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Taxes, frictions and asset shifting

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Taxes, frictions and asset shifting – when Swedes disinherited themselves[a]

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Abstract

We study tax-driven intergenerational asset shifting using a salient tax discontinuity and rich data on both donors and recipients. When the Swedish inheritance tax was in place, heirs could lower their inheritance tax bills by passing on part of the inheritance to their children. We present evidence on strong and precise responses to this incentive. We quantify optimization frictions, and we show that they are small in this setting. Both intensive and extensive margin policy responses can be rationalized by a simple model in which agents face small frictions at the extensive margin. Descriptive evidence suggests that the policy response is associated with the abundant supply of cheap legal advice on tax planning.

Keywords: tax avoidance, tax rate elasticity, inheritance taxation, inter vivos gifts
JEL Classification: H21; H24; H26

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1 Introduction

Progressive wealth and capital income taxes typically come with joint taxation of spouses. Even countries, which in other respects run tax systems based on the principle of individual taxation, levy (or levied) *household-based* wealth taxes. Individual-based progressive wealth taxes undeniably provide strong incentives for intra-household asset shifting, as the spouse facing a higher marginal tax rate can lower his or her tax payments by transferring assets to the spouse facing a lower marginal tax rate. A similar motivation applies to taxes on gifts, accompanying progressive wealth and inheritance taxes. In the absence of gift taxes, wealthy individuals and households could save on taxes by giving away resources to people who belong to separate taxable entities but are still close to them, most often children and grandchildren. However, such *intergenerational asset shifting* often involves a deeper economic trade-off than intra-household shifting; passing on wealth to children typically implies losing control over wealth.

While there is evidence on tax-induced intra-household asset shifting (Stephens Jr and Ward-Batts, 2004), there is less evidence on tax-driven intergenerational asset shifting. From earlier studies, we know that the choice to leave inheritances or to make *inter vivos* gifts is highly sensitive to taxes (Joulfaian, 2004; Bernheim et al., 2004; Nordblom and Ohlsson, 2006; Ohlsson, 2011). However, intergenerational asset shifting has not previously been studied in settings where rich data on both donors and donees are available. Consequently, we know little about the relevant mechanisms generating a shifting of assets within dynasties. Our setting does not only allow us to assess the sensitivity of intergenerational asset shifting to taxes. It also enables us to explore the mechanisms at work and quantify optimization frictions in a transparent way.

The setting we study in this paper follows from the structure of the Swedish inheritance tax, which was abolished in 2004. The tax was progressive and bequest based (as opposed to estate based). A feature of the tax law was that heirs with children faced a one-time opportunity to reduce their own taxable inheritance by transferring part of it to their children, a wealth transfer we refer to as *tax-favored inter vivos gift*.[1] The wealth received by the children was treated as if directly inherited from the decedent and taxed separately according to the inheritance tax schedule. In this way, heirs could avoid inheritance taxes, but it came at the cost of losing control over the assets; in a way, the heirs disinherited themselves. The Swedish inheritance tax schedule had a relatively low basic exemption at SEK 70,000 (USD 9,500), which means that there were many "ordinary people" – more or less the average heirs – receiving inheritances of a size close to it. These people could entirely avoid the inheritance tax by reducing their taxable inheritances down to the exemption, through these gifts.

We access rich administrative data on the universe of Swedish heirs who recently inherited their last surviving parent. To demonstrate the importance of these tax-favored gifts for the tax base elasticity, we graph the distributions of gross inheritances, before gifts are made, (in dark blue) and the taxable inheritance, net of gifts, (in red) in the range 1 to SEK 140,000 in Figure 1. If the taxable inheritance is less than or equal to SEK 70,000 (the exemption level), the inheritance tax bill is zero. There is substantial bunching at the exemption in the distribution of taxable inheritances, but not in the distribution of gross inheritances. The implied tax base elasticity is large – around 1.5. Most often, bunching estimates of tax base elasticities are small (Kleven, 2016). Here we find the opposite and the high elasticity originates from tax-favored gifts.[2]

The tax base elasticity illustrated in Figure 1 originates from both intensive and extensive margin giving responses, and we study both margins separately. The intensive margin (bunching) analysis shows unusual bunching at the kink point. The bunching is unusual in two senses: it is very precise, and it is quantitatively large. In the extensive margin analysis, we use gross inheritances as a forcing variable, allocating heirs into treated and non-treated groups, based on whether or not the inheritance is larger than

[1] The Swedish term is *arvsavstående*. An alternative English translation would be a *waiver*.

[2] The normative implications of the tax incentive are complicated, because tax induced *inter vivos* gifts bring about clear positive externalities on the recipients. Therefore, following the same logic as Dörrenberg et al. (2017), we do not interpret our tax base elasticity estimates as representing deadweight losses. Moreover, it is not necessarily a bad thing to provide incentives for middle-aged parents to transfer resources to less wealthy young children, but we do not explore the desirability of such policies in this paper.

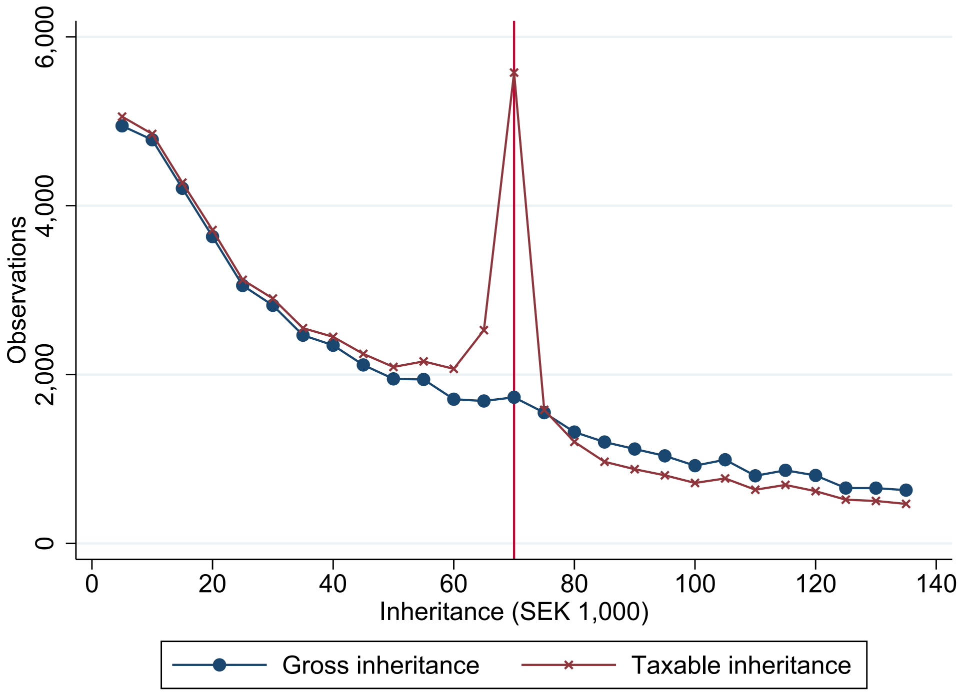


Figure 1: Inheritance distributions, gross and net of tax-favored gifts, for heirs receiving a gross inheritance of less than SEK 140,000. The vertical line indicates taxable exemption at SEK 70,000. The binsize is SEK 5,000.

the taxable exemption. Since there is a *slope change* in the relationship between the tax gain from giving and the inheritance size at the exemption of SEK 70,000, we estimate a regression kink design (RKD) model. We find a large and significant slope change in the probability to give at the threshold, which can be rationalized by a simple model, in which heirs have heterogeneous tastes for giving and experience different optimization frictions (fixed costs of giving). The estimated slope change is consistent with a simple numerical calibration where the average optimization friction is SEK 436 (USD 60). Hence, we conclude that optimization frictions are small in this environment.

Recent economics research suggests that people misperceive non-linear price schedules, see e.g., Liebman and Zeckhauser (2004) and Ito (2014). In the taxation literature, an analogous finding is that "ordinary people" – or middle class wage earners – typically do not bunch at convex kink points of the income tax schedule, where the marginal tax rate increases (Saez, 2010). This holds true also when the tax change at the kink is very large (Bastani and Selin, 2014), or when the policy response is salient in other respects (Søgaard, 2014). In our setting, we do indeed find that "ordinary people" optimize in a very precise fashion along a (fairly simple) piece-wise linear budget constraint. However, using a smaller data source containing information on expenses on legal advice, we find descriptive evidence suggesting that legal advice was an important determinant of the response. Legal advice was common, around 70 % in the relevant sample bought such services, and heirs hiring legal advisers were significantly more likely to make tax-favored gifts. Naturally, we cannot establish a causal effect of legal advisers on tax-favored gifts. Still, viewed from a broader perspective, we believe that the abundant supply of cheap tax planning advice could be considered as a market-level behavioral response to the tax rules.

2 Related literature

Our paper is related to a growing literature, which applies the bunching estimator on wealth and inheritance taxation. Using Swedish administrative data, Seim (2017) finds substantial bunching at the exemption level (kink point) of the Swedish wealth tax. Based on an extensive data analysis, he concludes that the estimated elasticities mainly represent reporting responses.[3] Glogowsky (2016) detects significant bunching at large convex kinks in the German inheritance and gift tax schedules, but the implied elasticities are small. Goupille-Lebret and Infante (2017) exploit notches (i.e., changes in average tax rates) in the French inheritance tax system to study the effect of inheritance taxation on capital accumulation.

Our study also connects to the literature on taxation and *inter vivos* giving. Several studies have documented that the timing of gifts is sensitive to taxation. For instance, Joulfaian (2004) notices that giving in 1976 was four times higher than in 1975, because people anticipated increases in the US top gift tax rates. After the tax increase, the number of gifts decreased again, and was then below their level in 1975. Ohlsson (2011) finds a similar pattern with respect to the Swedish inheritance and gift tax reform in 1948. Another important timing response concerns a parent's choice between *inter vivos* giving and bequests. When *inter vivos* gifts are preferentially treated by the tax law, people tend to substitute bequests for such gifts (Joulfaian, 2004; Bernheim et al., 2004; Nordblom and Ohlsson, 2006). Still, people make fewer gifts than they should for purely tax minimizing reasons.[4] Kopczuk (2013) interprets this phenomenon as evidence of people's reluctance to give up wealth and that they have motives to hold wealth that go beyond consumption. Since our setting is unique, we significantly contribute to this literature. In our setting, potential givers are exposed to a one-time only opportunity, and decisions are possibly more elaborate. Moreover, our data contain more information: we know more about the process in which gifts are decided on and the situation in which the gifts are made. For instance, we know who the potential beneficiaries are and thus,

[3] Jakobsen et al. (2018) argue that bunching estimates cannot be used to capture real responses to wealth taxation.

[4] In several countries with gift taxation, there is an annual exemption, meaning that people can make tax free gifts of up to that amount in each year. This, in turn, reduces inheritance taxation upon the donor's demise as the taxable estate is reduced through the gift. However, a number of studies focusing on the US (Joulfaian and McGarry, 2004; McGarry, 2000, 2001; Poterba, 2001) shows that this was not used to the extent one would expect from the point of view of tax minimization. For instance, Joulfaian and McGarry (2004) find that despite their potential to reduce tax liability, gifts were infrequent and only constituted about 10 percent of the value of the estates.

we also identify persons who did *not* receive the tax-favored gift.

3 Institutional setting

3.1 The inheritance tax

The Swedish inheritance tax, which was repealed in 2004, was a bequest based tax. Accordingly, the tax was not based on the value of the estate, but on the inheritances received by each heir. The tax law allowed the heir to reduce the taxable value of the inheritance by transferring parts (or all) of the received wealth through a gift, which we here refer to as a *tax-favored inter vivos gift*. For the gift to be tax-favored, it had to fulfill the following requirements:

- It had to be made at the same time as the estate division.
- The heir could only make it to his or her direct descendants, i.e., those who would have inherited in a hypothetical situation in which the transferring heir had been deceased.
- The heir had to make gifts of equal size to all children and not exclude any children.
- The heir had to make the gift without any preconditions.

If these requirements were fulfilled, the recipients of the gift were treated in the same way as the original heirs to the estate, meaning that the recipients paid taxes on the received wealth according the same inheritance tax schedule as the transferring heir.[5] The inheritance tax schedule was progressive. In our paper, we mainly focus on the first two brackets, which are given by the following expression:

[5]From an international perspective, these transfers are special because of the way in which they were treated by the tax law. In other countries, for instance the US, generation skipping transfers are instead subject to tax penalties. In Sweden, on the other hand, skipping one generation also means that the generation's tax payments are skipped. In addition, to make a gift of this kind under Swedish law implied that the parent's inheritance was divided into several smaller inheritances, which further reduced tax payments as the inheritance tax was progressive.

$$T(z) = \begin{cases} 0 & \text{if} \quad z < 70,000 \\ 0.1 \times (z - 70,000) & \phantom{\text{if}} \quad 70,000 \leq z < 370,000 \end{cases} \tag{1}$$

where z is the taxable inheritance and SEK 70,000 is the exemption level. At upper segments, the marginal inheritance tax rate was 0.2 up to SEK 670,000, and it was 0.3 for taxable inheritances exceeding SEK 670,000.[6] Regular gifts, which of course did not need to fulfill the above requirements, were subject to regular gift taxation. The gift tax schedule was identical to the inheritance tax schedule except for its exemption level, which was SEK 10,000, annually, rather than SEK 70,000. Hence, giving away newly inherited wealth was a one-time opportunity to make larger legal wealth transfers to children without paying any taxes.

The progressive inheritance tax created strong incentives for heirs to make the tax-favored *inter vivos* gifts. Consider, for instance, an heir with two children who inherits SEK 120,000. The tax on this inheritance is 10 percent of the amount exceeding the basic exemption of SEK 70,000, i.e., SEK 5,000. However, thanks to the tax-favored gifts, the heir could reduce her tax bill to zero by passing on SEK 25,000 to each child. The two children did not have to pay any taxes as they received less than the basic exemption.[7]

We have not been able to find any stated intention behind the policy, which strongly promoted *inter vivos* giving. Interestingly, the gifts are not explicitly regulated by law, but by custom and practice. Occasionally, the possibility of transferring inheritances has been subject to policy discussions (see Arvs- och gåvoskattekommittéen (1987)), and it was several times proposed that the possibility should be removed as it was a popular way of avoiding taxes. One argument in favor of the policy, however, was that the same allocation could, in principle, be achievable through wills written by the decedent.

[6]The kink points varied with the relationship between the decedent and heir. The reported schedule is valid for direct descendants of the decedent (children, grandchildren, etc.), which is our study population in this paper.

[7]Besides this immediate tax gain, the transfer may also reduce tax payments upon death of the heir, as the bequests he or she leaves will be of lower value because of the transfer. More examples of tax avoidance in this context can be found in Ohlsson (2007)

As mentioned, the Swedish inheritance tax on intergenerational transfers was repealed in December, 2004. The initiative came from the left-wing social democratic government. The repeal was first suggested and announced by the government on September 13, 2004, and later voted into law on December 17. The process was thus short. In fact, juridical expertise criticized the process and argued that the repeal was carried out too quickly.[8]

3.2 Writing the estate report and making the transfer

It was comparably easy to make the tax-favored gifts. The only requirement was that the heir stated the transfer in a signed document sent to the tax authority together with the estate report. The document was supposed to contain the name of the person making the transfer and the recipients, as well as the amount transferred.

As the gifts should be made when filing the estate report, it is useful to describe the process leading up to this, starting at the demise of the decedent. The first thing that has to be done when someone passes away is to form an estate inventory, listing all the assets and debts of the decedent at the time of death. Forming the inventory is obligatory and the tax authority requires that a report of the inventory (an estate report) is filed within three months of the decedent's demise. It is the responsibility of the heirs to file the report, but it may be administered by only one of the heirs. As we will show below in Section 9, it was also common to buy administrative help from a lawyer, a mortician or someone else chosen by the heirs. We refer to such third-parties as *legal advisers*.

Besides the administrator, two estate executors are required to establish the report. The executors may not themselves be heirs to the estate. When the inventory is established, a meeting is held, at which all heirs to the estate are informed of its assets and debts.[9] A report of the estate inventory is then signed by the administrator and

[8] See comments to the Government Bill, Prop. 2004/05:25. The inheritance tax on spousal bequests was abolished on January 1, 2004, also at short notice. See Escobar (2017) and Elinder et al. (2014) for details.

[9] All heirs were to be invited to this meeting. If some heirs were unable to attend, they would have to provide a signed note verifying that they were invited to the meeting.

estate executors, and sent to the tax authority. If there is any written will, or a marital agreement affecting the estate, these are to be sent in together with the report.

Even though it was efficient and seemingly easy to carry out, reducing the tax payment was not costless. It required that the heir made two trade-offs. The first is shared with other tax planning strategies that involve giving: the trade-off between tax minimization and keeping control over wealth. The second trade-off is more specific to this setting and is due to the requirements that the transfer had to fulfill to receive beneficial tax treatment. For instance, the requirements implied that the heir could not make the transfer to whomever he or she wanted, this was restricted to direct heirs. Neither could the heir exclude a direct heir, nor discriminate between them with respect to the size of the transfers. Thus, for an heir who had strong preferences to distribute the wealth unequally between his or her children, or strong preferences on how the transfer should be used by the recipients, it may have been better to transfer the wealth through regular gifts, and pay the gift taxes. In practice, informal gifts were probably also common: parents could e.g., buy a car and let their children use it. However, when tax minimizing, it was usually better for a parent to make a tax-favored gift rather than an informal gift, as the informal gift did not reduce the parent's inheritance tax.

It is not clear to what extent the Swedish tax authority verified that the transactions were actually made. We cannot exclude that some parents just stated the gifts in the estate report but never implemented them. To obtain a view on this issue, we exploited administrative data on wealth for those receiving tax-favored gifts, the year before and the year after the transaction was supposed to be made. There is a surprisingly high correlation between the size of the gift and the change in the children's wealth, even after controlling for the size of the inheritance. A gift of 1 SEK is associated with a 0.57 SEK increase in wealth.[10] Our interpretation is that most children did actually receive

[10] This exercise is influenced by Nekoei and Seim (2018), Appendix Figure A.2. In Figure E2 of Appendix E, we visualize the correlation between the change in the child's wealth and the size of the gift. The regression in Table E2 confirms this positive relationship and additionally shows that it is not driven by any inheritance received directly from the decedent or initial differences in wealth. We do not expect the association to be 1 to 1. First, bank holdings are imperfectly measured. Second, children may, of course, consume the gift immediately.

the self-reported gifts.

4 Data

The study requires extensive and detailed data on inheritances, heirs and the heirs' use of tax-favored gifts. We obtain these data from the Belinda database, which is extensively described by Elinder et al. (2014). The database is unique in both its coverage and level of detail. It was collected by the Swedish tax agency and covers the universe of estate reports in Sweden over the period 2002–2004. It was obligatory to file an estate report to the tax authority for the assessment of the inheritance tax.

The database provides us with information from the estate report on how much each heir inherited, the heir's relationship to the decedent and whether or not the estate included a will, beneficiaries to insurance policies, etc. Most importantly, it tells us whether or not the heirs made gifts out of their received inheritances and, if so, to whom and how much. This allows us to create variables on the amount given by an heir, the gross inheritance (inheritance before the tax-favored gifts had been made) and the taxable inheritance (the inheritance after the tax-favored gifts had been made). By linking the database to other administrative registers, we also observe various demographic characteristics of the decedents, the heirs and the heirs' children.

A few restrictions on the full population of heirs are required to make the analysis. First, as the Swedish inheritance tax schedule depends on the relationship between the decedent and the heir, we restrict our attention to individuals who inherit their parents. Second, to ensure that all individuals who receive the gifts, from the heirs, face the same tax schedule, we also restrict the population to heirs (children of the decedents) who themselves have children.[11] Third, we restrict the population to heirs who received positive inheritances, as heirs inheriting zero cannot make the tax-favored gifts. The restrictions leave 71,694 heirs.

To make the budget constraints more comparable, in our main analysis, we focus on

[11]This restriction will, however, be relaxed in Section 9 when studying sibling correlations.

heirs receiving inheritances of a value in the range SEK 1–140,000. This leaves 54,514 individuals who have inherited their parents.[12] The focus is not restrictive, but covers a large share of the inheritance distribution. In Table E1 of Appendix E, we see that compared to the full distribution of inheriting children, the individuals on which we focus have slightly lower incomes and wealth, but are close to identical in the degree of self employment, their gender, age and the extent to which they are married and have children. The average wealth in this group should also be compared to the average wealth of the adult population at large, SEK 460,000, and of the average 53 year old, SEK 593,000. The comparisons show that individuals receiving an inheritance of about the taxable exemption are not exceptionally rich, but rather "ordinary people".[13]

5 Model framework

In this section, we present a simple model framework, which aims at explaining the individual's choice to give. Guided by what is empirically observable, we model it as a choice between tax-favored gifts and consumption, with consumption broadly defined to include all the individual's other expenditures. Other expenditures may include other forms of gifts, which means that our results can be interpreted as a gift elasticity capturing both real responses (children get larger transfers than they otherwise would) and avoidance responses (parents substitute informal gifts with tax-favored gifts). Since informal wealth transfers are inherently difficult to observe, this problem is not unique to our study, but applies to the literature on *inter vivos* gifts at large.

5.1 Heterogeneity, preferences and budget constraint

We consider a highly stylized model economy in which agents (heirs) differ in three dimensions: the preference for giving to the children, θ, the gross inheritance received,

[12]In total, there are 104,802 people receiving positive inheritances from their parents during the period studied, meaning that our main focus is on about half of them.

[13]Averages in 2003, based on own calculations.

I, and a fixed cost of making the transfer, γ (optimization friction).[14] These arbitrarily correlated heterogeneity parameters are smoothly distributed in the population, which is normalized to unity. We model the heir's choice in the simplest possible way, as a choice between own consumption and the children's consumption. In Appendix A we explain our model in detail, but here we focus on the empirically relevant scenario, in which children do not pay any tax on the gift.[15] In this scenario, the heir chooses between own consumption, c, and the tax-favored gift, A, and the before-tax and after-tax gift coincide. Following the literature on warm-glow giving, heirs derive a positive utility from both own consumption and after-tax gifts, see, e.g., Laitner (1997) for an overview. Since the transfer had to be split equally across children, each child consumes $\frac{A}{J}$, where J is the number of children. For tractability, we assume that the children's utility functions are identical. For our purposes, a convenient way of representing preferences is the following:

$$U = c + \theta J \frac{\left(\frac{A}{J}\right)^{1-\frac{1}{\varepsilon}}}{1-\frac{1}{\varepsilon}}. \tag{2}$$

The quasi-linear specification might *ex ante* be thought of as unrealistic, but is not a limitation in the current application, as our empirical method only recovers the compensated price response.[16] Heirs maximize (2) subject to

$$c = I - A - T(I - A) - \gamma \cdot \mathbb{1}_{A>0}, \tag{3}$$

where $T(I - A)$ is the *piece-wise linear* inheritance tax function. Depending on the size of the gross inheritance, I, different individuals will face different budget constraints in

[14] In similarity with the literature on labor supply and taxation, see, e.g., Kleven and Kreiner (2006), we will make a distinction between the intensive and extensive margins of giving, where the latter arise due to fixed costs. Selin and Simula (2017) studied an optimal tax model with fixed and variable costs of tax planning (income shifting).

[15] In our main empirical analysis, we restrict our sample to heirs receiving gross inheritances below SEK 140,000. For the majority of heirs, who had two or more children, the children would never have to pay any taxes on the gift, because the equally sized gifts could never exceed the basic exemption of SEK 70,000.

[16] Using numerical simulations, Bastani and Selin (2014) showed in a taxable income context that the bunching estimator recovers the compensated elasticity also when there is a significant curvature in the utility of consumption and the kink is large. In Appendix A we allow for a curvature in the utility of consumption.

the $c - A$ space. A typical budget constraint for someone receiving a gross inheritance larger than the basic exemption of SEK 70,000 is shown in Figure 2. It contains two segments and one *kink point*. If an heir chooses not to make a gift, her own consumption amounts to $I - T(I)$. If the heir instead chooses to make a gift, her tax liability becomes $T(I - A)$. The relative price of A to c is $1 - t_1 = 0.9$ for the first units of A. However, at k the tax price changes discontinuously. Accordingly, for units of A exceeding k, the tax price is $1 - t_0 = 1$.

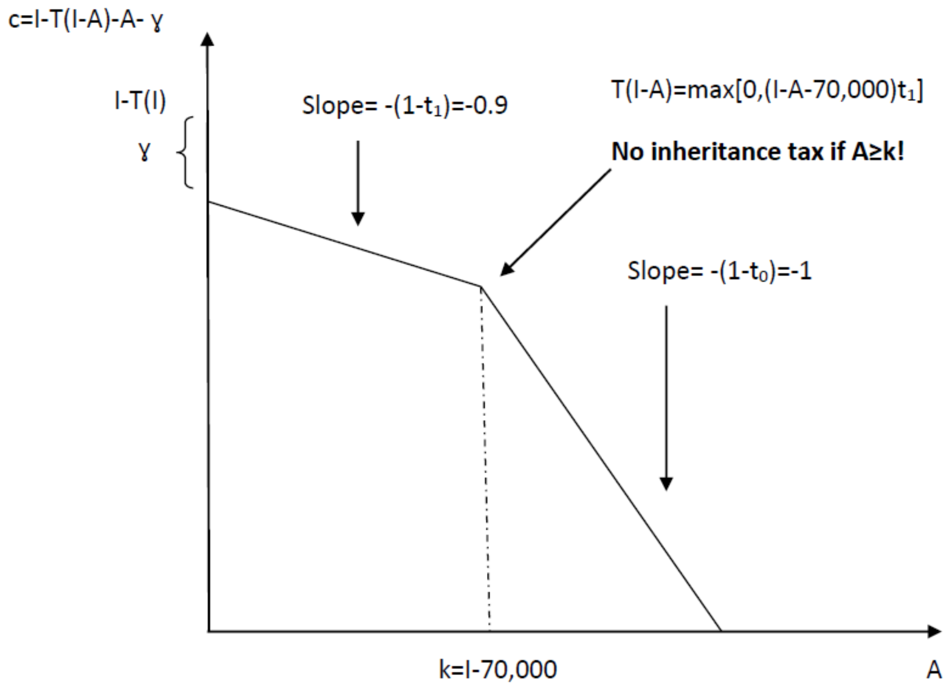


Figure 2: The budget constraint of a parent with at least two children when the gross inheritance falls in the range of SEK 70,000 to SEK 140,000.

5.2 The intensive margin response

Individuals who choose to make a gift set $A^* = [\frac{1-t_1}{\theta}]^{-\varepsilon} J$ if the optimum is on the first segment, $A^* = k$ if the optimum is at the kink and $A^* = [\frac{1-t_0}{\theta}]^{-\varepsilon} J$ if the optimum is on the second segment. The (compensated) elasticity at an interior of a segment is $-\frac{\log A^*}{\log(1-t_1)} = \varepsilon$. When ε is low (high), the indifference curves are curved (flat). Saez

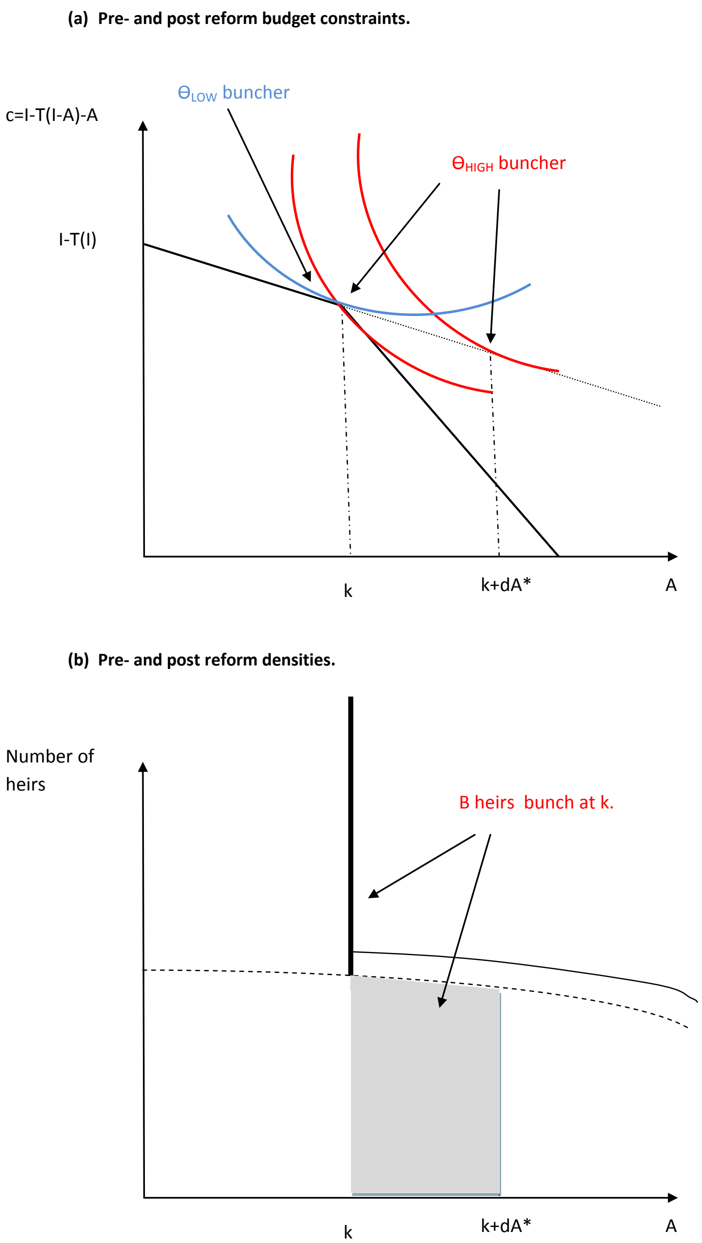


Figure 3: Bunching graph (hypothetical reform)

(2010) showed that the number of agents who bunch is proportional to the compensated elasticity. The intuition is contained in Figure 3. Under a hypothetical linear inheritance tax schedule with a constant slope $-(1-t_1)$, gifts $A(\theta)$ will be smoothly distributed in the population (as θ is smoothly distributed). In the hypothetical scenario when a convex kink is introduced at k, a certain number of agents, B, with values of θ between θ_{LOW} and θ_{HIGH}, will find it optimal to locate at k. When the kink is small, the number of agents who bunch is $B = \tilde{g}(k)dA^*$, where $\tilde{g}(k)$ is the counterfactual density at k, i.e., the density in the absence of a kink. The distribution to the right of k will be transformed, and a spike will occur at k. With an estimate of $\tilde{g}(k)$, the elasticity can be recovered using the following formula

$$\varepsilon = -\frac{b}{\left(\frac{dp}{p}\right) \times k}, \tag{4}$$

where $b = \frac{B}{\tilde{g}(k)}$ is the *excess mass* at k. Hence, the key challenge is to estimate the counterfactual density at k.[17] We further discuss estimation issues below in Section 6.1.

5.3 The extensive margin response

First we consider a setting without frictions, i.e., $\gamma = 0$ for everyone. When the budget set is convex, as in Figure 2 with $\gamma = 0$, the price of giving is the lowest on the first segment. Accordingly, since the utility function is well-behaved, an heir chooses to give a positive amount of A if and only if the marginal rate of substitution of A to c at $A = 0$ exceeds the *first-dollar tax price*, $1-t_1$.[18] In our model, this is equivalent to having drawn a sufficiently large value of θ. Note that the first-dollar tax price changes discontinuously as a function of I at the basic exemption: heirs receiving gross inheritances just below SEK 70,000 face a first-dollar tax price of $1 - t_0 = 1$, whereas heirs receiving I just above SEK 70,000 face a first-dollar tax price of $1 - t_1 = 0.9$. In a frictionless environment, we

[17] For large kinks, equation (4) only offers an approximation. Saez (2010) derives an analytical expression for the elasticity under the assumption that the underlying preference distribution takes on a trapezoid shape. In our setting, these issues are of small importance, because we will observe a very large bunching at the kink.

[18] In the context of female labor supply, Hausman (1980) discusses the conditions under which the slope of the budget constraint at zero hours determines the extensive margin response and the role of fixed costs.

therefore expect a *level shift* in the probability to give at I =70,000. Its magnitude will be determined by the underlying preference distribution.

In reality, such a jump in the probability to give is unlikely due to *optimization frictions*, which we now allow for. Following Chetty (2012) and Kleven and Waseem (2013), we model the optimization friction as a fixed cost of adjusting to a frictionless optimum. In the presence of fixed costs, the extensive margin response, locally around the exemption level, is no longer determined by the first-dollar tax price. The key issue now, from the heir's viewpoint, is whether or not the *tax gain* from giving is sufficiently large to outweigh the loss in own consumption and the fixed cost. Consider an heir receiving a gross inheritance of $I = 71,000$. Since the inheritance tax rate in the first bracket is $t_1 = 0.1$, the maximum financial gain from giving away wealth is SEK 100 (appr. 14 USD). Clearly, this heir must draw an extremely low value of the fixed cost to find it optimal to give. As I increases, the incentive to give also increases. Accordingly, while the first-dollar tax price changes discontinuously in its *level* at 70,000, the tax gain from giving changes discontinuously in its *first derivative* at 70,000. Therefore, we expect a *slope change* in the probability to give at SEK 70,000, and the magnitude of the response will depend on the distribution of fixed costs. If a large number of individuals are indifferent between giving and not giving at small values of the tax gain, the slope change will be large and vice versa.[19] Figure 4 shows the first-dollar tax price and tax gain as functions of the gross inheritance locally around SEK 70,000.

6 The intensive margin: empirical strategy and findings

In this section, we focus on heirs who received gross inheritances in the range SEK 70,000–140,000 and have at least one child. At this part of the gross inheritance distribution, all heirs not making tax-favored gifts were liable for the inheritance tax. However, all heirs in this range also had the possibility to completely avoid inheritance taxes by giving away newly received wealth so that the heir's net inheritance was less or equal to

[19] In Appendix A we write down these conditions more precisely. Typically, the slope change in $Pr(A > 0|I)$ will depend on both the fixed cost and the preference distribution.

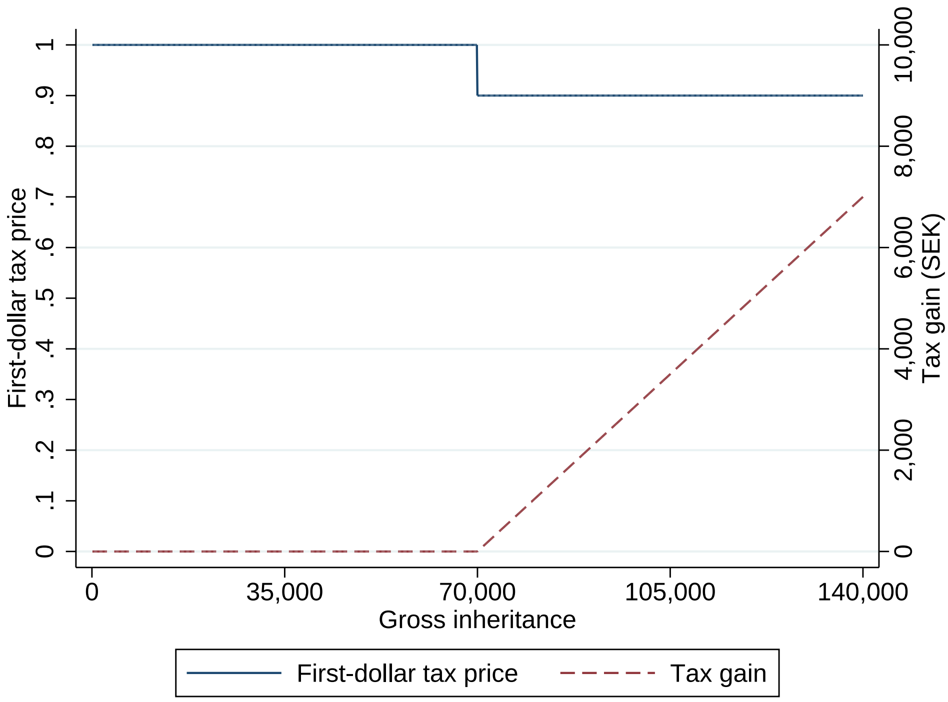


Figure 4: The extensive margin incentives. The figure shows the change in tax gain and first-dollar tax price at the taxable exemption of SEK 70,000.

SEK 70,000, which was the basic exemption.

6.1 Empirical strategy

A non-standard feature of our setting is that parents actually face different budget constraints in the $c - A$ plane, since gross inheritances, I, differ.[20] To illustrate this: If an heir's gross inheritance is SEK 100,000, the kink point in units of A will be at SEK 30,000. However, if an heir's gross inheritance is instead SEK 130,000, the kink point will be located at SEK 60,000. We will pool individuals with different gross inheritances in the range SEK 70,000 to SEK 140,000 for the years 2002–2004. During these years, the tax schedule was fixed in nominal terms.[21] We construct histograms by normalizing the amount given such that $k = 0$ for everyone. Hence, if people transfer wealth up to the kink, we should observe a spike at zero. We remove individuals who give nothing to focus on the intensive margin.

We estimate counterfactual densities using the estimation approach suggested by Chetty et al. (2011), which has now become a standard tool in empirical public finance. The data on tax-favored gifts made by heirs with gross inheritances in the range SEK 70,000 to SEK 140,000 are collapsed into bins of the width 1,000 SEK. Bin q has midpoint A_q, and the density distribution is normalized in such a way that $A_0 = k = 0$. On the binned data, we estimate the counterfactual distribution by fitting a polynomial to the observed distribution, while excluding a region around the kink. As the kink is normalized to be zero, the excluded region is in the range $q \in [-R_-, R_+]$. The excluded region is chosen based on visual inspection, and it is allowed to be asymmetric around the kink. Ideally, the excluded region should be chosen so as to capture exactly those

[20] More generally, the number of children, J, is also an important determinant of the budget constraints. However, this is of less importance in the main analysis, where we restrict the sample to heirs receiving up to SEK 140,000 in gross inheritance. The number of children does, however, affect the incentives to give away the heir's entire inheritance. An heir with a gross inheritance of SEK 100,000 and one child would reach the child's exemption at SEK 70,000. An heir with the same gross inheritance but with *two* children gives SEK 50,000 to each child. Accordingly, the heir with two children may give away the entire inheritance, while the dynasty is paying an inheritance tax of zero.

[21] We do not adjust for inflation when pooling the different years of data. During this time period, inflation was low in Sweden. The yearly inflation rates were 2.2 % in 2002, 1.9 % in 2003 and 0.4 % in 2004 according to Statistics Sweden.

individuals bunching. The number of individuals in bin q is given by the regression:

$$C_q = \sum_{i=0}^{s} \beta_i A_q^i + \sum_{i=-R_-}^{R_+} \delta_i \times \mathbb{1}_{q=i} + \eta_q \tag{5}$$

where the first term on the right-hand side is a s:th degree polynomial in A_q. In the baseline estimations, we use a 7th order polynomial. $\mathbb{1}_{q=i}$ is a dummy variable, which takes the value of 1 if bin q with midpoint A_q is part of the excluded region, and η_q is an error term.

The number of individuals who bunch at the kink, B, can be estimated as $\hat{B} = \sum_{-R_-}^{R_+}(C_q - \widehat{C_q})$, where C_q is the actual number of individuals in bin q and $\widehat{C_q}$ is the estimated counterfactual density in bin q. The excess mass, $b = \frac{B}{\bar{g}(k)}$, can be estimated as

$$\hat{b} = \frac{\hat{B}}{\sum_{j=-R_-}^{R_+} \frac{\widehat{C}_j}{R_- + R_+ + 1}} \tag{6}$$

Following Chetty et al. (2011), standard errors are bootstrapped on the binned data. To arrive at an elasticity estimate, we simply plug (6) into (4). Importantly, when evaluating the elasticity, we do no longer normalize k to be zero. Instead, we evaluate the elasticity at the average value of k in the sample, expressed in units of SEK 1,000.

6.2 Bunching: evidence and interpretation

Figure 5 shows the excess mass estimate, its bootstrapped standard error, and the implied elasticity.[22] The following features of the graph are striking:

Large bunching at the kink point. We see that most heirs, who choose to make the gifts, transfer wealth such that their taxable inheritances amount to the basic exemption, i.e., SEK 70,000. In regions further away from the kink, the density is small.[23]

[22] In Figure 5 we use a symmetric excluded region with $R_- = R_+ = \frac{SEK5000}{SEK1000}$. However, given the asymmetry around the kink, we also experimented with asymmetric excluded regions, $R_- = 1$ and $R_+ = 7$. The results were quite similar.

[23] The low density far to the left of the kink is, however, an artifact of how we construct the graph and lacks any economic meaning. Since we normalize the budget constraints such that $k = 0$ for everyone, only heirs with a gross inheritance close to SEK 140,000 could possibly locate far out to the left.

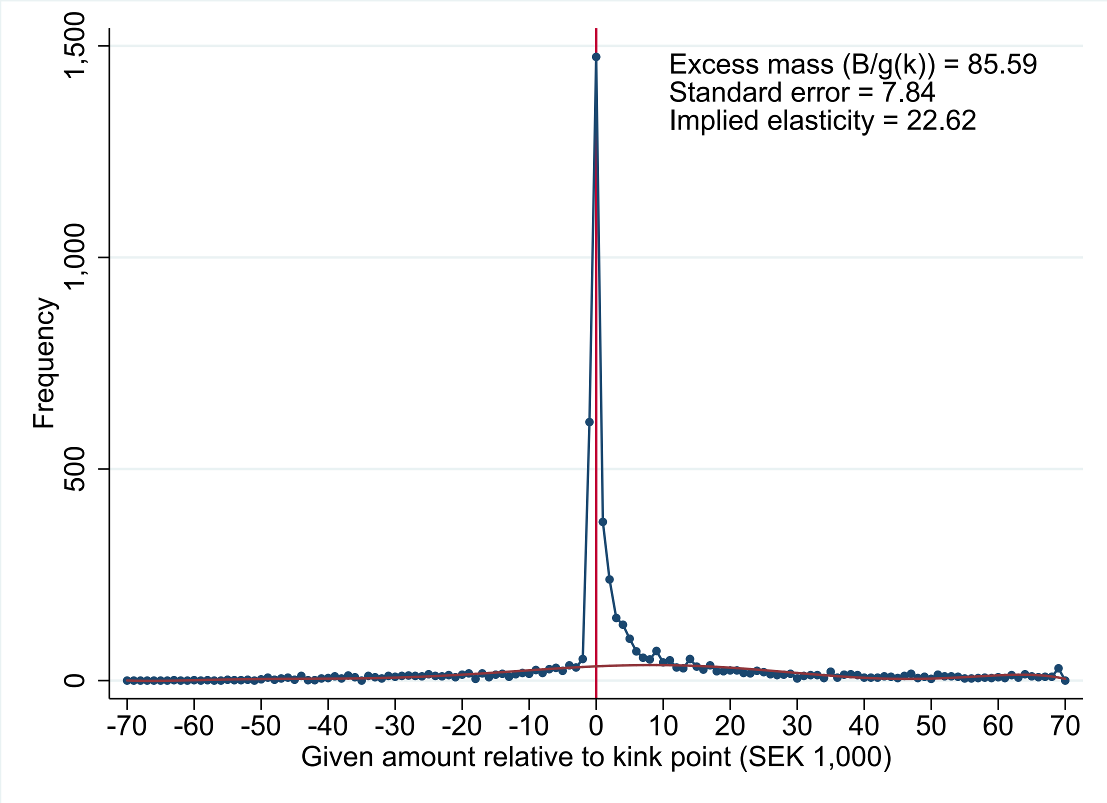


Figure 5: Intensive margin elasticity. The figure shows the distribution and estimated counterfactual distribution of gifts. The distributions are normalized so that 0 implies that an individual has given exactly the tax minimizing amount. The elasticity is estimated on heirs receiving gross inheritances of SEK 70,000$< I <$140,000, using a binsize of SEK 1,000.

A situation where agents exclusively choose to locate at corners of the budget constraint corresponds to perfect substitutability between the transfer, A, and other uses, c, and a tax price elasticity approaching infinity. We compute an elasticity of around 23.

Bunching is precise. Clearly, we observe a spike, i.e., a huge excess mass *exactly* occurring at the kink. Accordingly, in contrast to, e.g., the labor supply context, optimization frictions do not seem to matter to any large extent at the intensive margin: heirs who make the gifts seem to be fully aware of the tax code. In Section 7 we will discuss the role of optimization frictions for extensive margin behavior. The large and precise response contrasts bunching estimates obtained in labor market contexts, see, e.g., Kosonen and Matikka (2017) for notches and Søgaard (2014) for kinks.

Bunching is asymmetric to the right. Few heirs locate at a distance more than SEK 1,000 to the left of the kink. Accordingly, few heirs have to pay the inheritance tax after having made the tax-favored gift. On the other hand, there is a hump to the right of the kink. This extra mass, located just to the right of the kink, should not necessarily be interpreted as a consequence of optimization errors. Remember that, to the right of the kink, the inheritance tax liability is zero regardless of how much the parent transfers.[24] An heir who just wants to minimize tax payments, and is indifferent between A and c, is indifferent between $A = k$ and $A > k$. Still, the fact that a vast majority of heirs bunch exactly at k strongly indicates that people in general are *not* indifferent between A and c: heirs prefer keeping control over their wealth, otherwise they would not mind giving away more.

7 The extensive margin: empirical strategy and findings

About half of the heirs we study do *not* make tax-favored gifts, despite the financial incentive to do so. In this section, we study the extensive margin and how it depends on taxes.

[24]For heirs with one child only, an additional kink emerges in the budget set at SEK A=70,000, because at that point the child reaches the basic exemption and becomes liable for the inheritance tax.

7.1 Graphical evidence

The incentive to make tax-favored gifts depends on the gross inheritance. If the gross inheritance, I, is lower than the basic exemption, SEK 70,000, the inheritance tax is zero no matter what, and the inheritance tax bill does not depend on the gift, A.[25] If, on the other hand, the gross inheritance is, say SEK 71,000, the heir can make a small financial gain of SEK 100 from a transfer. The financial gain from making that transfer monotonically increases in I. In this section, we consider I as being a forcing variable, which assigns heirs to treatment and non-treatment at SEK 70,000. As we elaborated on in Section 5.3, the nature of the incentive change depends on whether optimization frictions are present or not. In a frictionless environment, the first-dollar tax price is the relevant incentive variable, and its *level* decreases discontinuously at SEK 70,000. By contrast, in an environment with frictions (modeled as fixed costs of making the transfer) the financial gain is the relevant incentive variable – its *slope* changes discontinuously at SEK 70,000.

To begin with, we examine the discontinuity graphically. In Figure 6 we plot the share making tax-favored gifts on the gross inheritance.[26] We draw the following tentative conclusions from the figure:

Visually, there is a slope shift in the outcome at the discontinuity. The probability to make a tax-favored gift is positive, but small, to the left of SEK 70,000. Heirs to the left SEK 70,000 were probably doing tax planning to avoid the gift tax. At SEK 70,000, the slope of the giving probability increases dramatically.

Fixed costs exist, but do not seem to be large. The slope in the giving probability is very steep to the right of the basic exemption. Interestingly, the response function has a concave shape. The giving probability stabilizes already at approximately SEK 20,000 to the right of the exemption level.

A substantial proportion of heirs with incentives to give do not give. When

[25] Heirs receiving $I <$ SEK 70,000 still have some incentives to make tax-favored gifts if they want to transfer newly inherited money to children in a legal way. Gifts exceeding SEK 10,000 were subject to gift taxation.

[26] We have chosen optimal binsize as determined by the integrated means squared error (IMSE) approach of Calonico et al. (2015).

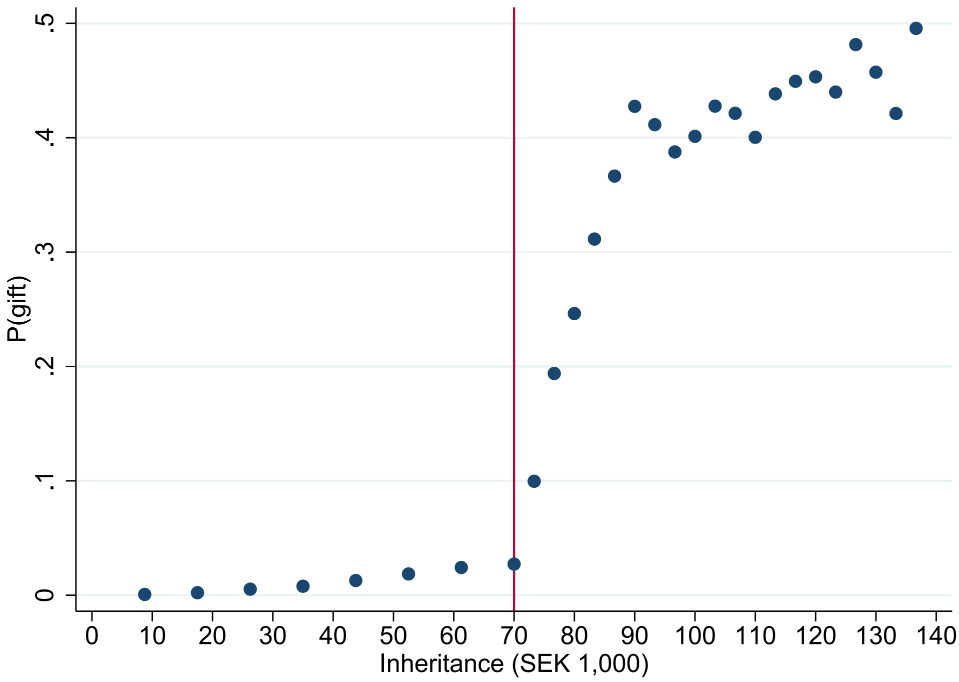


Figure 6: Extensive margin. The figure shows the relationship between the probability to give and gross inheritance. The vertical line indicates the taxable exemption of SEK 70,000. Binsize selected following the integrated means squared error (IMSE) approach of Calonico et al. (2015).

we look at heirs receiving around SEK 140,000, who may gain SEK 7,000 from making the tax-favored gift, we see that the average giving probability is around 0.5.

7.2 The slope shift: a Regression Kink Design (RKD)

We now explore the slope shift of Figure 6 in more formal terms. We want to estimate the following derivative locally at I=70,000:

$$\frac{\partial Pr(A>0)|I)}{\partial \tau(I)} = \int_{\theta} f[\theta, \tilde{\gamma}(I,\theta)|I]d\theta, \tag{7}$$

where $\tau(I) = t_1 \times (I - k_1)$ is the tax gain from making the transfer (illustrated in Figure 4 above). $f[\theta, \tilde{\gamma}(I,\theta)|I]$ is the joint density of θ and γ conditional on I, evaluated at $\tilde{\gamma}(I,\theta)$, i.e., the threshold value of γ at which an individual is indifferent between giving and not giving. Hence, the RKD estimate will reflect the number of individuals who are indifferent between giving and not giving at small values of the tax gain (averaged over the preference parameter).[27]

Suppose that it is random whether the gross inheritance, I, falls just to the left or the right of SEK 70,000. If so, a Regression Kink Design (RKD) can identify a local treatment effect by comparing the magnitude of a kink in the treatment variable and the induced kink in the outcome variable (Nielsen et al., 2010).[28] Our RKD estimand of (7) can be written:

$$\left.\frac{\partial Pr(A>0)}{\partial \tau(I)}\right|_{I=70,000} = \frac{\lim\limits_{I\to 70,000^+} \dfrac{\partial Pr(A>1|I)}{\partial I} - \lim\limits_{I\to 70,000^-} \dfrac{\partial Pr(A>0|I)}{\partial I}}{\lim\limits_{I\to 70,000^+} \dfrac{\partial \tau(I)}{\partial I} - \lim\limits_{I\to 70,000^-} \dfrac{\partial \tau(I)}{\partial I}}, \tag{8}$$

[27] If one considers substitution between gifts subject to the gift tax and tax-favored gifts, there is a tax gain also to the left of SEK 70,000. This incentive explains the positive mass to the left of the kink in Figure 6. In our formal derivations, we do not consider this margin, because it does not fundamentally affect the interpretation of the RKD estimate. The slope change in the tax gain is nevertheless the same. (The level of the tax gain at I would, however, be important when evaluating elasticities.)

[28] It is not common to use RKD when estimating extensive margin responses to taxes. Gelber et al. (2017), who study extensive margin labor supply responses around the exemption level of the social security earnings test, is an exception.

where the numerator is estimated by separate local linear regressions to the left and to the right of SEK 70,000, weighted with a triangular kernel. We choose the bandwidth following the algorithm developed by Calonico et al. (2014), which trade-offs bias against variance.

As shown by Card et al. (2015), there are two key assumptions that must be fulfilled for causal identification with a regression kink design. Translated into our setting, the first assumption requires that there is no change in the relationship between the first derivative in the probability to give and the gross inheritance received that is not related to the change in the tax gain, at the kink point of SEK 70,000. We test for this assumption by applying the RKD specification on a number of predetermined characteristics, see Appendix B. The second assumption requires that the distribution of gross inheritances received is smooth at the threshold. The sufficient condition is that the *partial derivative* of the density function with respect to inheritances is continuous at the kink. Following Card et al. (2015), we test for the continuity of the first derivative of the pdf, and it turns out that we cannot reject the null hypothesis of no change in derivative at the kink. We refer the reader to Appendix B for further details and graphical exposition.

As was to be expected from Figure 6, we find that a SEK 100 (USD 14) increase in the tax gain increases the probability of giving by 2.87 percentage points (std error of 0.472), using a bandwidth of SEK 16,722 (see Figure E1 of Appendix E for details). It is a large and statistically significant response, meaning that a large number of heirs faced very low fixed costs of optimizing.

7.3 The level shift and frictions: a simple calibration

The estimated slope shift provides valuable information on the distribution of optimization frictions locally around I=70,000. However, the frictionless policy response is arguably more interesting, i.e., the response we would hypothetically observe in the absence of frictions. Needless to say, in the presence of frictions, we cannot identify this level shift through credible causal inference. To make progress, we impose structure on the heterogeneity parameters θ and γ, and we calibrate the two-good model of Section 5 to match the observed response function of Figure 6. In a minimalistic spirit, we assume that all three heterogeneity parameters are independently and uniformly distributed. We let $\theta \sim \mathcal{U}(0.8, 1)$ and $\gamma \sim \mathcal{U}(0, \bar{\gamma})$. Moreover, we let $I \sim \mathcal{U}(0, 140000)$, and we generate 100,000 observations in this interval. The tax gain is given by $\tau(I) = t_1 \times (I - k_1) = 0.1 \times (I - 70,000)$. Since we estimated a very large intensive margin elasticity in Section 6.2, we now consider A as being infinitely price elastic. When $\epsilon \to \infty$ the utility function of equation (2) becomes linear in both arguments. We let a simple algorithm find the optimal values of A^*. In Appendix A, we derive a closed form expression for $Pr(A > 0|I)$ for uniform distributions and linear utility, see equation (A.16). Using this expression, we solve for the $\bar{\gamma}$ that generates the estimated slope change at SEK 70,000.

In Figure 7 we graph both the observed $Pr(A > 0|I)$ and the simulated $Pr(A > 0|I)$ as functions of I. It is striking that the chosen parameterization generates a concave function, which is close to the observed one. Since θ is uniformly distributed between 0.8 and 1, and the first-dollar tax price is lowered from 1 to 0.9 at SEK 70,000, the frictionless response at the discontinuity is a jump by 50 percentage points (from zero). The average (and median) friction is low, SEK 436 (USD 60). Naturally, this simple calibration exercise can be improved in a number of ways. Ultimately, an estimate of the frictionless response will, however, rely on strong distributional assumptions. The aim of this subsection was to illustrate that the observed concave function can be replicated using a simple parameterization.

8 Tax base elasticities and implications for tax revenues

As already mentioned in Section 1, we have also estimated the tax base elasticity locally around the exemption level. Adopting a standard bunching methodology, we estimated a significant tax base elasticity of 1.53 (see Appendix C1 for details). But what about the two upper kinks at SEK 370,000 and SEK 670,000? Needless to say, the inheritance distribution is thinner when moving further up in the distribution, and it is more difficult

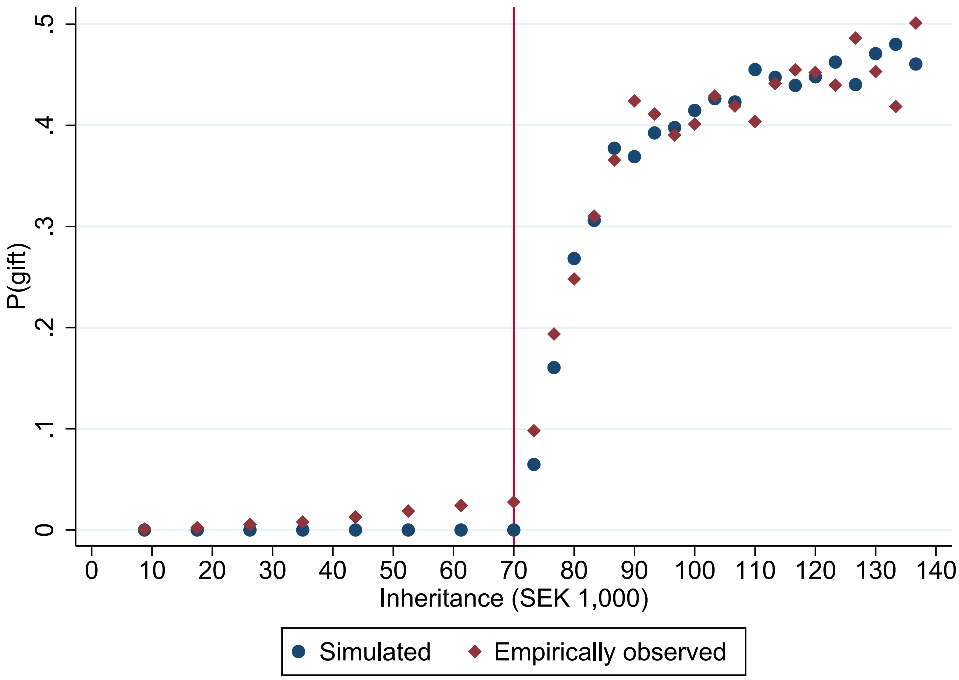


Figure 7: Simulated and empirical observed extensive margin responses. Relationship between both the observed and simulated probabilities to give and the gross inheritance. The vertical line indicates the taxable exemption of SEK 70,000. The empirically observed probabilities are identical to those of Figure 6.

to achieve statistical precision there. Still, at the SEK 370,000 kink, we estimated a significant elasticity of 0.34. This point estimate is indeed lower than the estimate at SEK 70,000. The two estimates are not fully comparable, however, because heirs inheriting more than 370,000 face more kinks than the heirs in the main analysis. They may, e.g., make tax-favored gifts up to the children's basic exemption of SEK 70,000.

How much tax revenues were lost due to the tax-favored gifts? We examined this issue by comparing actual revenues collected with the revenues that would have been collected if the gifts had not been made. We found that a substantial share of tax revenues, 31 %, were lost due to tax-favored gifts. We made these calculations for the entire population of heirs who were eligible for tax-favored gifts, including heirs receiving large inheritances.

9 Understanding the mechanism

9.1 Co-ordination within families

To learn more about the mechanisms determining the use of tax-favored gifts, we first study the role of co-ordination within groups of siblings. This is of first-order interest, because siblings inherit the same decedent, typically receive the same amount and file a joint estate report (Erixson and Ohlsson, 2014). We also find that siblings appear to coordinate giving.[29]

Figure 8 compares the distribution of individual heirs' taxable inheritances and the distribution of *average* taxable inheritances in the family. The "family" includes all siblings with children. The population of heirs in the graph is restricted so that gross inheritances received by siblings within a family are the same, meaning that any difference between the distributions depends on differences in the siblings' decision to give. If all

[29] When some people are inequity averse, equitable equilibrium outcomes may emerge in many economic environments (Fehr and Schmidt, 1999). We examined if there are more "equal division puzzles" in our data. We checked if there was a propensity of people receiving gross inheritances below SEK 70,000, who were unaffected by taxes, to split the inheritance equally with the children. The hypothesis was that a heir with one child receiving, say SEK 50,000, would transfer SEK 25,000 to the child. We found no evidence of such behavior in our data.

siblings transferred the same total wealth to their children, the two distributions would be identical. From the figure, we see that the distributions are similar, with the peak at SEK 70,000 being only slightly lower for the average inheritances than the individual inheritances. Accordingly, Figure 8 provides graphical evidence of a strong sibling correlation in giving behavior.

To study the correlations along the intensive and the extensive margins separately and put numerical values on them, we estimate the sibling correlation in probabilities to make gifts, and to give to the minimum tax minimizing amount. We construct the estimates of the sibling correlation using the between and within family variation, obtained using a mixed-effect logistic regression. The estimation is described in more detail in Appendix D. The results, presented in Table 1, show that the sibling correlation in the probability to give is 0.85 and the probability to give the tax minimizing amount is 0.88. This confirms that the giving behavior is strongly correlated within sibling groups.

9.2 The importance of legal advisers

We emphasized in Section 3.2 that it was common to hire legal advice when filing the estate report. The adviser could, e.g., be a lawyer, or a mortician. We lack data on such expenses in the population-wide data. Fortunately, there is a smaller data source on estate reports, unique in its level of detail, which contains information on the assets and debts of the estate and, most importantly, on the expenses for professional help to establish the estate report. The latter were deductible from the estate. The data are obtained from a random sample covering 3 percent of the estate reports in 2004 (approximately 3,000 reports). 546 heirs remain after imposing our sample restrictions,[30] 70 % of whom hired legal advice.

The observations are too few to perform RKD or a bunching analysis. Still, the sample is sufficiently large to be informative on the significant correlation between the probability to give and the probability to hire an adviser. Figure 9 shows that the

[30] The gross inheritance received must be positive but less than SEK 140,000, and the heir must have children.

Table 1: Sibling correlations

	Pr(give)	Pr(bunch)
Sample sibling correlation	0.85 (0.01)	0.88 (0.01)

Note: Standard error in parenthesis. Estimates obtained using a latent linear response model. For details see Appendix D. The number of observations in the estimation is 25,733.

transfers were much more common among heirs who had help from a legal adviser. A simple comparison between groups suggests that those who hired an adviser were 3 times more likely to make a tax-favored gift than others.

The advisers were available at a moderate cost. The average cost per estate was SEK 4,000 (USD 480), which implies that the average cost per heir was about SEK 2,300 (USD 270).[31] Even though the cost was moderate, the expense was often larger than the potential tax gain from giving. Clearly, the heirs did not hire advisers solely for tax purposes, but also because they needed help in general with the estate inventory.[32] Still, the results indicate that advisers guided the choice on how much to give, and they most likely played a key role in dissolving optimization frictions. Having said that, we lack means to establish a causal effect of legal advice on giving behavior. Selection mechanisms are probably also at play; people who are more prone to avoid taxes by giving to children may also be more prone to hire legal advisers. Nevertheless, we find it likely that the large sibling correlations reported above, at least to some extent, were driven by the legal advisers. These advisers were operating at the estate level, implying that all siblings shared the same legal advisers.[33]

[31] The maximum amount paid for one estate was SEK 28,000 (USD 3,300).

[32] Descriptive statistics show that the use of advisers was pretty common also among those receiving less than SEK 70,000: about 65 percent of the estates with heirs receiving less than SEK 70,000 report expenses for legal advice, while 80 percent of the estates with heirs receiving more than SEK 70,000 used legal advice.

[33] Given the large sibling correlations, we *a priori* expected larger policy responses among siblings than among non-siblings. However, we actually found close to identical tax base elasticity estimates for siblings and non-siblings, see figure C3 in the appendix. The proportion of heirs hiring an adviser was large in both groups, approximately 60 % for non-siblings and 70 % for siblings.

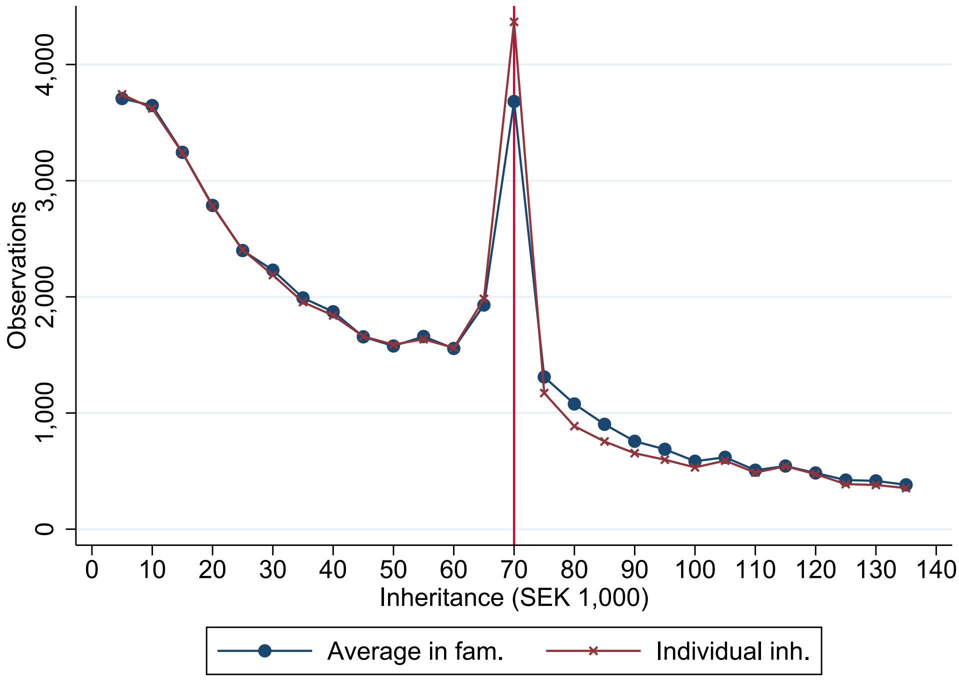


Figure 8: Distributions of taxable inheritances, individual and averaged within families. The vertical line indicates the taxable exemption of SEK 70,000. The binsize is SEK 5,000.

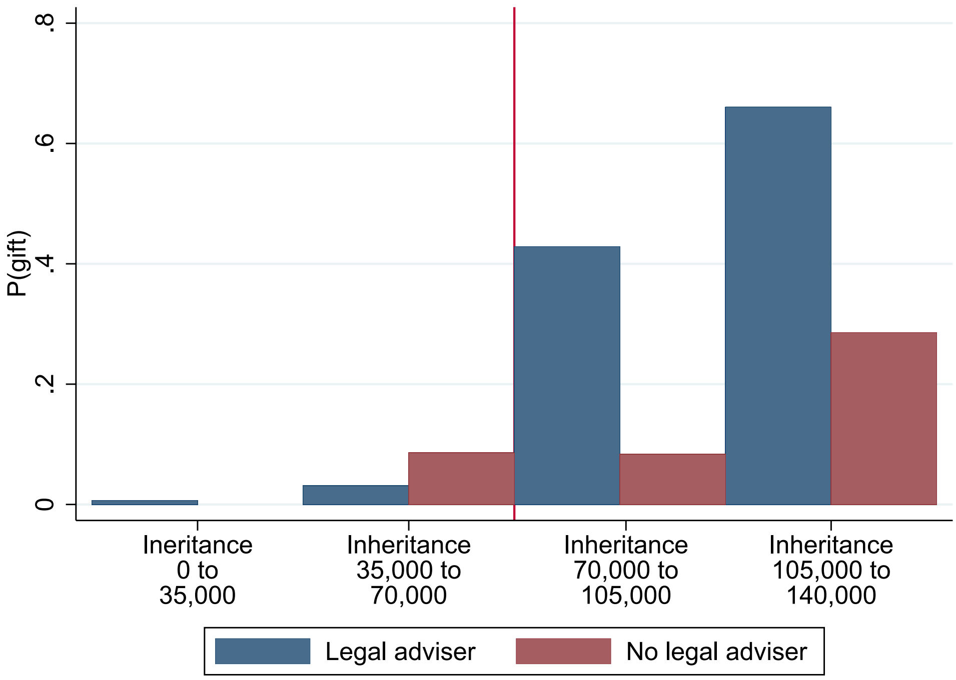


Figure 9: Share of individuals making gifts among those with and without legal advisers. N=546.

10 Concluding remarks

We used detailed administrative data on heirs for the last three years of the Swedish inheritance, 2002–2004, to document and understand the mechanisms behind intergenerational asset shifting. Our results can be summarized in the following way: First, we document that the Swedish inheritance tax base was highly elastic, and the elasticity arose due to tax-favored *inter vivos* gifts. Second, we showed that "ordinary people", who received gross inheritances around the basic exemption, optimized in a precise fashion, both at the intensive and extensive giving margins. We quantified the average optimization friction (fixed cost of giving) to be small, around SEK 436 (USD 60). Third, we found a strong correlation between buying legal advice with the estate report and making tax-favored gifts. Therefore, we believe that legal advisers played a key role in informing people and dissolving frictions.

Naturally, there are several interesting aspects of the tax-favored *inter vivo* gifts, which we have not touched upon. One of those is the welfare effects of the tax incentive. Even though the estimated tax base elasticity determines tax revenues, it is *not* a sufficient statistic for the deadweight loss of the inheritance tax. The reason is that a reduction in the taxable inheritance represents a transfer to other agents in the economy and, hence, is not a waste, cf. the point made by Chetty (2009). Most heirs receive the inheritance at an age when they need it the least, and regular wealth transfers were subject to a gift tax. Against this background, providing incentives for wealth transfers to children is not necessarily a bad thing.[34]

However, the most concrete lesson to be learned from our study is that inheritance and wealth taxes may turn optional if wealth transfers can be made legally within family networks and across generations. Actually, intergenerational asset shifting is not only relevant for bequest based inheritance taxation. Asset shifting has potential revenue implications for *any* progressive wealth or capital tax, and it underlines the importance of well-designed wealth transfer taxes.

[34]It would also be fruitful to further model the legal advisers. Clearly, inheritance tax avoidance created a surplus to be shared between the taxpayer and the adviser, and it would be interesting to examine who reaped the gains. The adviser's marginal cost of providing tax advice was probably very low in this context, because the tax planning strategy was quite simple.

References

Arvs- och gåvoskattekommittéen (1987). *Ny arvs- och gåvoskattelag (SOU1987:62)*. Allmänna förlaget.

Bastani, S. and Selin, H. (2014). Bunching and non-bunching at kink points of the Swedish tax schedule. *Journal of Public Economics*, 109:36–49.

Bernheim, B. D., Lemke, R. J., and Scholz, J. K. (2004). Do estate and gift taxes affect the timing of private transfers? *Journal of Public Economics*, 88(12):2617–2634.

Calonico, S., Cattaneo, M. D., and Titiunik, R. (2014). Robust nonparametric confidence intervals for regression-discontinuity designs. *Econometrica*, 82(6):2295–2326.

Calonico, S., Cattaneo, M. D., and Titiunik, R. (2015). Optimal data-driven regression discontinuity plots. *Journal of the American Statistical Association*, 110(512):1753–1769.

Card, D., Lee, D. S., Pei, Z., and Weber, A. (2015). Inference on causal effects in a generalized regression kink design. *Econometrica*, 83(6):2453–2483.

Chetty, R. (2009). Is the Taxable Income Elasticity Sufficient to Calculate Deadweight Loss? The Implications of Evasion and Avoidance. *American Economic Journal: Economic Policy*, 1(2):31–52.

Chetty, R. (2012). Bounds on Elasticities With Optimization Frictions: A Synthesis of Micro and Macro Evidence on Labor Supply. *Econometrica*, 80(3):969–1018.

Chetty, R., Friedman, J., Olsen, T., and Pistaferri, L. (2011). Adjustment Costs, Firm Responses, and Micro vs. Macro Labor Supply Elasticities: Evidence from Danish Tax Records. *The Quarterly Journal of Economics*, 126(2):749–804.

Dahl, G. B., Løken, K. V., and Mogstad, M. (2014). Peer effects in program participation. *The American Economic Review*, 104(7):2049–2074.

Dörrenberg, P., Peichl, A., and Siegloch, S. (2017). The elasticity of taxable income in the presence of deduction possibilities. *Journal of Public Economics*, 151:41–55.

Elinder, M., Erixson, O., Escobar, S., and Ohlsson, H. (2014). Estates, bequests, and inheritances in Sweden - A look into the Belinda databases. Working Paper 2014:14, Uppsala Center for Fiscal Studies, Department of Economics, Uppsala University.

Erixson, O. and Ohlsson, H. (2014). Estate division: Equal sharing as choice, social norm, and legal requirement. Working Paper 1006, IFN.

Escobar, S. (2017). Inheritance tax evasion: Spousal bequests and under-reporting of inheritances in Sweden. Unpublished.

Fehr, E. and Schmidt, K. M. (1999). A Theory of Fairness, Competition, and Cooperation. *The Quarterly Journal of Economics*, 114(3):817–868.

Gelber, A., Jones, D., Sacks, D. W., and Song, J. (2017). Using Kinked Budget Sets to Estimate Extensive Margin Responses: Method and Evidence from the Social Security Earnings Test. Unpublished.

Glogowsky, U. (2016). Behavioral responses to wealth transfer taxation: Bunching evidence from Germany. Unpublished.

Goupille-Lebret, J. and Infante, J. (2017). Behavioral Responses to Inheritance Tax: Evidence from Notches in France. Working Paper 2017/76/EPS, INSEAD.

Hausman, J. (1980). The effect of wages, taxes, and fixed costs on women's labor force participation. *Journal of Public Economics*, 14(2):161–194.

Ito, K. (2014). Do Consumers Respond to Marginal or Average Price? Evidence from Nonlinear Electricity Pricing. *American Economic Review*, 104(2):537–63.

Jakobsen, K., Jakobsen, K., Kleven, H., and Zucman, G. (2018). Wealth Taxation and Wealth Accumulation: Theory and Evidence from Denmark. Working Paper 24371, National Bureau of Economic Research.

Joulfaian, D. (2004). Gift taxes and lifetime transfers: time series evidence. *Journal of Public Economics*, 88(9–10):1917–1929.

Joulfaian, D. and McGarry, K. (2004). Estate and gift tax incentives and inter vivos giving. *National Tax Journal*, 57(2):429–444.

Kleven, H. J. (2016). Bunching. *Annual Review of Economics*, 8(1):435–464.

Kleven, H. J. and Kreiner, C. T. (2006). The marginal cost of public funds: Hours of work versus labor force participation. *Journal of Public Economics*, 90(10-11):1955–1973.

Kleven, H. J. and Waseem, M. (2013). Using Notches to Uncover Optimization Frictions and Structural Elasticities: Theory and Evidence from Pakistan. *The Quarterly Journal of Economics*, 128(2):669–723.

Kopczuk, W. (2013). Taxation of Intergenerational Transfers and Wealth. In Auerbach, A. J., Chetty, R., Feldstein, M., and Saez, E., editors, *Handbook of public economics*, volume 5, chapter 6, pages 329 – 390. Elsevier.

Kosonen, T. and Matikka, T. (2017). Discrete earnings and optimization errors: Evidence from student's responses to local tax incentives. Unpublished.

Laitner, J. (1997). Intergenerational and Interhousehold Economic Links. In Rosenzweig, M. R. and Stark, O., editors, *Handbook of Population and Family Economics*, volume 1, chapter 5, pages 189–238. Elsevier.

Liebman, J. B. and Zeckhauser, R. J. (2004). Schmeduling. Unpublished.

McGarry, K. (2000). Inter vivos transfers or bequests? Estate taxes and the timing of parental giving. *Tax Policy and the Economy*, 14:93–121.

McGarry, K. (2001). The cost of equality: unequal bequests and tax avoidance. *Journal of Public Economics*, 79(1):179–204.

Nekoei, A. and Seim, D. (2018). How do Inheritances Shape Wealth Inequality? Theory and Evidence from Sweden. Unpublished.

Nielsen, H. S., Sørensen, T., and Taber, C. (2010). Estimating the Effect of Student Aid on College Enrollment: Evidence from a Government Grant Policy Reform. *American Economic Journal: Economic Policy*, 2(2):185–215.

Nordblom, K. and Ohlsson, H. (2006). Tax avoidance and intra-family transfers. *Journal of Public Economics*, 90(8-9):1669–1680.

Ohlsson, H. (2007). Tax avoidance - a natural experiment. Working Paper 2007:13, Department of Economics, Uppsala University.

Ohlsson, H. (2011). The legacy of the Swedish gift and inheritance tax, 1884–2004. *European Review of Economic History*, 15(3):539–569.

Poterba, J. (2001). Estate and Gift Taxes and Incentives for Inter Vivos Giving in the US. *Journal of Public Economics*, 79(1):237–264.

Saez, E. (2010). Do taxpayers bunch at kink points? *American Economic Journal: Economic Policy*, 2(3):180–212.

Seim, D. (2017). Behavioral Responses to Wealth Taxes: Evidence from Sweden. *American Economic Journal: Economic Policy*, 9(4):395–421.

Selin, H. and Simula, L. (2017). Income Shifting as Income Creation? The Intensive vs. the Extensive Shifting Margins. Working Paper 6510, CESifo Group Munich.

Søgaard, J. E. (2014). Labor Supply and Optimization Frictions: Evidence from the Danish student labor market. Working Paper 2014-02, Economic Policy Research Unit (EPRU), Department of Economics, University of Copenhagen.

Stephens Jr, M. and Ward-Batts, J. (2004). The impact of separate taxation on the intra-household allocation of assets: evidence from the UK. *Journal of Public Economics*, 88(9-10):1989–2007.

A Model appendix

In this section we provide a more detailed description of our model framework.

A.1 The population

We consider a population of heirs who just received an inheritance. All heirs are parents and have J children. In this model economy agents (heirs) are heterogeneous along three dimensions:

1. The size of the gross inheritance received, I.

2. The preference for the children's consumption, θ.

3. The fixed cost of giving newly inherited wealth to children, γ, which we will also refer to as an *optimization friction*.

Heirs make draws of these parameters from a multidimensional distribution with joint pdf $f(I, \theta, \gamma)$ and joint cdf $F(I, \theta, \gamma)$ with support on R^3_+. We denote the pdf and cdf of, say, γ conditional on the other parameters by $f(\gamma|I, \theta)$ and $F(\gamma|I, \theta)$. In the most general setting, we allow for any correlation between the three different sources of heterogeneity.

A.2 The optimization problem

We consider the optimization problem of an individual who inherits I\$. The latter quantity will determine the heir's budget constraint in two ways. First, a higher I enables a larger transfer to the children. Second, the level of I determines the shape of the budget constraint, because the inheritance tax schedule is non-linear.

The parent faces the following trade-off: she can keep the inheritance for consumption (defined in a broad sense, including informal transfers to the children), or she can pass it on to her J children and thereby reduce her inheritance tax liability. However, when transferring wealth she also reduces her own consumption. Still, the heir is altruistic and derives utility from the children's utility of consumption out of A. The heir's utility function can be written in the following way:

$$U = u(c) + \theta \sum_{j=1}^{J} \Phi(c_j), \tag{A.1}$$

where c is the heir's consumption and c_j is child j's consumption. $u(c)$ is the heir's utility from own consumption, whereas $\Phi(c_j)$ represents the heir's utility as a function of child j's consumption. U is increasing and concave in c and c_j. θ, which differs across heirs, is the weight she gives to her children's utility. Variants of the utility function in (A.1) are common in the literature on warm-glow giving, see, e.g., the discussion in Laitner (1997).

We denote the total amount transferred to the children by A. $T(z)$ is the inheritance tax function, and z is the tax base. For the moment, we assume that $T(z)$ is a convex and smooth function. When the heir transfers A\$, she reduces her own inheritance tax liability by $[T(I) - T(I - A)]$\$. Thus, the heir's consumption, c, can be written

$$c(A) = y^p + I - A - T(I - A) - \gamma \cdot \mathbb{1}_{A>0}, \tag{A.2}$$

where y^p is other exogenous income of the heir. $\mathbb{1}_{A>0}$ is an indicator function, which is one if A is positive and the heir has to pay the fixed cost γ, and zero otherwise.

The heir has to give the same amount, $\frac{A}{J}$\$, to *all* her children (see Section 3). If she passes on wealth to the children, the consumption of the individual child j increases by $[\frac{A}{J} - T(\frac{A}{J})]$\$. The given amount is taxed according to the inheritance tax function, T, also at the level of the child. Note, however, that the tax bases differ. The heir reports $z = I - A$, whereas the child reports $z = \frac{A}{J}$. The consumption of child j can be written

$$c_j(A) = y_j + \frac{A}{J} - T\Big(\frac{A}{J}\Big), \tag{A.3}$$

where y_j is other exogenous income of child j. The prices on the composite goods c and c_j are normalized to 1. By plugging (A.2) and (A.3) into (A.1), we see that the only relevant choice variable in this problem is A: when the heir determines A, she also determines $c(A)$ and $c_j(A), j = 1, ..., J$. Hence, the optimization problem can be thought of as a standard two-good problem (analogous to the standard consumption-leisure problem).

In Section 5 we elaborate on a stylized economic environment, where the tax function takes on the form of (A.14) below. Moreover, we assume $u(c) = c$ and $\Phi(c_j) = \frac{c_j^{1-\frac{1}{\varepsilon}}}{1-\frac{1}{\varepsilon}}$, and we set $y^p = y_j = 0$.

A.3 The intensive margin response

If we differentiate (A.1) with respect to A, and slightly rearrange the first-order condition, we see that, for interior solutions, the optimal quantity of A^* implicitly satisfies:

$$\frac{1 - T'(I - A^*)}{1 - T'(\frac{A^*}{J})} = \theta \frac{\overline{\Phi'}(c_j(A^*))}{u'(c(A^*))}, \tag{A.4}$$

where $\overline{\Phi'} = \frac{\sum_{j=1}^{J} \Phi'}{J}$ is the average marginal utility of consumption of the J children. In equilibrium, the heir will choose A such that the *endogenous* marginal tax price, on the left-hand side of (A.4), will equate the marginal rate of substitution of the children's consumption for own consumption, on the right-hand side. We let $p^* = \frac{1-T'(I-A^*)}{1-T'(\frac{A^*}{J})}$ refer to the linear price of A, which we obtain by linearizing the budget constraint around the optimum. Along a linearized budget constraint, the demand functions have standard properties.

A.4 Extensive margin responses – without frictions

We now consider a world without optimization frictions, i.e., $\gamma = 0$ for all heirs. In this situation the individual will choose to transfer wealth to children, i.e., set $A > 0$, if and only if the marginal rate of substitution, locally at $A = 0$, is larger than the marginal tax price at $A = 0$. At a given level of I, the population will be partitioned into two sets, depending on the heir's preference for giving θ. An heir will set $A > 0$ if and only if

$$\theta \frac{\overline{\Phi'}[c_j(0)]}{u'[c(0)]} \geq p^0, \tag{A.5}$$

where $p^0 = \frac{1-T'(I)}{1-T'(0)}$ is the so-called first-dollar tax price. There will be a unique cut-off $\tilde{\theta}(p^0) = \frac{u'(c(0))}{\overline{\Phi'}(c_j(0))} p^0$, where heirs are indifferent between the two states. Hence, all heirs with $\theta \geq \tilde{\theta}(p^0)$ will set $A > 0$, while all heirs with $\theta < \tilde{\theta}(p^0)$ will set $A = 0$. Accordingly, in a frictionless setting the probability to choose $A > 0$ at a certain inheritance level I is

$$\int_{\tilde{\theta}(p^0)}^{\infty} f(\theta|I, \gamma = 0) d\theta = 1 - F[\tilde{\theta}(p^0)|I, \gamma = 0]. \tag{A.6}$$

When the tax function is piece-wise linear, the first-dollar tax price will jump at kinks of the inheritance tax schedule. Suppose that there is a discontinuous level change in the first-dollar tax price by Δp^0 at $I = k$. The *frictionless response* to a discrete change in p^0 at k is

$$\lim_{I \to k^-} F[\tilde{\theta}(p^0)|I = k, \gamma = 0] - \lim_{I \to k^+} F[\tilde{\theta}(p^0 + \Delta p^0)|I = k, \gamma = 0]. \tag{A.7}$$

A.5 Extensive margin response – with frictions

We now consider an economy with homogeneity in preferences, i.e., $\theta = \hat{\theta}$ for all agents. This implies that everyone with the same I chooses the same A^* in the frictionless optimum. We assume $\hat{\theta} > \tilde{\theta}(\gamma = 0)$, i.e., everyone would choose to give a positive amount in the frictionless optimum. Now, however, we assume that there is heterogeneity in frictions, which individuals draw from a density distribution $f(\gamma|I, \theta)$. The individual compares two utility levels: U^1, where $A > 0$, and U^0, where $A = 0$. Using (A.1),(A.2) and (A.3), the probability that someone chooses to transfer wealth is given by

$$\begin{aligned} &\Pr\{A > 0|I, \theta\} = \Pr\{U^1 > U^0|I, \theta\} = \\ &\Pr\{\gamma < \tilde{\gamma}(I, \theta)|I, \theta\} = F\{\tilde{\gamma}(I, \theta)|I, \theta\}, \end{aligned} \tag{A.8}$$

where $\tilde{\gamma}(I,\theta)$ is a unique cut-off, which partitions the population into individuals who give and individuals who do not give.[35] $\tilde{\gamma}(I,\theta)$ is implicitly defined by the indifference condition $U^1(\tilde{\gamma}) = U^0$. Since tax incentives change as a function of I, it is fruitful to characterize the derivative of the giving probability with respect to I. It reads

$$\frac{dPr(A>0|I,\theta)}{dI} = \frac{d\tilde{\gamma}}{dI} f(\tilde{\gamma}(I,\theta)|I,\theta) \tag{A.9}$$

Applying the implicit function theorem on the indifference condition $U^1(\tilde{\gamma}) = U^0$, we arrive at the following expression:

$$\frac{d\tilde{\gamma}}{dI} = 1 - T'(I-A^*) - \frac{u'_{A>0}}{u'_{A=0}}[1-T'(I)] \tag{A.10}$$

Obviously, the derivative of the threshold value with respect to I depends on the first derivative of the tax function. $\tau(I,A^*) = T(I) - T(I-A^*)$ is the *tax gain* from giving.

We now consider a special case when the utility function is quasilinear in consumption, i.e., $u' = u'_{A>0} = u'_{A=0}$ is a constant. It follows from equation (A.10) that $\frac{d\tilde{\gamma}}{dI} = \frac{d\tau(I,A)}{dI}$, which implies $\frac{d\tilde{\gamma}}{d\tau} = 1$, and the derivative of the giving probability with respect to the tax gain becomes

$$\frac{dPr(A>0|I,\theta)}{d\tau(I,A)} = f(\tilde{\gamma}(I,\theta)|I,\theta). \tag{A.11}$$

In the presence of frictions, the extensive margin response is determined by the number of individuals who are just indifferent between giving and not giving. In our setting, the derivative of the tax gain changes discontinuously when the gross inheritance exceeds the exemption level. The change in the first derivative of the giving probability at the kink, k, is

$$\lim_{I\to k^+} f[\tilde{\gamma}(I,\theta)|I=k,\theta=\hat{\theta}] - \lim_{I\to k^-} f[\tilde{\gamma}(I,\theta)|I=k,\theta=\hat{\theta}]. \tag{A.12}$$

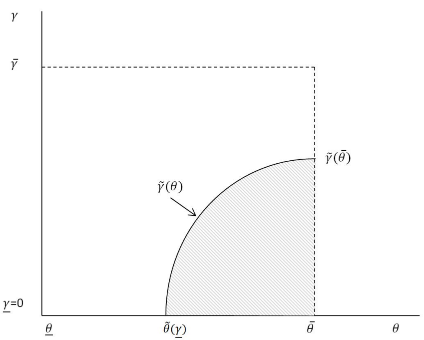
[35] The assumption that $u'(c) > 0$ ensures that the cut-off is unique, because the utility as a giver monotonically decreases in γ.

A.6 Both frictions and preference heterogeneity

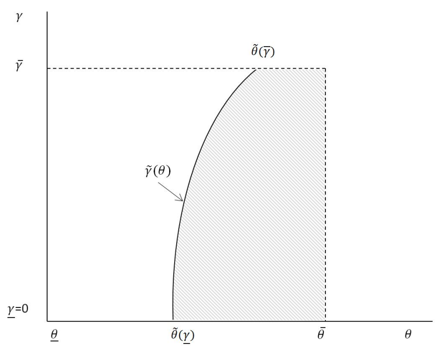
In the empirically most relevant scenario, both θ and γ differ in the population. At a given level of I, the giving probability is given by a double integral. The cut-off in γ is denoted by $\tilde{\gamma}(\theta, I)$, and vice versa: The cut-off in θ is denoted by $\tilde{\theta}(\gamma, I)$. As we illustrate in Figure A1, the order of integration depends on the magnitude of the maximum potential utility gain. At all levels of I, we have that $\tilde{\theta}(\gamma = 0, I) = p^0 \frac{u'[c(0)]}{\Phi'[c_j(0)]}$ (the indifference condition in the absence of frictions). When $\tilde{\gamma}(\bar{\theta}, I) < \bar{\gamma}(I)$, the outer integral should sum over $\tilde{\theta}(\underline{\gamma}, I)$ to $\bar{\theta}$. Conversely, when $\tilde{\gamma}(\bar{\theta}, I) \geq \bar{\gamma}(I)$, the outer integral should sum over $\underline{\gamma}$ to $\bar{\gamma}$. The giving probability can be written

$$Pr(A > 0|I) = \begin{cases} \int_{\tilde{\theta}(\underline{\gamma},I)}^{\bar{\theta}} \int_{\underline{\gamma}}^{\tilde{\gamma}(\theta,I)} f(\gamma, \theta|I) d\gamma d\theta & \text{if } \tilde{\gamma}(\bar{\theta}) < \bar{\gamma} \\ \\ \int_{\underline{\gamma}}^{\bar{\gamma}} \int_{\tilde{\theta}(\gamma,I)}^{\bar{\theta}} f(\gamma, \theta|I) d\theta d\gamma & \text{if } \tilde{\gamma}(\bar{\theta}) \geq \bar{\gamma} \end{cases} \tag{A.13}$$

In general, at a given level of I, the probability to give will be determined by both frictions and preferences.



(a) $\forall I$ such that $\tilde{\gamma}(\bar{\theta}, I) < \bar{\gamma}(I)$



(b) $\forall I$ such that $\tilde{\gamma}(\bar{\theta}, I) \geq \bar{\gamma}(I)$

Figure A1: Limits of integration

A.7 A parametric example

To gain intuition, we now impose more structure on the utility function and $f(\theta, \gamma, I)$, which we also use in the numerical simulation exercise reported in Figure 7 in the main text. Since the obtained intensive margin estimate is large, we assume that utility is linear in both arguments. This implies that the marginal rate of substitution is simply given by θ. We also assume that all three parameters are uniformly distributed, letting $\theta \sim \mathcal{U}(\underline{\theta}, \overline{\theta})$, $\gamma \sim \mathcal{U}(\underline{\gamma}, \overline{\gamma})$, and $I \sim \mathcal{U}(\underline{I}, \overline{I})$.

The piece-wise linear tax function in this simple setting can be written

$$T(z) = \begin{cases} 0 & \text{if } z < k \\ t_1 \times (z - k) & \text{if } z \geq k \end{cases} \tag{A.14}$$

with $z = I - A$. We assume that there are agents with a marginal rate of substitution both below and above the first-dollar tax price. More formally, we assume $(1-t_1) \in [\underline{\theta}, \overline{\theta})$. We also assume $\overline{\theta} = 1$. Since the slope on the second segment is -1, this assumption ensures that heirs will either choose $A^* = 0$ or $A^* = I - k$.[36] Hence, the cut-off value $\tilde{\theta}(\gamma, I)$ of equation (A.13) becomes

$$\tilde{\theta}(\gamma, I) = 1 - t_1 + \frac{\gamma}{I - k}. \tag{A.15}$$

If we plug (A.15) into (A.13) and use the distributional assumptions, we obtain the following closed form expression for the giving probability locally at I:

$$Pr(A > 0|I) = \begin{cases} \frac{I-k}{(\bar{\gamma}-\underline{\gamma})(\bar{\theta}-\underline{\theta})}\left[\frac{\bar{\theta}^2-(1-t_1)^2}{2} - (1-t_1)\bar{\theta} + (1-t_1)^2\right] & \text{if } k \leq I < \frac{\bar{\gamma}}{t_1} + k \\ \frac{\overline{\theta}-(1-t_1)}{\overline{\theta}-\underline{\theta}} - \frac{1}{2}\frac{\overline{\gamma}^2-\underline{\gamma}^2}{(\overline{\gamma}-\underline{\gamma})(\overline{\theta}-\underline{\theta})}(I-k)^{-1} & \text{if } I \geq \frac{\bar{\gamma}}{t_1} + k \end{cases} \tag{A.16}$$

The first line of equation (A.16) shows that the giving probability is linear in I up to a threshold. The first term on the right-hand side of the second line of equation (A.16)

[36] Since the individual locates at a kink, we cannot apply the envelope theorem when differentiating indirect utility with respect to I.

represents the probability to give in a frictionless economy, which is equal to the share of agents drawing θ larger than the first-dollar tax price. The second term is a non-linear function of the gross inheritance, I. Note that the slope of the giving probability depends on properties of both the adjustment cost and preference distributions, also in a setting when the two distributions are independent.

In our numerical calibration, we first set $t_1 = 0.1$, $k = 70,000$, $\overline{\theta} = 1$, $\underline{\theta} = 0.8$, and $\underline{\gamma} = 0$. The estimated slope change is 0.0000287. We solve for $\bar{\gamma}^{RKD}$, and we obtain $\overline{\gamma}^{RKD} = 871$, implying an average fixed cost of appr. SEK 436. Up to $I - k = 10,000$, the slope change is given by $\frac{I-70,000}{\bar{\gamma}^{RKD}} \times 0.025$. When the gross inheritance falls above SEK 80,000, it is given by $0.5 - \frac{2500}{I-70,000}$.

B RKD – specification tests

This section describes a number of tests carried out to evaluate the identification assumptions of the RKD estimations.

If the assumptions are violated, the characteristics of the heirs receiving gross inheritances just below and just above SEK 70,000 are likely to be related to their treatment status. Therefore, we evaluate the relationship between the size of the gross inheritance and a number of pre-determined characteristics of the heirs, which include age, sex, wealth, capital income and labor income. Figure B1 shows these relationships. Age, wealth, and labor income appear to be correlated with the size of the inheritance received, but—critically to our identifying assumptions—there are no obvious discontinuities in the relationship between them and the size of the inheritance at the treatment threshold of SEK 70,000. We also test for a discontinuity in the relationship by estimating the specification

$$Y_i = \delta_0 + \sum_{j=1}^{J} \delta_j (I_i - 70,000)^j + D \times \sum_{j=1}^{J} \beta_j (I_i - 70,000)^j + \epsilon_i, \tag{B.1}$$

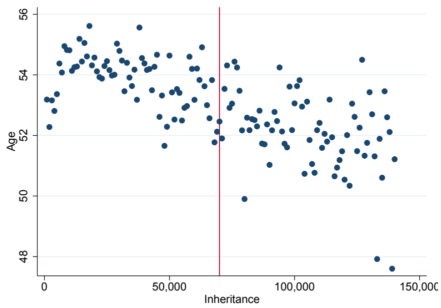
with the listed predetermined characteristics as outcome variables, Y_i , using a local linear specification. As in the main estimations, I_i is the size of the gross inheritance received, and β_1 is the change in the slope of the outcome variable at the basic exemption of SEK 70,000. The estimations are shown in Table B1. We see that all estimates, except for the estimate on wealth, are statistically insignificant at conventional levels. The estimate on wealth is only significant for certain bandwidths and it is not significant when using the bandwidth of the main estimation (SEK 16,722). In general, the results support the assumption of it being essentially random whether an individual receives an inheritance just below or just above SEK 70,000.

As mentioned, Card et al. (2015) showed that the RKD estimation requires that the distribution of gross inheritances is smooth at the treatment threshold, and that a sufficient condition for this is that the *partial derivative* of the density function with respect to inheritances is continuous at the kink point. Figure B2 shows the frequency of inheritances in the interval SEK 50,000–90,000, using bins of SEK 1,000 and SEK 250, respectively. While Subfigure a), which uses the higher level of aggregation, possibly indicates a small over-density just below the treatment cut-off, this is less clear in Subfigure b), which uses the lower level of aggregation. Following Card et al. (2015, p. 2475) we test for a change in the derivative more formally by fitting a series of polynomial models that allow the first and higher order derivatives of the binned density function to jump at the kink point, while imposing continuity at the kink. The test fails to reject the null hypothesis of no change in the derivative.[37]

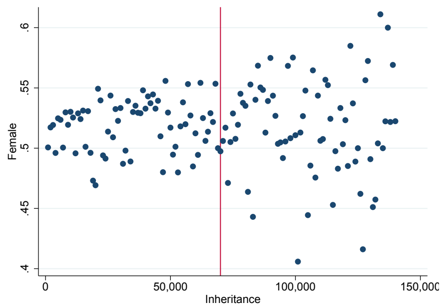
To further ensure that there is no manipulation of the assignment variable, we carry out a robustness check in which we exclude observations close to the threshold from the estimation. If individuals misreport the inheritances to evade taxes, they are likely to end up close to the treatment threshold and we exclude individuals in the interval SEK 69,000 to 71,000. This approach, a so-called donut design, has primarily been carried out together with RD methodology (see, e.g., Dahl et al. (2014)) to account for a possible manipulation of treatment assignment. Figure B3 shows that the main estimates and

[37]The estimated change in the first derivative of the density function is 0.0036, with a standard error of 0.0066 (using a fourth-order polynomial model as suggested by the Akaike information criterion). The estimates are not sensitive to the change of the bin-width.

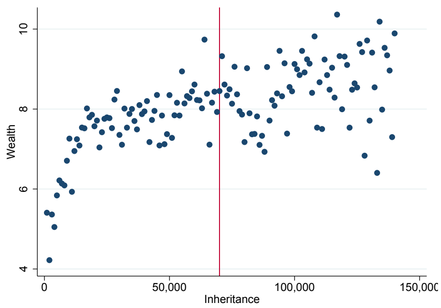
the estimates of the donut design are close to each other at all presented bandwidths and in particular when using bandwidths relevant to the estimates of the main effect.



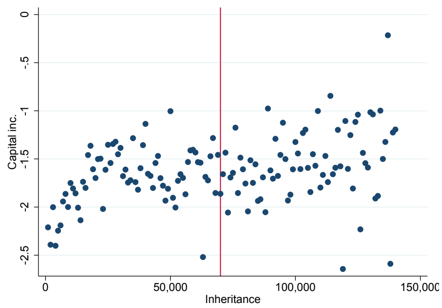
(a) Age



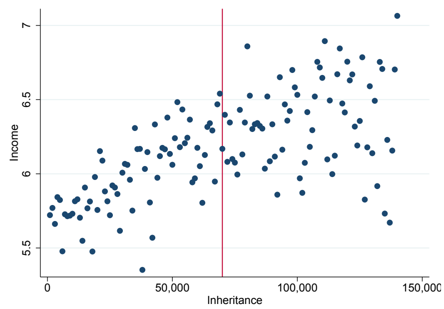
(b) Female



(c) Wealth



(d) Capital income



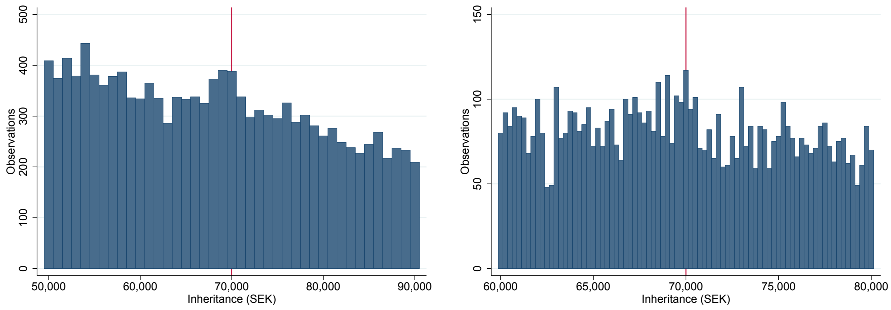
(e) Income

Figure B1: The relationship between inheritance and predetermined characteristics. Scatter-plots of the relationship between the size of the inheritance received and predetermined outcomes (indicated on y-axis). The binsize is SEK 1,000. The vertical line indicates taxable exemption.

Table B1: Effects in predetermined characteristics (placebo test)

	Female	Age	Income	Capital income	Wealth	University education
Treatment effect	0.00000378	0.000109	-0.0000328	-0.00000314	-0.000145*	-0.00000116
	(0.00000413)	(0.0000822)	(0.0000449)	(0.0000378)	(0.0000804)	(0.00000432)
Bandwidth	29498.6	28766.2	21456.4	30301.6	29585.5	25019.1
Observations	18347	17923	13422	18937	18482	15594

Note: Estimates obtained using local linear regression and a triangular kernel. Bandwidth chosen following the approach of Calonico et al. (2014). *, **, and *** denotes $p < 0.10$, $p < 0.05$ and $p < 0.01$, respectively.



(a) Binsize SEK 1,000 (b) Binsize SEK 250

Figure B2: Distribution of gross inheritances (before tax-favored gifts) around the taxable exemption, indicated by the red vertical line.

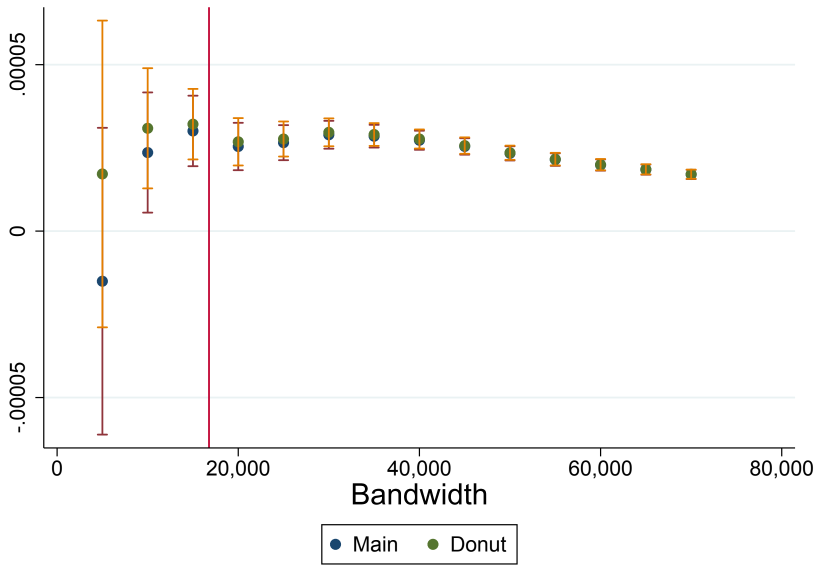


Figure B3: Comparison of donut and conventional RKD estimates. The red line indicates the estimation bandwidth used for the main results (SEK 16,722). Point estimates and 95% confidence intervals.

C Estimating the tax base elasticity

The tax base elasticity, i.e., the elasticity of the taxable inheritance with respect to one minus the marginal inheritance tax rate, has been estimated in the same way as the intensive margin giving responses. Hence, we applied formula (4), setting $p = 1 - t$ and k to SEK $70,000$ in units of thousands. Furthermore, we estimated the excess mass using the procedure described in Section 6.1, which follows from Chetty et al. (2011). Figure C1 shows the excess density, the estimated counterfactual distribution and reports the implied tax base elasticity. Figure C3 does the same thing, but separately for heirs with and without siblings using a normalized scale. The magnitude of the policy response is similar in the two groups.

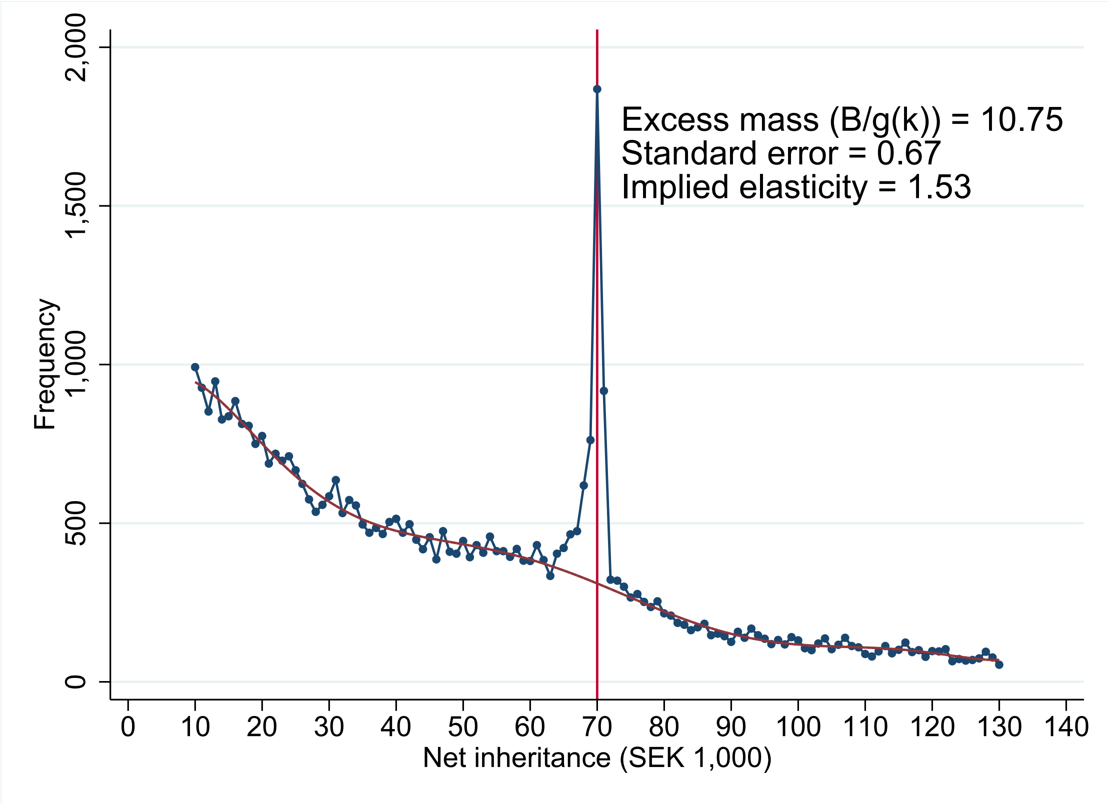
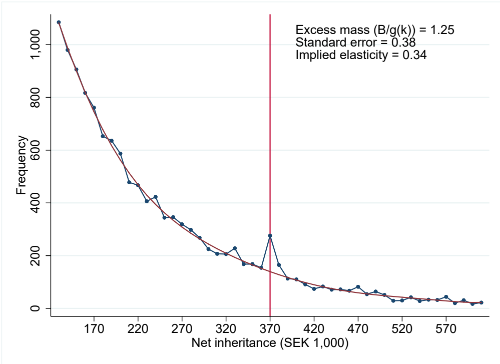
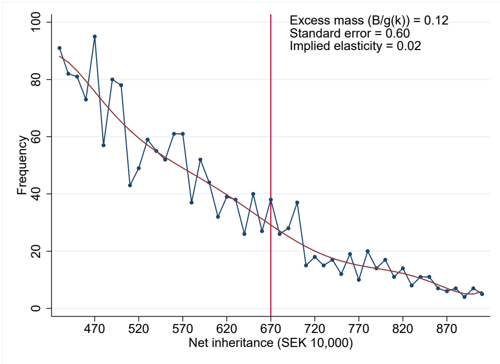


Figure C1: Elasticity of taxable inheritance. The figure shows the empirical and estimated counterfactual distributions of net inheritances. The vertical line indicates the taxable exemption of SEK 70,000. The binsize is SEK 1,000. The elasticity is estimated on heirs receiving gross inheritances of SEK 0< I <140,000.

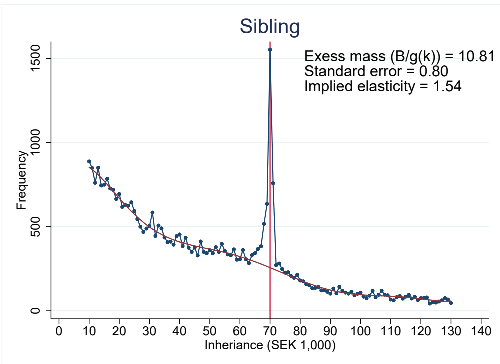


(a) Kink point=370,000



(b) Kink point=670,000

Figure C2: The elasticity of taxable inheritance estimated at higher kink points in the inheritance tax distribution. The figures show the empirical and estimated counterfactual distributions of net inheritances. The vertical lines indicate the kink points at SEK 370,000 and SEK 670,000. The binsize is SEK 10,000. The elasticity is estimated on heirs receiving gross inheritances of SEK 120,000< I <620,000 and SEK 420,000< I <820,000, respectively.



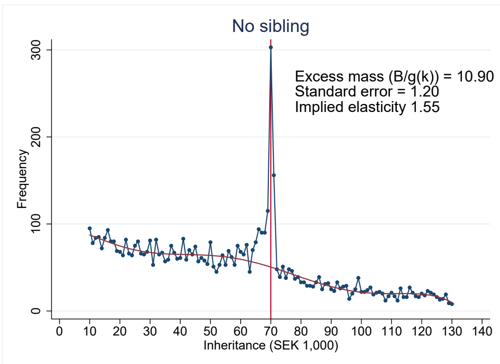


Figure C3: Elasticity of taxable inheritance of heirs with and without siblings. The figures show the empirical and estimated counterfactual distributions of net inheritances for the groups. Vertical lines indicate the taxable exemption of SEK 70,000. The binsize is SEK 1,000. The elasticity is estimated on our full population of study (heirs receiving gross inheritances of SEK 0< I <140,000).

D Estimating sibling correlations

To estimate the sibling's choice of giving (or giving to the tax minimizing amount) Y_{if}, we model the decision of sibling i from family f as

$$Y_{if} = X_i\beta + \epsilon_{if}, \tag{D.1}$$

where X_f is a vector of individual characteristic controls, including the sibling's income, age and sex. The term ϵ_{if} is the residual. It is individual-specific and its population variance is given by σ_ϵ^2. ϵ_{if} is assumed to consist of two components that are linearly additive and independent

$$\epsilon_{if} = a_f + b_{if}, \tag{D.2}$$

where a_f is shared by the siblings and b_if is unique to the sibling i of family f. The variance of ϵ_{if} can be expressed in terms of the variance of these components

$$\sigma_\epsilon^2 = \sigma_a^2 + \sigma_b^2. \tag{D.3}$$

The share of variance in the sibling's giving that depends on factors shared with his or her siblings is

$$\rho = \frac{\sigma_a^2}{\sigma_a^2 + \sigma_b^2}, \tag{D.4}$$

which is also the correlation of Y within sibling pairs.

We construct the estimate of ρ using the estimates of σ_a^2 and σ_b^2, which we obtain by estimating the following latent linear response model:

$$Y_i = X_{if}\beta + a_f + b_{if}, \tag{D.5}$$

where Y is an indicator variable taking the value one if the individual gives (or gives to the tax minimizing amount, depending on which outcome we are interested in), and X_{if} controls for the sibling's income, age and sex. We estimate the model using STATA's *melogit* command, under the assumption that a_f is a realization from a normal distribution with mean zero and constant variance, while the individual variance component, b_{if} is drawn from the logistic distribution with mean zero and variance $\pi/3$.

E Miscellaneous figures and tables

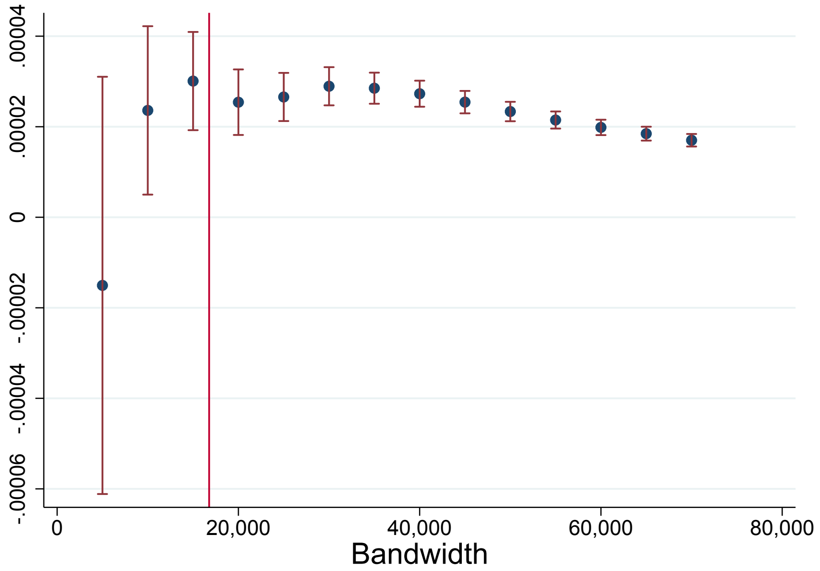
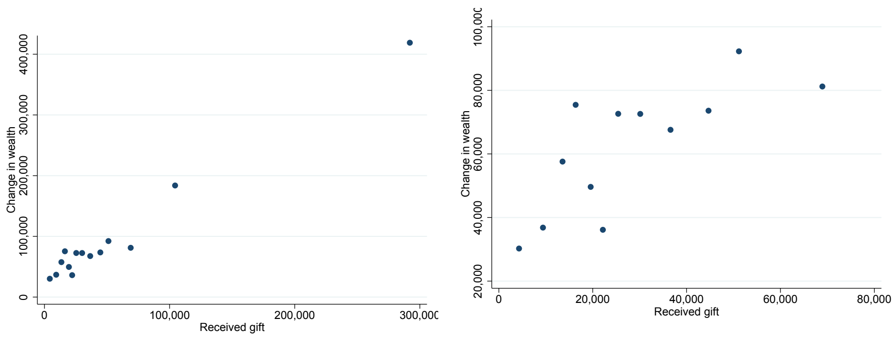


Figure E1: RKD estimates by bandwidth. Red line indicates the estimation bandwidth used for the main results (SEK 16,722). Point estimates and 95% confidence intervals.

Table E1: Descriptive statistics

	All inheriting children	Main study population
Labor income	177,625	167,450
Capital income	12,743	3,397
Net wealth	713,056	562,920
Self employed (share)	0.06	0.06
Age	52.84	53.55
Male (share)	0.52	0.52
Married (share)	0.61	0.62
Children (share)	0.27	0.25
Observations	71,694	54,514

Note: Means. Labor income, capital income and net wealth are measured in SEK. Age is measured in years.



(a) All children receiving gifts

(b) Excluding children in top decile of size in gifts received

Figure E2: Relationship between change in wealth one year before and one year after the gift was received and size of received gift. The sample is based on all children receiving tax-favored inter vivos gifts.

Table E2: Relationship between Wealth$_{t+1}$ and gift received

	(1)	(2)
Gift amount	0.572***	0.577***
	(0.122)	(0.0484)
Inheritance	0.507	0.525**
	(0.378)	(0.237)
Wealth$_{t-1}$	1.060***	1.178***
	(0.00290)	(0.00257)
Constant	33156.8***	19509.5***
	(5599.0)	(4351.8)
Observations	26,348	29,085

Note: OLS regression, the dependent variable is wealth in one year after the gift is received, wealth$_{t+1}$. (1) is estimated on all children receiving gifts from their inheriting parents, except those receiving the top 10 percent largest gifts. (2) is estimated on all children receiving gifts from inheriting parents. *, **, and *** denotes $p < 0.10$, $p < 0.05$ and $p < 0.01$, respectively.