 50% at taxable wealth transfer level 100,000 DM. The underlying elasticity is 0.25. By assumption, the random wealth transfer shock $\xi$ is normally distributed, with the standard deviation $\sigma \in \{2000, 5000, 8000, 10000, 15000, 20000, 25000, 30000\}$ and a zero mean. The blue lines represent the simulated taxable transfer distribution. The vertical red lines show the kink's location and the vertical grey lines refer to the 95%-confidence intervals for $b_0$. For comparison, the panel also includes the distribution of other taxable inheritances (i.e., inheritances that are not specific inheritances).

**Figure E.5: Simulating Imprecise Control (Elasticity: 0.11)**




***Notes:*** This figure displays the simulation results, considering the jump in the marginal tax rate from 7% to 50% at taxable wealth transfer level 100,000 DM. The underlying elasticity is 0.11. By assumption, the random wealth transfer shock $\xi$ is normally distributed, with the standard deviation $\sigma \in \{2000, 5000, 8000, 10000, 15000, 20000, 25000, 30000\}$ and a zero mean. The blue lines represent the simulated taxable transfer distribution. The vertical red lines show the kink's location and the vertical grey lines refer to the 95%-confidence intervals for $b_0$. For comparison, the panel also includes the distribution of other taxable inheritances (i.e., inheritances that are not specific inheritances).

## E.6 Scenario Selection With Adjustment Costs

Elasticity estimation requires to identify the relevant scenario. In the following, I demonstrate that my method even identifies the scenario correctly if 91%–99% of the donors do not respond to the schedule (due to adjustment costs).

**No Adjustment Costs:** In general, bunching depends on the structural elasticity $\varepsilon$ and a set of parameters of the tax schedule $X$ such that $B = B(\varepsilon, X)$. Suppose, for example, the donor's elasticity corresponds to $\varepsilon$. Then, the marginal buncher's behavioral response is $\Delta b^D(\varepsilon)$, and all donors with pre-reform transfers $(b_1, b_1 + \Delta b^D(\varepsilon)]$ bunch at $b_1$:

$$B = \int_{b_1}^{b_1+\Delta b^D(\varepsilon)} h_0(b)\mathrm{d}b \approx h_0(b_1) \cdot \Delta b^D(\varepsilon). \tag{28}$$

**Adjustment Costs:** If donors face adjustment costs (such as costs of making a testament), these may prevent them from bunching [Kleven 2016]. Particularly, under standard assumptions, only individuals with pre-reform transfers $(\underline{b}_1, \Delta b^D(\varepsilon)]$ move to the kink point, where $\underline{b}_1 > b_1$ [Gelber *et al.* 2020b]. The amount of bunching with adjustment costs is:

$$B^F = \int_{\underline{b}_1}^{b_1+\Delta b^D(\varepsilon)} h_0(b)\mathrm{d}b \approx h_0(b_1) \cdot (1-a) \cdot \Delta b^D(\varepsilon) < B, \tag{29}$$

where $a$ refers to the fraction of the initial bunchers $B$ who do not move to the kink (due to high enough adjustment costs). The marginal buncher still chooses pre-reform transfers $b_1 + \Delta b^D(\varepsilon)$. Notably, if we apply the standard bunching estimator for the behavioral response $B/h_0(b_1)$, we uncover the response attenuated by adjustment costs $\Delta b^{D,A} = (1-a) \cdot \Delta b^D(\varepsilon)$.

**Knife-Edge Case:** For comparison, consider the knife-edge case that separates both scenarios. The behavioral response of the marginal knife-edge buncher with $\varepsilon = \widetilde{\varepsilon}$ becomes $\Delta b^D(\widetilde{\varepsilon})$. If the marginal buncher's actual response $\Delta b^D(\varepsilon)$ is smaller than or equal to $\Delta b^D(\widetilde{\varepsilon})$, Scenario 1 applies. In this case, $\varepsilon \leq \widetilde{\varepsilon}$. Otherwise, Scenario 2 is relevant.

**Scenario Selection:** Next, I discuss the role of adjustment costs for scenario selection. To that end, consider the following situation. Suppose the donor's elasticity corresponds to $\varepsilon > \widetilde{\varepsilon}$. The respective marginal buncher responds by $\Delta b^D(\varepsilon) > \Delta b^D(\widetilde{\varepsilon})$. Hence, Scenario 2 is relevant. Nevertheless, in the presence of adjustment costs, Scenario 1 is selected if:

$$\int_{b_1}^{\underline{b}_1} h_0(b)\mathrm{d}b > \int_{b_1+\Delta b^D(\widetilde{\varepsilon})}^{b_1+\Delta b^D(\varepsilon)} h_0(b)\mathrm{d}b. \tag{30}$$

The left-hand side represents the mass of donors who do not bunch due to adjustment costs. The right-hand side reflects the mass of donors who reduce their transfer more than the marginal knife-edge buncher with $\widetilde{\varepsilon}$.

**Bounding the Fraction of Unresponsive Donors:** Building on the previous discussion, I can calculate an upper bound for the fraction of unresponsive individuals up to which I select the correct scenario. This bound is:[48]

$$\overline{a} = 1 - \frac{\Delta b^{D,A}}{\Delta b^D(\widetilde{\varepsilon})}, \tag{31}$$

where $\Delta b^{D,A}$ reflects the *estimated* behavioral response that is potentially attenuated by adjustment costs, and $\Delta b^D(\widetilde{\varepsilon})$ corresponds to the marginal knife-edge buncher's response.

For illustration, assume that $\Delta b^{D,A} = 1000$ and $\Delta b^D(\widetilde{\varepsilon}) = 2000$. Based on these values, one would conclude that Scenario 1 applies. What is the upper bound for the fraction of unresponsive donors up to which this conclusion is valid? According to equation (31), $\overline{a}$ corresponds to 0.5. This value implies that if more than 50% of the bunchers are unresponsive due to adjustment costs, then the marginal buncher's frictionless response would be larger than that of the knife-edge buncher. Only in this case, Scenario 1 would be selected, although Scenario 2 applies.

**Results:** Table E.1 presents the upper bounds for my application. Column 3 focuses on inheritances and Column 4 on inter vivos gifts. The results imply that, in my case, the fraction of unresponsive individuals can be substantial. First, consider inheritances. Even if 91% to 99% of all individuals who would bunch without adjustment costs were unresponsive, Scenario 1 would be selected correctly. For an illustration of the underlying numbers, consider the pre-2009 period as an example. I estimate that the marginal buncher reduces inheritances by 977 Euro to bunch at the kink (see Table 1). The knife-edge elasticity is $\widetilde{\varepsilon} = 0.31$, which implies $\Delta b^D(\widetilde{\varepsilon}) = 10{,}840$. Hence, we have $\overline{a} = 1 - 977/10{,}840 = 0.91$. Second, turning to inter vivos gifts, the respective range is 81% to 96%. In sum, I conclude that adjustment costs are a little threat to my scenario-selection strategy.

[48] This equation directly follows from equation (29), when setting $\Delta b^D(\varepsilon) = \Delta b^D(\widetilde{\varepsilon})$.

**Table E.1: Adjustment Costs and Selection of Relevant Scenario**

| | Convex Kink $b_1$ (1) | Jump in MTR $\Delta t_1$ (2) | Upper Bound $\overline{a}$ Inheritances (3) | Inter Vivos Gifts (4) |
|---|---|---|---|---|
| **A Close Relatives** | | | | |
| Before Reform in 2009 | 52K | .43 | .91 | .81 |
| After Reform in 2009 | 75K | .43 | .96 | .87 |
| | 300K | .39 | .99 | .94 |
| | 600K | .35 | .99 | .96 |
| **B Other Relatives** | | | | |
| Before Reform in 2009 | 52K | .38 | .98 | .96 |
| After Reform in 2009 | 75K | .35 | .99 | .94 |

***Notes:*** This table presents an upper bound for the fraction of unresponsive donors (due to adjustment costs) up to which Scenario 1 is correctly identified. Column 1 defines the relevant kink point, Column 2 shows the jump in the marginal tax rate, Column 3 presents the upper bound for inheritances, and Column 4 focuses on inter vivos gifts. For example, according to Table 1, donors reduce inheritances by 997 Euro to bunch at the kink during the pre-2009 period. This response lies way below that of the marginal knife-edge buncher $\Delta b^D(\widehat{\varepsilon}) = 10{,}840$. Table E.1 additionally shows that, for this case, $\alpha = 0.91$. This value implies that only if more than 91% of the bunchers are unresponsive due to adjustment costs, then the marginal buncher's frictionless response would be larger than that of the knife-edge buncher.

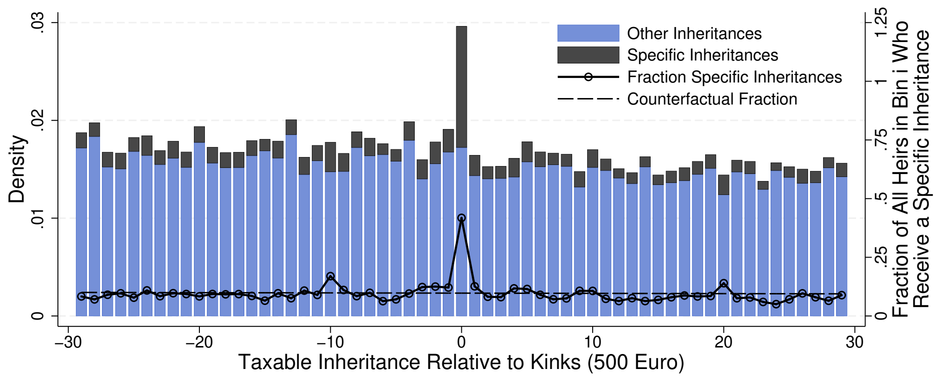
# F Contribution of Specific Inheritances to Bunching

Subsequently, I examine whether individuals exploit specific inheritances excessively compared to the other inheritance types to target the kink. I also test formally what share of total bunching can be explained by specific inheritance bunching.

**Excessive Specific Inheritance Bunching:** In Subsection 6.2, I have argued that (a) the fraction $f_i$ of closely related heirs in bin $i$ who receive specific inheritances peaks in the bunching range compared to the counterfactual situation and (b) that this implies that individuals disproportionately often bunch through specific inheritances. However, for the sake of brevity, I have not explicitly presented an estimate of the counterfactual scenario. Subsequently, I will provide such an estimate.

Before that, let me recall the main argument: If individuals bunch at the kink but do not over-frequently adjust specific inheritances for that purpose, the fraction $f_i$ of closely related heirs in bin $i$ who receive specific inheritances is a smooth function of taxable wealth transfers in the bunching range. Stated otherwise, individuals proportionally bunch through specific and other inheritances such that the ratio between these two quantities is unchanged. I label this scenario the counterfactual situation without excessive specific-inheritance bunching, and $\hat{f}_i$ refers to the corresponding counterfactual fraction. If individuals instead disproportionately often bunch through specific inheritances, the fraction $f_i$ peaks in the bunching range compared to the counterfactual situation.

**Figure F.1: Importance of Specific Inheritances for Bunching**




***Notes:*** This figure decomposes the pooled taxable inheritance distribution into specific inheritances (upper bars) and all other types inheritances (lower bars). It also shows the bin-specific fraction of recipients who receive specific inheritances $f_i$ (solid line) and the corresponding counterfactual fraction $\hat{f}_i$ (dashed line). I obtain the estimate for the counterfactual fraction as the predicted values of a regression in the spirit of equation (8) that uses $f_i$ as the dependent variable. Section 5 details the estimation strategy. Bin width: 500 Euro.

The latter pattern is observable in the data. To see this, consider Figure F.1 that adds an estimate of the counterfactual fraction $\hat{f}_i$ to Panel C in Figure 8 (dashed line). I obtain this estimate as the predicted values of a regression in the spirit of equation (8) that uses $f_i$ as the dependent variable.[49] The predicted counterfactual fraction revolves around 0.10 in the bunching area. Compared to that counterfactual, directly at the kink, the empirical share peaks at a high value of 0.42. Thus, individuals excessively exploit specific inheritances for bunching.

**Share of Total Bunching Explained by Specific Inheritance Bunching:** Next, I explicitly investigate what share of total bunching is explained by over-frequent adjustments of specific inheritances. A simple estimator for the share $s$ of excessive specific-inheritance bunching $S$ in total bunching $B$ is:

$$\hat{s} = \frac{\hat{S}}{\hat{B}} = \frac{\sum_{i=L}^{U}(f_i - \hat{f}_i)n_i}{\hat{B}}, \tag{32}$$

where $f_i$ refers to the fraction of closely related heirs in bin $i$ who receive specific inheritances, $\hat{f}_i$ is the counterfactual fraction, $n_i$ indicates the mass of taxable wealth transfers in bin $i$, and $[L, U]$ refers to the bunching window. Furthermore, $f_i n_i$ denotes the observed mass of specific inheritances in bin $i$ and $\hat{f}_i n_i$ is the corresponding counterfactual mass. Consequently, $\sum_{i=L}^{U}(f_i - \hat{f}_i)n_i$ denotes excessive specific-inheritance bunching. Because this estimator of $S$ exploits variation in the bin-specific fraction of heirs who receive specific inheritances, excessive specific-inheritance bunching reflects an increase in the relative importance of testamentary gifts in the bunching range.[50]

The results are clear-cut: The point estimate of $s$ suggests that the share of excessive inheritance bunchers compared to the total number of bunchers is 0.82. The corresponding 95% bootstrap percentile confidence interval is $[0.58, 1.12]$. I cannot reject the hypothesis that excessive specific-inheritance bunching explains all bunching at the kink at the 5% level.

[49] The details of this regression are like those of the original specifications used to estimate excess bunching. The approach hence assumes that the counterfactual fraction is a smooth function of taxable inheritances in the bunching range.

[50] The overall higher number of inheritances in the bunching range does not affect $\hat{S}$. For clarification, consider a situation in which $B > 0$ and $f_i$ is constant across all bins. In this case, there would be a spike in the specific inheritance distribution at the kink, reflecting the higher total number of inheritances in the bunching area. The used estimator of $S$ does not account for this type of mass.

# G Extensive-Margin Responses

The bunching analysis exploits double-kinked schedules to estimate responses at the intensive margin. However, tax policies might also trigger extensive-margin responses. Particularly, they may influence the binary decision to engage in testament planning or not. Inspired by Gelber *et al.* [2020a] and Escobar *et al.* [2019], I note that such extensive-margin responses affect the relationship between the probability of creating a testament and the taxable statutory succession (i.e., the inheritance that heirs would receive without testaments). Particularly, when being expressed as a function of statutory successions, the probability features a jump discontinuity at the convex kink point (if testaments do not have fixed costs) or a kink (fixed costs). I demonstrate that neither is the case. The extensive margin of testament planning, thus, seems negligible. In a similar vein, donors also do not add additional heirs to their wills. In sum, they seem to adjust their testamentary dispositions but not their extensive-margin decisions.

## G.1 Conceptual Considerations and Estimation Approach

In the following, I present simple conceptual considerations to demonstrate the effects of extensive-margin responses in the simplest possible way. For illustration, I rely on simulation exercises and a mostly verbal (instead of formal) discussion[51] My approach builds strongly on Escobar *et al.* [2019], who (more formally) study heirs' binary decisions to exploit a specific tax loophole.

**The Decision to Create a Testament:** If donors die intestate, the intestate succession law allocates the estate among statutory heirs. For example, in Germany, other relatives only inherit if there are no close relatives; unrelated individuals never inherit. Some donors' preferences are likely in line with this allocation. From their perspective, there is, hence, no need to create a testament. Others may have different preferences and create a testament to determine their estate's final allocation. Therefore, the main benefit of testaments is that they allow donors to allocate their estate according to their preferences. However, testaments may have (fixed) utility costs (i.e., there might be optimization frictions at the extensive margin). For example, donors might find it challenging to contemplate death, or testaments might require time input. They might also come with monetary costs. Conceptually, denoting the utility derived from the allocation of the estate with and without testaments

[51]Because the results speak against extensive-margin responses, I decided against presenting the most general theoretical model. Instead, I mainly focus on offering the underlying intuition.

by $u^T$ and $u^N$, donors create a testament if the utility gain of testation $u^T - u^N$ is larger than the associated cost $c$.

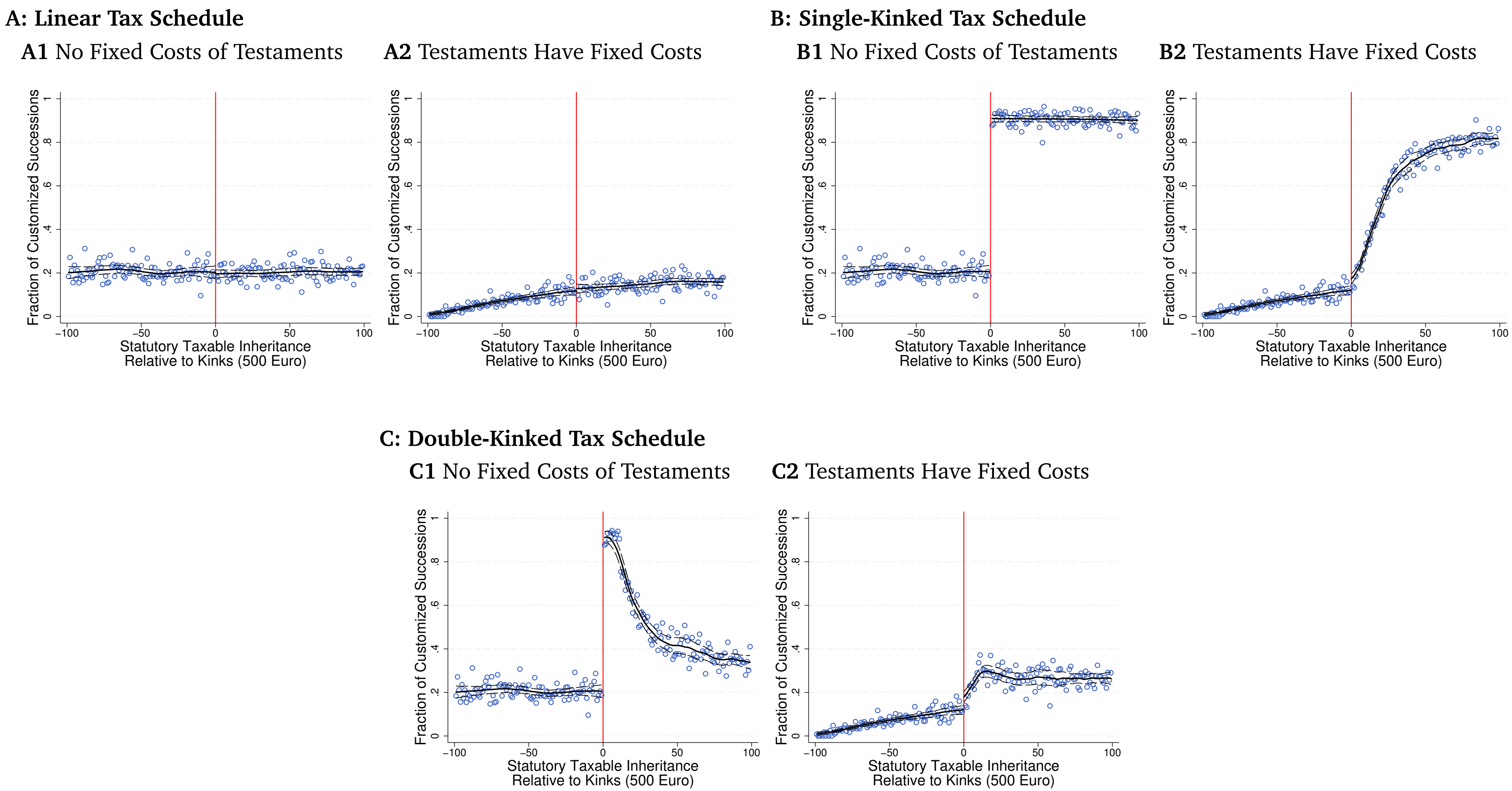
**Linear Tax Schedule:** As a benchmark, consider a hypothetical economy in which (a) many donors think about the decision to create a testament, and (b) all heirs are taxed according to *linear counterfactual tax schedules*. Different heirs may be subject to different tax schedules. Hence, taxes can change the relative prices for transfers between heirs. However, if all heirs are taxed at linear schedules and the donors' preferences over allocations are smoothly distributed in the population, the probability of creating a testament is a smooth function of the statutory taxable inheritance. Panel A in Figure G.1 exemplifies this observation using simple simulations. The basic assumptions are as follows (see figure notes for details):

- Many altruistic donors possess an exogenous estate $E$, which they can allocate among two heirs $i = 1, 2$.[52]
- Preferences over allocations of the estate between both heirs are smoothly distributed in the population.
- According to the intestate succession law, heir 1 inherits the entire estate. If donors want to deviate from this statutory succession rule, they need to create a testament.
- Both heirs are taxed according to linear tax schedules, where the tax rate for heir 1 is lower than for heir 2.

Panel A1 considers the case *without* fixed costs. Specifically, it shows the average bin-specific fraction of donors who customize their successions as a function of the statutory taxable inheritance of heir 1. As this individual is the sole statutory heir, her statutory taxable inheritance corresponds to the estate $E$. The vertical line marks the transfer level at which a convex kink will be introduced later. Because this point is not special under a linear tax schedule, the fraction of testators smoothly evolves around it. Panel A2 introduces a *fixed cost*, which is uniformly distributed in the population. With fixed costs, the fraction of testators increases in the statutory taxable inheritance. The reason is that if the donor's estate (and, hence, the

[52] It is possible to derive similar results for frameworks with multiple heirs. For example, one could consider a model in which the testator's preferences are: $u = \sum_{i=1}^{H} \theta^i \cdot \left( b^i - T_i(b^i) - \frac{\rho}{1+1/\varepsilon} \cdot \left(\frac{b^i}{\rho}\right)^{1+1/\varepsilon} \right)$, where $\theta^i$ determines how strongly the trade-off between the utility gains and the costs of bequeathing wealth $b^i$ to the individual $i$ influences the testator's decision. This utility function represents the $H$-heir version of equation (2).

## Figure G.1: Simulating Extensive-Margin Decisions




***Notes:*** This figure uses simulations to exemplify extensive-margin responses to kinked tax schedules. The simulations build on the following assumptions: Donors contemplate how to allocate their estate $E$ among two potential heirs $i = 1, 2$. Heir $i = 2$ (the non-statutory heir) is always taxed according to a linear tax schedule $T_0^2(b^2) = t^2 \cdot b^2$, where $b^2$ refers to the second heir's taxable inheritance and $t^2 = 0.12$. By contrast, the simulations vary how heir $i = 1$ (the statutory heir) is taxed. Panel A considers a linear tax schedule of form $T_0^1(b^1) = t^1 \cdot b^1$, with the first heir's taxable inheritance $b^1$. Panel B considers the single-kinked tax schedule $T_1^1(b^1) = t^1 \cdot b^1 + \Delta t_1^1(b^1 - b_1^1) \cdot \mathbb{1}(b^1 > b_1^1)$. Panel C shows responses to the double-kinked schedule $T_2^1(b^1) = t^1 b^1 + \Delta t_1^1(b^1 - b_1^1) \cdot \mathbb{1}(b_1^1 < b^1 \leq b_2^1) + \Delta t_2^1 b^1 \cdot \mathbb{1}(b^1 > b_2^1)$. In line with the German tax schedule for close relatives, the parameters for $i = 1$ are $t^1 = 0.07$, $\Delta t_1^1 = 0.43$, $\Delta t_2^1 = 0.04$, $b_1^1 = 52{,}000$, and $b_2^1 = 57{,}300$. For simplicity, the donors perceive inheritances received by both heirs as perfect substitutes. The donors' utility function reads $u = b^1 - T_j^1(b^1) + \theta \cdot (b^2 - T_0^2(b^2))$ with $j \in [1, 3]$. Hence, $\varepsilon = 0$. $\theta$ reflects how strongly the donors weight inheritances received by $i = 2$. According to the intestate succession law, $b^1 = E$ and $b^2 = 0$. Deviations from this distribution require testaments, which have fixed utility costs $c$ in the Panels A2, B2, and C2. Furthermore, the simulations assume that $E$ is uniformly distributed according to $\mathcal{U}(0, 150000)$, $\theta$ is uniformly distributed according to $\mathcal{U}(0.5, 1.2)$, and the fixed cost $c$ is uniformly distributed according to $\mathcal{U}(0, 5000)$.

statutory inheritance) is low, the potential transfer to the second individual is constrained and small. However, for small transfers, it is less likely that the utility gain from creating a testament exceeds the costs.

**Single-Kinked Tax Schedule:** Next, suppose a reform introduces a *single convex kink* in the tax schedule of statutory heirs. Donors with low enough estates that place their statutory heirs below the cutoff are not affected by this reform. By contrast, donors whose statutory heirs inherit above the cutoff might change their behavior. Particularly, due to the higher tax rate above the cutoff, some of the donors who initially (i.e., under linear schedules) found it optimal to bequeath their entire estate to statutory heirs likely no longer prefer this allocation. Hence, they create a testament to bequeath a part or their entire estate to non-statutory heirs as well.

This type of extensive-margin response will affect the relationship between the probability of creating a testament and the statutory taxable inheritance. Notably, there will be either a jump discontinuity (without fixed costs) or a kink (with fixed costs) in the fraction of testators at the convex kink point. In a similar vein, if both individuals (instead of only one individual) inherit after the reform, there will also be a jump discontinuity or a kink in the number of heirs at the cutoff. The higher the extensive-margin elasticity, the larger the discontinuities.[53]

Panel B exemplifies the resulting jump discontinuities and kinks, again, by exploiting simple simulation exercises. The underlying tax schedules are as follows:

- The statutory heir 1 faces a tax schedule with a single convex kink.
- The tax schedule for heir 2 is linear.

Panel B1 demonstrates that, *without fixed costs*, the fraction of testators discretely soars at the threshold. The reason is that, due to the marginal-tax-rate jump, the (relative) price of transferring the first unit to heir 2 discontinuously decreases as a function of the statutory taxable inheritance at the cutoff. Panel B2 shows the case *with fixed costs*. In this case, the donor's decision to create a testament depends on whether or not the utility gain of testation $u^T - u^N$ is larger than the associated cost $c$. The gain is a kinked function of the statutory inheritance at the cutoff; thus, the fraction of testators features a kink at the cutoff as well (as $c$ is smoothly distributed).

**Double-Kinked Tax Schedule:** Suppose a second reform introduces a double-kinked tax schedule. Specifically, the tax schedules are as follows:

[53] Escobar *et al.* [2019] explicitly derive a relationship between an extensive-margin elasticity and such discontinuities.

- The statutory heir 1 faces a schedule with a *transition area*. Hence, it features a convex kink (at the beginning of the transition area) and a concave kink (at the end of the transition area).
- The tax schedule for heir 2 is linear.

Panel C exemplifies the analysis, again, considering simulations. Without fixed costs, there is a discrete jump in the fraction of testators (Panel C1). However, given that the tax rate decreases above the second concave kink point, the fraction decreases and converges towards a lower level. By contrast, with fixed costs, there are again kinks (instead of jumps) in the fraction of testators (Panel C2).

**Estimation Approach:** Kinks in tax schedules can lead to jump discontinuities or kinks in (a) the fraction of donors who create a testament and (b) the number of heirs included in the testament. This insight is beneficial as it allows me to estimate extensive-margin responses. Particularly, I can exploit regression kink or discontinuity designs to detect kinks or jump discontinuities. My outcome variables are (a) a dummy indicating whether a donor customized successions or not and (b) the number of heirs who inherited from a specific donor.[54] The main prerequisite of the approach is that it requires approximating the statutory taxable inheritance (as this is the forcing variable). To that end, I have developed a tax-base simulator. The simulator calculates the statutory taxable inheritance by combining information on the German statutory successions rules with detailed data on the composition of the family and the estate.

**Identifying Assumption:** The fundamental identifying assumption of a regression discontinuity design (regression kink design) is that there should be no jumps (kinks) at the cutoff for other covariates. This assumption unlikely holds if individuals can select either side of the cutoff. In the present context, selection implies that donors modify the estate's total size (as the statutory taxable inheritance is defined by law, and it is a function of the estate). Put differently, donors change their wealth accumulation behavior. Jakobsen *et al.* [2020] argue that kinks do not trigger real responses to wealth taxes. A similar argument applies to inheritance taxes. I, hence, expect the identifying assumptions to hold. To nevertheless test its validity, I conduct the usual manipulation tests, and I find no evidence in favor of manipulation. Explicitly, employing the manipulation testing procedures of Cattaneo *et al.* [2019]

[54] Focusing on the probability to engage in testament planning has one main benefit: Testament planning at death almost always requires a testament. In this vein, I follow a reduced-form approach that captures various forms of testament planning.

that rely on local polynomial density estimators, I cannot reject the null hypothesis that donors did not manipulate statutory taxable inheritances ($p$-value: 0.6822).

**Sample:** In the baseline specification, I do not impose any sample restrictions. Additionally, I perform sub-sample analyses. For example, following the simulation exercise, I focus on families with only one statutory heir. In different specifications, I also consider donors with at least two statutory heirs (as the testament-planning incentives might be higher if more heirs are involved). No matter how I select the sample, the results always remain unchanged: There is no evidence for extensive-margin responses. In the following, I focus on the baseline specification for brevity.

## G.2 Results

This subsection analyzes the discontinuities visually. Regression analyses lead to similar conclusions. Figure G.2 illustrates the main results.

**Customized Successions:** Panel A shows the fraction of donors who customize successions as a function of the simulated statutory taxable inheritances. All panels pool the data across the first three convex kinks.[55] The vertical line marks the convex kink points. Panel A1 relies on a bin width of 500 Euro, and Panel A2 uses bins of 1,500 Euro. Each circle represents the fraction of testators in one specific bin. For example, in Panel A1, the fraction of testators in bin 1 is 0.33. Hence, 33% of all donors whose statutory heirs' inheritance would fall into the first bin without a testament create a last will. The panels also show best-fit lines of kernel-weighted local polynomial regressions on either side of the threshold (solid lines). The main takeaway message is that there are neither jumps nor kinks at the cutoff. My regression results confirm this finding. The results suggest that the extensive-margin testament-planning responses are not pronounced. As previously mentioned, I ran a wide range of additional analyses. The results are robust.

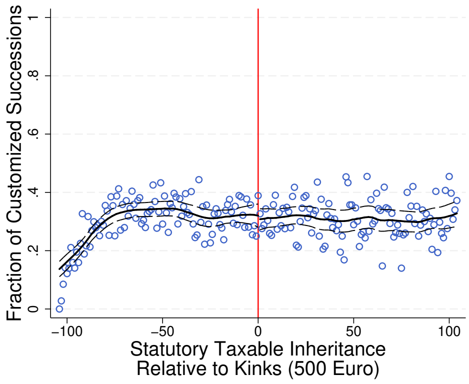
**Number of Heirs:** As discussed, donors may also integrate additional heirs into their testament. Then, there should be a discontinuity in the number of heirs at the cutoff. Panel B of Figure G.2, however, does not provide evidence in line with this hypothesis. It shows that the bin-specific average number of heirs smoothly evolves as a function of the statutory taxable inheritance. In a nutshell, the donors seem to adjust their testamentary dispositions but not their extensive-margin decisions.

[55] I also consider the kinks separately from each other. The results remain unchanged.

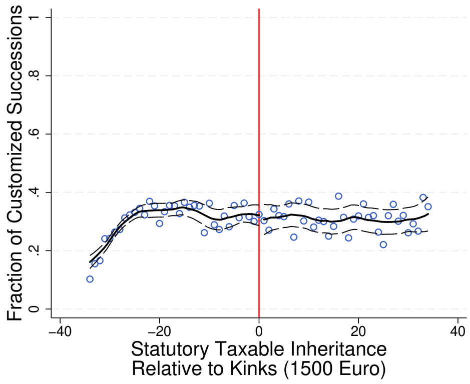
**Figure G.2: Extensive-Margin Responses**

**A: Fraction of Customized Successions**

**A1** Bin Width: 500 Euro

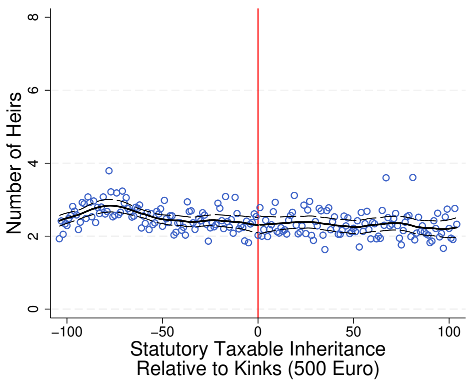



**A2** Bin Width: 1,500 Euro

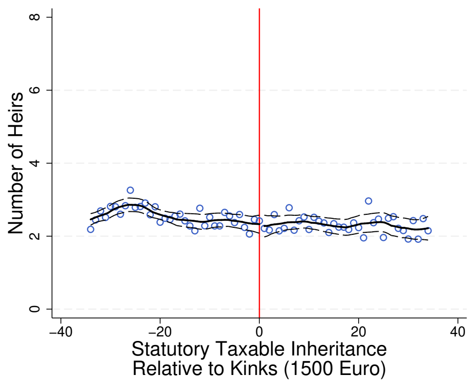



**B: Donor-Specific Number of Heirs**

**B1** Bin Width: 500 Euro




**B2** Bin Width: 1,500 Euro




***Notes:*** This figure studies extensive-margin responses. Panel A shows the bin-specific fraction of donors who customize successions as a function of the statutory taxable inheritance (i.e., the taxable inheritance that heirs would receive without testaments). The vertical line marks the location of the convex kink. Furthermore, Panel B shows the donor-specific number of heirs as a function of statutory taxable inheritances. The circles present bin-specific averages. The Panels A1 and B1 choose a bin width of 500 Euro to mimic the data's underlying variability. The Panels A2 and B2 trace out the underlying conditional expectation function by focusing on a bin width of 1,500 Euro. The panels also show best-fit lines of kernel-weighted local polynomial regressions on either side of the threshold (solid lines) and 95% confidence intervals (dashed lines).

## G.3 Relationship to Gelber et al. [2018]

In the following, I briefly discuss how my approach relates to the one of Gelber *et al.* [2020a] that has been developed to study the extensive-margin decision to work. The core idea of their approach is as follows: Suppose individuals (a) face fixed costs of employment and (b) cannot adjust their earnings at the intensive margin perfectly (i.e., they face intensive-margin frictions). Further, think of the employment probability as a function of desired earnings (i.e., the earnings workers would choose under a linear budget set). Under the assumptions (a) and (b), a kink in the budget set leads to a kink in the employment rate function (i.e., the slope of the probability function decreases at the kink). In a nutshell, the kink drives individuals who would like to move to the kink but are unable to do so (due to the frictions) into unemployment. The paper then uses regression kink designs to estimate the elasticity of earnings to the average net-of-tax rate.

Although my approach is inspired by Gelber *et al.* [2020a], I cannot simply apply their methods to my setting. The main reason is that they study a different type of extensive-margin decision: Specifically, they consider the extensive-margin to work and show that the employment rate is a kinked function of desired earnings.[56] Instead, I focus on the decision of whether or not to engage in testament planning. This different focus requires different conceptual considerations. Most importantly, I find that the fraction of testators is a kinked or discontinuous function of the statutory taxable inheritance.[57] Therefore, my empirical approach focuses on statutory inheritances (instead of desired inheritances) as a forcing variable and relies on a different identifying assumption. Table G.1 summarizes the differences.

**Table G.1: Comparison to Gelber et al. [2020]**

| | **Gelber et al. [2020]** | **This Paper** |
|---|---|---|
| **Type of Decision** | Work: yes/no | Create a testament: yes/no |
| **Relationship of Interest** | Employment rate as function of desired earnings (i.e., earnings without kinks) | Fraction of testators as function of taxable statutory inheritances (i.e., inheritances without testaments) |
| **Prediction** | Kinks in budget sets lead to kinks in employment rate function | Kinks in budget sets lead to jump discontinuities (no fixed costs) or kinks (fixed costs) in the fraction of testators |
| **Measurement of Forcing Variable** | Panel data: (past) earnings are observed without kinks | Statutory inheritances can be simulated |
| **Identifying Assumption** | Individuals cannot make small intensive margin labor-supply adjustments | Individuals cannot make small intensive-margin adjustments of the total estate |

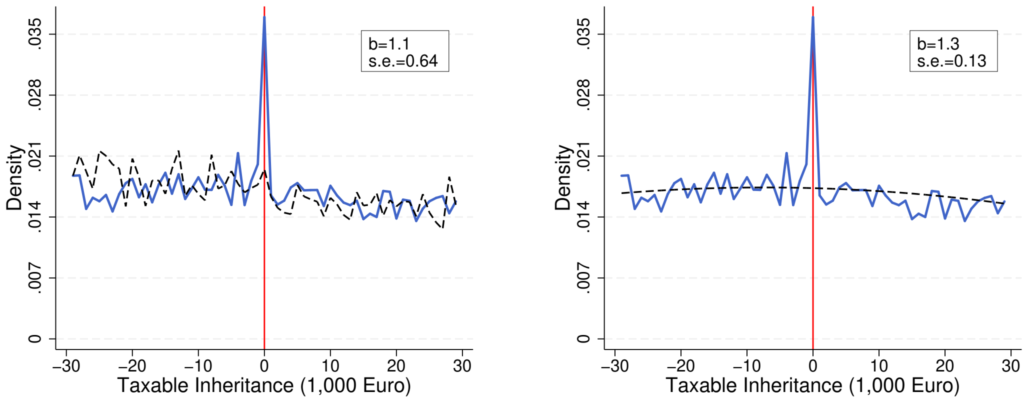
[56] The equivalent in my setting is the extensive-margin decision of whether to leave any bequests.
[57] My data does not include information on desired inheritances (i.e., transfers without kinks).

# H Alternative Control Group

As a robustness check, intestators can serve as a control group for testators. By definition, intestators do not use testaments to plan the allocation of their estate. The corresponding taxable inheritance distribution for this sub-group, hence, approximates a counterfactual world in which donors do not respond to tax incentives by testament planning. Instead of assuming how the distribution would have been in the absence of testament-planning responses, a version of this counterfactual world is directly observable in the data. Importantly, in this case, the estimate of excess bunching relies on an additional distribution to estimate bunching. Hence, it is not subject to the recent critique of Blomquist and Newey [2017].

**Figure H.1: Alternative Control Group for Statutory Successions**

**A** Intestators as Control Group　　　　**B** Standard Control Group




***Notes:*** This figure presents the results of a robustness check that uses an alternative control group for statutory successions. Particularly, Panel A focuses on close relatives and exploits statutory successions (dashed line) as the control group for customized successions (solid line). The underlying idea of this comparison is straightforward: By definition, intestators do not plan the allocation of the estate. Statutory successions, hence, approximate a counterfactual world in which donors do not respond to tax incentives by testamentary succession planning. Panel B uses the standard bunching estimator to estimate the control group for customized successions. Further details are as follows: $b$ is the excess mass around the convex kink point relative to the average density of the statutory successions distribution. The standard errors rely on bootstrap procedures. The vertical lines mark the convex kink points (normalized to zero). Bin width: 500 Euro.

Figure H.1 shows the results. Panel A exploits intestators (dashed lined) as control group for testators (blue line). Panel B applies the standard polynomial estimator of Chetty *et al.* [2011]. Exploiting intestators as a control group leaves the results for testators unchanged. The estimated bunching statistic $\hat{b}$ takes a value of 1.1 (1.3) in Panel A (Panel B).

# I Revenue-Maximizing Tax Rate

In the following, I take the results presented in this paper at face value and calculate the linear revenue-maximizing tax rate.

**Revenue-Maximizing Tax Rate** The linear revenue-maximizing tax rate is:

$$t = \frac{1}{1+\varepsilon},$$

where $\varepsilon$ represents the elasticity of the taxable estate to the net of tax rate (see e.g., Piketty and Saez 2013). As I aim at calculating a lower bound for $t$, I assume that the elasticity corresponds to the largest one for specific inheritances ($\varepsilon = 0.11$). The resulting revenue-maximizing rate is 0.9. Importantly, and as previously discussed, the estimated behavioral responses for specific inheritances reflect non-real responses. Because these responses can create fiscal externalities, the revenue-maximizing rate is arguably a lower bound.