What Happens When Dying Gets Cheaper? 
Behavioural Responses to Inheritance Taxation*

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Abstract

This paper intends to identify behavioural responses to significant cuts in the inheritance tax, paying special attention to evasion and avoidance. Using the universe of inheritance tax returns of Catalan tax residents from 2008 to 2015, it exploits a natural experiment resulting from an important tax reform: the quasi-repeal of the inheritance tax for bequests given to close relatives (i.e. descendants, parents and spouses). Main findings suggest that taxpayers facing very low (or null) tax rates increase reported inheritances by 40%. Such increase can be explained by real estate over-assessment. Although this behaviour is not related to inheritance tax evasion, it helps to reduce potential capital gains in the future, and thus it helps to evade future personal income taxes.

Keywords: Inheritance tax, behavioural responses to taxation, natural experiment 

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1 Introduction

Even though the importance of wealth taxation within the tax systems has declined over time\(^1\), its presence in the public debate has increased in the last years, especially when considering the rise in income and wealth inequality (Piketty 2014, Alvaredo et al. 2018). Given that empirical evidence suggests that an important part of the inequality comes from bequests (e.g. (Kopczuk 2016)), bequests taxation takes particular relevance. Although this tax has always been especially controversial in the public arena, convincing empirical evidence on behavioural responses to inheritance taxation, which would help to validate the arguments given by its supporters and its detractors, is still scarce (Kopczuk 2017).

In this context, this paper intends to identify behavioural responses to significant cuts in the inheritance tax, paying special attention to evasion and avoidance. Using the universe of inheritance tax returns of Catalan tax residents from 2008 to 2015, it exploits an important reform that occurred during this period in Catalonia. It is worth pointing that, particularly during the period under study, this tax was a source of contention not only in the political but also in the public arena. In that sense, this study is not only relevant for academic and public policy purposes, but also for the society as a whole.

Focusing on inheritances placed at the top of the distribution, the paper uses a regression discontinuity design that exploits a natural experiment resulting from an important tax reform: the “repeal” of the inheritance tax for bequests given to close relatives (i.e. descendants, parents and spouses). In fact, it was not a proper abolishment of the tax, but the introduction of a 99% discount of the tax liability. Other heirs with a more distant relationship with the deceased were not affected by the reform. This new measure, which was approved on June 1st, 2011, was applicable to all deceases occurred from January 1st, 2011. Such retroactive effect ensures the absence of any behavioural response regarding the timing of death.

Later on, the paper implements a difference-in-differences strategy to look at longer run effects and potential real responses from the deceased. In particular, it intends to study the effect of the reform on reported inheritances and bequest allocation.

\(^1\)OECD and http://taxfoundation.org/article/estate-and-inheritance-taxes-around-world
Main findings indicate that taxpayers facing very low (below 1%) tax rates increase reported inheritances by 40%. When looking at responses by types of assets inherited, results suggest that low inheritance taxation does not encourage inheritors to declare wealth unreported by the deceased (such as offshore accounts). On the contrary, taxpayers benefit from the low inheritance taxation by over-valuing assets that could generate capital gains in the future, such as real estate. This response can be easily adopted provided that such assets are self-assessed by taxpayers. This behaviour cannot be associated to evasion of the inheritance tax but helps to evade future personal income taxes and thus has a direct impact on personal income tax revenues.

The remaining of the paper proceeds as follows: Section II provides a literature review of the relevant studies. Section III describes the institutional setting, explaining how the inheritance tax works and the reform that took place during the period under study. Section IV presents the data and Section V the methodology. Section VI shows the results. Section VII concludes.

2 Literature review

Following the approach of Feldstein (1995, 1999) for income taxation, a number of papers have intended to relate estate taxation to wealth accumulation. In order to study such relation, Kopczuk & Slemrod (2001) use US estate tax returns covering selected years between 1916 and 1996 and pursue both aggregate and micro-based analysis. Although their findings suggest that measures of the estate tax rate structure are generally negatively correlated with the reported net worth of the top estates, the identification strategies used are not convincing, as posteriorly noted by one of the authors (Kopczuk 2013, 2016). Holtz-Eakin & Marples (2001) use US Health and Retirement Survey to estimate the effect of estate taxation on wealth of the living population. However, the HRS data does not contain the “super-rich” who are most highly affected by the estate tax, and cross-sectional variation may not deal adequately with location-based heterogeneity and endogeneity of location decisions. Joulfaian (2006) uses data on US federal tax revenues from the estate tax over the second half of the 20th century. The author explores the behavioural response of taxable bequests to estate taxation by employing an equivalent income tax rate measure.

The papers mentioned so far did not focused on the distinction between responses that involve “real behaviour” (i.e. wealth accumulation, lifetime
transfers, etc.) and those that are intended to reduce tax liability with no real consequences, that is, tax avoidance responses. Focusing on tax avoidance and evasion responses, Wolff (1996) and Poterba (2000) proposed an approach that is based on comparing estate tax returns to wealth of the living population. This procedure, however, needs to make some assumptions on the appropriate mortality rates to use and cannot account for adjustments done shortly before death, which are found to be substantially significant (Kopczuk 2007). Using US estate tax data for filers in 1977, Kopczuk (2007) is able to identify taxpayers who suffered (and for how long) a terminal illness before dying. He concludes that wealth accumulation for the very wealthy continues until the onset of a terminal illness and that tax avoidance is particularly pronounced shortly before death.

An alternative approach is to rely on audits. Eller et al. (2001) find that in 60% of the cases the assessed tax increased after the audit, indicating an important role for enforcement. Changes primarily involved revaluation of assets, with noncompliance spread out over most categories of assets, but mainly affecting mortgages, insurance and closely held stock.

One of the main conclusions that can be extracted from the existing literature is that most of the studies analysing behavioural responses to bequest taxation are focused on the US and use estimation strategies which are not particularly appealing by the post-“credibility revolution” standards of what constitutes a convincing empirical design (Kopczuk 2017).

Some recent evidence of the impact of inheritance taxation on wealth accumulation is provided by Goupille-Lebret & Infante (2018), which are able to disentangle the different components of behavioural responses. Using French Assurance-vie accounts data, authors take advantage of age and time discontinuities contemplated in the inheritance tax scheme and implement a bunching approach to estimate inter-temporal shifting elasticity in short and medium term. Authors also use a difference-in-difference setting to estimate shifting among asset portfolio and real responses. Although the analysis does not allow to observe other types of assets, it convincingly indicates the presence of important but relatively small responses.

Glogowsky (2016) also undertakes a bunching approach to analyse behavioural responses to wealth transfer taxation in Germany. He finds large bunching of taxable inheritances and taxable inter vivos gifts. However, the underlying taxable inheritance and gifts elasticities are moderate and amount up to 0.11.
Escobar (2017) uses a regression discontinuity design to estimate the extent of estate size under-reporting after the repeal of the Swedish tax on spousal bequests. Results show that estate sizes were 17 percent lower, and that 8 percent fewer estates were liable to taxation, because of tax planning.

The contribution of this study to the existing literature is precisely the provision of new empirical evidence of behavioural responses to inheritance taxation. In particular, by exploiting a natural experiment resulting from an inheritance tax policy change it will be able to identify the reaction of the taxpayers to the almost “repeal” of the tax. Although it is a similar setting to the one studied in Escobar (2017), it still has relevant differences that allow to answer different questions.

First, in the Swedish context the tax repeal was applicable only to spousal bequests, whereas in the context under study the tax repeal was applicable to all close inheritors. This is important because descendants might respond differently than spouses. Additionally, the Swedish study looks at the effect on the estate size, whereas this paper will try to analyse whether there is an effect on bequests’ distribution as well. Finally, this paper will try to understand the mechanism underlying the results by looking at heterogeneous effects by types of assets.

Other studies have also used repeals or important reforms of the inheritance tax carried out in different countries to analyse other outcomes affected by those measures (Tsoutsoura 2015, Gans & Leigh 2006). However, the effect of the abolishment of such tax on bequests has not been extensively studied because data is usually no longer available after the abolishment of the tax.

3 Institutional setting

The Inheritance tax is levied on heirs and depends on the degree of kinship with the deceased. Therefore, who inherits matters. The Spanish Inheritance Tax is transferred to regional governments, who have some normative capacity to modify specific features of the tax and also are in charge of its administration and control. Given this decentralization, during the period under analysis inheritance taxpayers in Catalonia were those heirs, who residing
anywhere in Spain, inherited from a deceased who was living in Catalonia.\textsuperscript{2,3}

The tax base is the sum of inherited wealth, life insurance payments and other specific assets determined by law\textsuperscript{4}. Once the tax base is computed, some tax deductions might be applied. These tax deductions depend on (a) heirs characteristics (age, degree of disability) and family relationship with the deceased, and (b) on the type of assets inherited\textsuperscript{5}.

Whereas the tax base is defined according to the Inheritance Tax Law approved by the Central Government\textsuperscript{6}, regional governments have legislative power to regulate tax deductions and tax credits. To this regard, the first type of tax deductions (\textit{type a}) were modified several times between 2009 and 2014 by the Catalan government. See Table 1 for a more detailed information.

If the net tax base, defined as the tax base minus the tax deductions exposed above, is positive, progressive tax rates are applied to compute the tax liability. Tax rates also depend on the family relationship with the deceased.\textsuperscript{7} For close inheritors (first and second degree of kinship), tax rates ranged from 7.42\% to 32.98\% with 16 tax brackets until December 31, 2009.

\textsuperscript{2}In terms of inheritance taxation, a deceased will be considered a Catalan resident if he/she lived most of the time in Catalonia during the last 5 years before death. When it is not obvious where to fix the deceased residence, the Law contemplates specific rules that rely on personal income criteria.

\textsuperscript{3}On January 1, 2015, came into force a legislation change that broadened this criteria as a result of a sentence from the EU Justice Tribunals (Case C-127/12), which condemned the existing discrimination between Spanish and other EU residents with respect to the Spanish Inheritance and gifts tax law. From that time onwards, other taxpayers can apply the inheritance legislation foreseen in Catalonia: i) heirs residing in Catalonia that inherit from a deceased who was an EU resident, and most of the assets are located either in Catalonia or elsewhere outside Spain; ii) heirs who are EU residents and inherit Spanish life insurance benefits or assets located in Spain from a deceased who was living in Catalonia; iii) heirs residing outside Spain who inherit Spanish life insurance benefits or assets located in Spain from a deceased who was an EU resident, and most of such inherited assets are located in Catalonia. For an EU resident I refer to individuals living in EU countries other than Spain.

\textsuperscript{4}The law foresees some conditions on how and when one should include to the tax base assets that were held by the deceased shortly before passing away but were not owned at the moment of death.

\textsuperscript{5}For some types of assets, such as life insurance, business assets or closely-held shares, descendant main dwelling, etc., the law contemplates a deduction of 95\% of the net asset value.

\textsuperscript{6}Ley 29/1987, de 18 de diciembre, del Impuesto sobre Sucesiones y Donaciones.

\textsuperscript{7}Until the end of 2009 tax rates depended on heirs’ pre-existing wealth as well, but this aspect goes beyond the precision and details this paper intends to provide.
Table 1: *Type-a* tax base deductions, 2008-2015

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</thead>
<tbody>
<tr>
<td>Descendants younger 21</td>
<td>18,000 + 12,000*(21-age)</td>
<td>Max 144,000</td>
<td>Max 104,000</td>
<td>Max 138,875</td>
<td>Max 130,000</td>
</tr>
<tr>
<td>Spouse</td>
<td>18,000</td>
<td>125,000</td>
<td>312,500</td>
<td>500,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Direct descendant</td>
<td>18,000</td>
<td>68,750</td>
<td>171,875</td>
<td>275,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Other descendant</td>
<td>18,000</td>
<td>37,500</td>
<td>93,750</td>
<td>150,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Grandparent</td>
<td>18,000</td>
<td>25,000</td>
<td>62,500</td>
<td>100,000</td>
<td>30,000</td>
</tr>
<tr>
<td>Other relative</td>
<td>5,000</td>
<td>12,500</td>
<td>31,250</td>
<td>50,000</td>
<td>9,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Degree of disability</th>
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</tr>
</thead>
<tbody>
<tr>
<td>33-64%</td>
<td>245,000</td>
<td>275,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 65%</td>
<td>570,000</td>
<td>650,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heirs older than 75</td>
<td>N/A</td>
<td>275,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Amounts expressed in euros. Distant relatives are siblings and those who have a 3rd degree of kinship with respect to the deceased.

From January 1, 2010 onwards, tax rates were simplified and ranged from 7% to 32% with 5 tax brackets. For inheritors with third and fourth degree of kinship, the taxes rates just exposed have to be multiplied by 1.5882 and 2, respectively. The last step to compute the tax liability is to consider the tax credits foreseen in the Law. From 2011 onwards, the Catalan Inheritance Tax Law contemplated a 99% discount on the tax liability, which was applicable only to close heirs. Given the relevance of this reform throughout the paper, additional information about its introduction is provided in the next section. Such tax credit was applicable until January 31st, 2014. From February onwards, it remained the same for spouses but it was reduced for other close inheritors. Taxpayers have up to 6 months after the date of death to submit the tax returns to the Catalan tax agency.

Regarding inheritance assessment rules, the Inheritance Law foresees that all assets should be valued by its market price. For financial assets such as bank accounts, bonds, quoted shares, etc., it is the bank or investment office who provides a certificate with such information. In turn, the inheritor will be requested to attach these certificates to the inheritance tax return when submitting it to the tax authorities. Therefore, in these cases it is very straightforward for inheritors to value such assets and for the tax administration to check whether it has been done correctly. Nevertheless, there are other assets such as real estate, closely-held business, jewellery, art pieces, etc., whose valuation is not that straightforward. In most of the cases there

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8From February 1, 2014, the tax credit rate applicable to close heirs other than spouses decreases in a regressive way with the tax base, ranging from 99% for the first bracket (tax bases below €100,000) to 20% for the eleventh and last bracket (tax bases above €3,000,000).

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aren’t available market price assessments of these assets, so inheritors will have to value them themselves or hire an appraisal expert. With respect to closely-held businesses, taxpayers can use the assessment rules determined in the Spanish Wealth Tax Law\(^\text{9}\), which mainly rely on balance sheets (and not necessarily reflect its market value).

Regarding real estate, the tax administration knows the ownership of all registered properties located in Spain and their administrative value (known as cadastral value), but it does not have their market price. Therefore, the tax agency needs to infer the market price somehow in order to validate the value reported by the inheritors. It does so by adjusting the cadastral value with some coefficients that are determined at municipal level and reviewed every year\(^\text{10}\). These real estate assessment rules are publicly available\(^\text{11}\). The Catalan Tax Agency publishes the coefficients and the assessment instructions by year, stating clearly that real estates whose reported value is below this adjusted administrative value will be classified as priority in terms of auditing. Therefore, at least for real estate taxpayers know the minimum value they have to report to avoid being audited.

### 3.1 The “repeal” of the inheritance tax

The abolishment of the Inheritance tax in Catalonia had been requested from different spheres of society, both political and social\(^\text{12}\). The political coalition who won the Catalan Regional Elections in November 2010 contemplated the abolishment of the inheritance tax in its political program, however, the debate of such measure did not arise until the end of January 2011. It was an extremely controversial proposal given that the Catalan economy was severely harmed by the economic crisis and the government had to adopt rigorous austerity measures to reduce fiscal deficit. The majority of the opposition parties and part of the public opinion begged to postpone its implementation and threatened the government to vote against the Budgetary

\(^{9}\)Ley 19/1991, de 6 de junio, del Impuesto sobre el Patrimonio.
\(^{10}\)More precisely, the adjusted value corresponds to the 80% of the cadastral value corrected with the multiplying coefficients.
\(^{11}\)https://atc.gencat.cat/ca/normativa-i-criteris/valoracions-immobiliaries/instruccions-comprovacio-valors/
\(^{12}\)Just to provide some anecdotal evidence, by the end of 2008 a popular association was created to protest against inheritance taxation in Catalonia (see http://www.nosuccessions.org) and one year later they managed to carry out a bus advertisement campaign in the main Catalan cities (see http://www.eleconomista.es/economia/noticias/1635571/10/09/Un-cadaver-con-una-etiqueta-de-cobrado-para-protestar-contra-el-impuesto-de-sucesiones.html).
Laws if the reform was carried on. Given this situation, the potential inheritance tax amendment evolved with high uncertainty. Finally, on June 1, 2011, the Catalan Parliament approved the “repeal” of the inheritance tax for bequests given to descendants, (grand)parents and spouses. One week later the legislation was modified accordingly.

In fact, it was not a proper abolishment of the tax, but a significant reduction of the tax liability. The reform consisted on the introduction of a 99% discount of the tax liability for close inheritors (descendants, spouses and (grand)parents). Other heirs with a more distant family relationship with the deceased (including siblings) could not benefit from the reform. This new measure entered into force on June 15, 2011, and was applicable to all deceases occurred from January 1, 2011, onwards. Such retroactive effect ensures the absence of any behavioural response regarding the timing of death.

4 Data

The data employed in this paper is the universe of anonymized inheritance tax returns from Catalan tax residents between 2008 and 2015. This data has been provided by the Catalan Tax Agency and contains most of the information reported in the tax returns: heirs’ age and family relationship with the deceased, inherited wealth and computations of the tax base and the tax liability.

Inherited wealth is fully self-reported by the taxpayer (the inheritor), although it is required to accompany bank statements and other valuation proofs. The taxpayer should also report the composition and the overall value of the estate of the deceased. However, if there is more than one inheritor this is not always done correctly. To deal with this misreporting issue, the overall estate of a particular deceased will be computed as the sum of the inheritances reported by their heirs.

Regarding some general facts, on average 44,236 estates are reported to the tax authorities every year, and the average number of inheritors for a given estate is 2.33. Table 2 provides some information on how estates are distributed among heirs and Table 3 provides descriptive statistics on inheritances, distinguishing between close (descendants, spouses and (grand)parents) and “distant” (siblings, uncles, cousins, nieces, etc.) heirs.
Table 2: Estate assignment

<table>
<thead>
<tr>
<th>Inheritor type</th>
<th>Portion of taxpayers (%)</th>
<th>Inherited wealth over total estate (%) mean (std. dev.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spouses</td>
<td>19.6</td>
<td>70.7 (35.96)</td>
</tr>
<tr>
<td>Descendants younger than 21</td>
<td>2.4</td>
<td>30.8 (25.19)</td>
</tr>
<tr>
<td>Other descendants</td>
<td>64.6</td>
<td>36.7 (27.25)</td>
</tr>
<tr>
<td>Parents</td>
<td>1.0</td>
<td>60.4 (30.47)</td>
</tr>
<tr>
<td>Distant relatives</td>
<td>9.8</td>
<td>35.5 (31.73)</td>
</tr>
<tr>
<td>No family relationship</td>
<td>2.6</td>
<td>36.7 (34.83)</td>
</tr>
</tbody>
</table>

Obs: 789,320

Table 3: Close vs. Distant inheritors

<table>
<thead>
<tr>
<th>Period</th>
<th>% taxpayers with positive tax liability</th>
<th>Taxpayers with tax liability&gt;0</th>
<th>Taxable base (€)</th>
<th>Tax liability (€)</th>
<th>Average tax rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Close</td>
<td>Distant</td>
<td>Close</td>
<td>Distant</td>
<td>Close</td>
</tr>
<tr>
<td>2008-2009 Mean</td>
<td>38.55</td>
<td>71.96</td>
<td>159,247</td>
<td>96,914</td>
<td>12,016</td>
</tr>
<tr>
<td>1st half 2010 Mean</td>
<td>13.70</td>
<td>55.28</td>
<td>342,621</td>
<td>126,410</td>
<td>15,880</td>
</tr>
<tr>
<td>2nd half 2010 Mean</td>
<td>5.47</td>
<td>43.41</td>
<td>2,973,253</td>
<td>451,062</td>
<td>67,814</td>
</tr>
<tr>
<td>2011-Feb’14 Mean</td>
<td>4.47</td>
<td>35.81</td>
<td>1,056,484</td>
<td>165,181</td>
<td>1,145</td>
</tr>
<tr>
<td>Feb’14-2015 Mean</td>
<td>14.58</td>
<td>73.52</td>
<td>403,090</td>
<td>89,902</td>
<td>29,594</td>
</tr>
</tbody>
</table>

Note: close inheritors refer to spouses, all descendants and (grand)parents. Distant inheritors refer to siblings, more distant relatives such as uncles, cousins (3rd or higher degree of kinship) or inheritors with no family relationship with the deceased.

5 Methodology

As previously anticipated, this paper will make use of the natural experiment resulting from the quasi-abolishment of the inheritance tax for close heirs to study the effect on reported inheritances and bequests’ distribution.

First, the paper will look at short term responses with the implementation of a Regression Discontinuity Design (RDD). Later on, a Difference-in-Differences (DiD) strategy will be adopted to look at longer term responses.
5.1 Short term responses (RDD)

The identification strategy relies on the randomness in the date of death within a certain time threshold. Although different studies provide evidence of death responses to tax changes (Kopczuk & Slemrod (2003), Gans & Leigh (2006) and Eliason & Ohlsson (2008, 2013)), the reform under analysis offers a nice setting because it was approved on June, 2011, but was applicable to all deceases occurred from January 1, 2011. Such retroactive effect reinforces the assumption of no responses regarding the timing of death. In fact, together with the tax return, taxpayers have to provide a medical certificate of death, which cannot be modified once it has been registered.

Figure 1 provides the histogram of deaths reported to the tax authority two months before and after the reform took place. At first sight it does not seem to be bunching of deaths during the first days of 2011. To confirm there is no manipulation at the cutoff, I ran the RD manipulation test proposed in Cattaneo et al. (2018) for different bandwidths, and also a binomial test to check that the probability of dying just two weeks before or two weeks after January 1st is not different from 50%. Both tests fail to reject the null hypothesis of no manipulation at the cutoff.\footnote{The statistic and p-value for the rddensity test (Cattaneo et al. 2018) is -1.1174 and 0.2638, respectively, when using a bandwidth of 100 days; statistic/p-value of 1.1717/0.2413 for a bandwidth of 180 days; statistic/p-value of -0.9968/0.3189 for a bandwidth of 15 days. The two-sided p-value from the binomial test is 0.26567.}

Figure 1: Histogram of deceases reported to the tax authority

![Histogram of deceases reported to the tax authority](image)
Another characteristic feature of the reform is that it was not applicable to all inheritors. Descendants, spouses and (grand)parents of the deceased could benefit from the tax credit but siblings, nieces/nephews, aunts/uncles, cousins or more distant relatives could not. From now on I will refer to the two groups (those targeted by the reform and those not) as close and distant inheritors, respectively. Looking at the data one can clearly see that it is very unlikely that the same estate is distributed among the two groups. Figure 2 shows that either everything, or nothing, is left to close relatives, and this happens before and after the reform. This is the case because before the reform the Inheritance Tax Law was already favouring close inheritors. Therefore, as data shows, it is very likely that the deceased will distribute the estate among close relatives only, in case to have them. Otherwise, everything is left to distant relatives. This clear distinction on how bequests are assigned provides a control group (distant heirs who inherit most of the estate), although there are not as many observations as in the treated group.

Figure 2: Estate distribution among heirs

Notes: The y-axis refers to the fraction of estates. The x-axis indicates the portion inherited by close heirs as a group, adding up the individual portion inherited by descendants, spouses and (grand)parents. In order to focus on large estates, only those above €500,000 are considered. Bin width: 0.02.
The empirical analysis will focus on inheritances placed at the top of the distribution (top 5%), given that smaller bequests were not affected by this reform because they were already excluded from the tax\textsuperscript{14}. According to the distribution of reported inheritances in 2010, the top 5% starts at €311,000.

Figures 3 and 4 provide some descriptive evidence of how tax liabilities, average tax rates and marginal tax rates changed with the reform, for close (treated) and distant (non-treated) inheritors.

**Figure 3: Changes in the tax liability**

Notes: Each dot represents a weekly average. Close inheritors' figure considers those placed at the top 5% of inheritances distribution (9222 observations). Because the number of distant heirs is much lower than close heirs, the figure regarding distant inheritors includes those placed at the top 30% of inheritances distribution (5789 observations).

From Figure 4 it can be appreciated that average and marginal tax rates of close inheritors decreased during the second half of 2010 (from week -26 to 0 in the graphs). This is the case because tax deductions increased during that period\textsuperscript{15}. Given that the RDD setting captures the effect at the cut-off, this change should not involve big drawbacks.

\textsuperscript{14}Tax deductions were quite high in 2010 and, consequently, the net tax base was zero (see Section 3 for more details).

\textsuperscript{15}See Section 3 for more information
Figure 4: Changes in the average and marginal tax rates

(a) Average tax rates

(b) Marginal tax rates

Notes: Each dot represents a weekly average. Close inheritors’ figure considers those placed at the top 5% of inheritances distribution (9222 observations). Because the number of distant heirs is much lower than close heirs, the figure regarding distant inheritors includes those placed at the top 30% of inheritances distribution (5789 observations).
It is important to mention that among those close heirs placed at top 5% of inheritances distribution, there were some of them already treated before the reform, and some others who did not benefit from it once it was approved. The first case occurs because taxpayers can apply additional tax deductions if they inherit certain types of assets or belong to targeted groups like elderly or disabled. In such situations, if tax deductions are large they might face very low, or null, tax rates. The second case is related with the retroactive implementation of the reform. Few taxpayers had already prepared the tax returns before the reform was approved and they did not bother to submit a substitute tax reform to benefit from the tax credit.

Figure 5 shows the exposure to treatment as time approaches January 1, 2011. Treatment is defined as facing very low marginal tax rates (below 1%). After January 1st all close inheritors are treated, except very few that submitted the tax returns before the reform was approved. All these considerations lead towards the implementation of a Fuzzy RDD.

Figure 5: Treatment exposure

Notes: Each dot represents the weekly average of taxpayers exposed to treatment (i.e. facing a marginal tax rate below 1%). The figure only considers close heirs who reported inheritances above €311,000 (top 5% of the distribution).
The significant cut on the tax liability could incentivise: (i) to report assets previously undeclared, and (ii) to “overvalue” those assets that could generate capital gains in the future, such as real estate or closely held stocks. If the first effect dominates, assets which are easier to evade, such as financial assets (offshore accounts), should be more responsive. On the other hand, if the second effect dominates, assets whose valuation is easier to adjust, such as real estate, should be more responsive. We will dig into this by looking at responses by assets types.

Some additional methodological comments before proceeding with the empirical analysis: all RDD results shown in the Results section have been estimated using linear trends; several time bandwidths have been considered in the estimations (from 8 to 40 weeks before and after the cut-off - January 1, 2011 -); and all monetary values are expressed in January 2011 euro.

5.2 Long term responses (DiD)

The RDD setting used so far only provides local responses close to the cut-off. On the contrary, a difference-in-differences strategy will allow us to obtain longer term responses.

The definition of the treatment group needs to be more restricted in this setting for several reasons. First, some close heirs placed at the top 5% of inheritances distribution where already treated before the reform was applicable because of the large tax deductions (this is the reason why a Fuzzy RDD is implemented in the previous sub-section). The inclusion of these taxpayers who were already treated before January 1, 2011, could invalidate the parallel trends assumption. The second reason relates to how the 99% tax credit is regulated after January 31, 2014. As explained in Section 3, from February 2014 onwards, the tax credit remained the same for spouses but it was reduced for other close inheritors.

Given these two reasons, with respect to the treatment group I will focus on descendants placed at the top 1% of inheritances distribution. This way I make sure that: (i) all of them were treated at January 1, 2011, and not before, and (ii) all of them were affected equally after January 31, 2014, by the second tax credit reform. Regarding the control group, I will consider distant heirs placed at the top 30% of inheritances distribution to have a
reasonable sample size.\textsuperscript{16}

Figure 6 shows the evolution of marginal tax rates, relative to the second half of 2010 (just before the reform took place), for treated and control group. One can see that marginal tax rates decrease significantly in 2011 for descendants and remain unchanged for distant heirs. On the contrary, tax rates increase again in the first half of 2014 for descendants.

Whereas the RDD setting only allows to capture short-term responses adopted by the inheritors, the DiD strategy allows to study potential real responses from the deceased as well. One of such real responses could be, for instance, distributing the estate among less inheritors. When inheritance taxation is high and progressive, individuals might have the incentive to distribute the estate as much as possible. This incentive vanishes when inheritance taxation is low. To study whether this is the case, we will look at the effect of the 2011 tax cut on the individual portion inherited. Additionally, we will keep analysing the effect on reported inheritances.

The DiD specification employed is the following:

\[ Dep.var_{i,t} = \sum_{h \neq 2010} \beta^C_h \cdot Hyear_{h=t} + \sum_{h \neq 2010} \beta^T_h \cdot Hyear_{h=t} \cdot Treat_i + \nu_{i,t} \]  

(1)

Where \( Dep.var_{i,t} \) is log of reported inheritance or portion inherited by taxpayer \( i \) in semester \( t \), \( Hyear_{h=t} \) is a dummy that equals 1 when the semester equals \( t \) and \( Treat_i \) is a dummy that equals 1 if taxpayer \( i \) belongs to the treatment group.

Some other methodological comments before proceeding to the results: percentiles of inheritances distribution are defined yearly; all monetary values are expressed in January 2011 euro.

\textsuperscript{16}Since the number of distant heirs is much lower than close heirs, estimations would not be possible when considering as control group only those distant heirs placed at the top 1% of inheritances distribution.
6 Results

6.1 Short term responses

Figure 7 provides reduced form estimates of the effect of the tax cut on reported inheritances (in logs). The “Intention to Treat” (ITT) effect is higher when only few weeks are considered into the regressions, but when the time bandwidth broadens and more observations are added, the coefficient stabilizes around 20%. Figure 8 at the top shows the “Treatment on Treated” (TOT) estimates resulting from the implementation of a Fuzzy RDD through instrumental variables. Figure 8 at the bottom compares ITT and TOT estimates. TOT coefficients indicate that those taxpayers facing very low (or null) marginal tax rates increase reported inheritances by 40%.

Figures 9, 10 and 11 provide some placebo tests. Figure 9 compares reported inheritances before and after the reform by distant inheritors placed
at the top 30% of inheritances distribution\textsuperscript{17}. According to the distribution of reported inheritances in 2010, the top 30% starts at €78,000. Figure 10 compares reported inheritances before and after the reform by close heirs placed at percentiles 80-90 of inheritances distribution. Such inheritors were not affected by the reform because they were already facing zero tax liability. Figure 11 shows the estimates on reported inheritances by the group under study (close heirs placed at the top 5% of inheritances distribution) using January 1, 2012, as the cut-off. None of the coefficients reported in those three figures are statistically significant different from zero.

Figures 12 and 13 try to shed some light on the mechanisms driving the responses on reported inheritances. The approach being used so far only provides very short term responses, thus they can not reflect any real behaviour from the deceased, especially because they had already passed away when the reform was approved. Consequently, the substantial increase in reported inheritances can only be driven by reporting responses from inheritors.

As already anticipated in the previous section, the significant cut on the tax liability could incentivise: (i) to report assets previously undeclared, and (ii) to “overvalue” those assets that could generate capital gains in the future\textsuperscript{18}. Examples of assets commonly unreported are unproductive assets such as art pieces, jewellery, antiques, etc. and offshore accounts. Examples of assets that could generate capital gains in the future and are self assessed by the inheritors are real estate, closely-held businesses and unproductive assets such as art pieces, antiques, etc. If taxpayers perceived the low inheritance taxation as an opportunity to declare and regularize assets previously hidden by the deceased, we should observe an increase in the reported value of the first type of assets. If taxpayers wanted to take advantage from the low inheritance taxation and minimize potential income taxes faced in the future, we should observe an increase in the reported value of the second type of assets.

Taking all this into consideration, Figure 12 shows RDD reduced form estimates when looking at reported values of real estate and financial assets (both in logs). The selection of these two types of assets is motivated by...

\textsuperscript{17}Since the number of distant heirs is much lower than close heirs, there are more percentiles considered in this placebo test (70-100) to have a reasonable sample size.

\textsuperscript{18}Given that capital gains are subject to personal income taxation in Spain, over-assessing inherited assets might be useful in the case of a potential sale because it will help to reduce capital gains (computed as the difference between the selling price and the value reported in the inheritance tax return.)
the fact that are the ones most commonly reported\textsuperscript{19}. One can check that coefficient estimates on real estate values are very similar to those presented in Figure 7. On the other hand, financial assets estimates are negative and mostly insignificant. These findings suggest that real estate assessment is what is driving most of the results. Figure 13 will help to validate this conclusion.

As explained in Section 2, since Tax Authorities do not have the market value of real estate properties, they define an adjusted administrative value\textsuperscript{20} in order to determine those inheritances that should be audited. The Catalan Tax Agency makes clear in the real estate assessment instructions that properties valued below the adjusted administrative value will be prioritized with respect to auditing procedures. Indeed, data confirms that taxpayers are aware of this criteria. Figure A1 in the Appendix shows the distribution of the real estate assessment over its adjusted administrative value. One can see there is a clear bunching at 1, meaning that real estate is valued exactly at its adjusted administrative value.\textsuperscript{21}

Figure 13 shows the impact of the reform on real estate assessment, relative to its adjusted administrative value. The coefficients show a positive and significant effect on real estate assessments. The number of observations of these estimations is lower because some taxpayers do not provide all the information needed to compute the adjusted administrative value.

The conclusions that can be extracted so far are that facing low, or very low indeed, tax rates does not encourage taxpayers to declare hidden wealth, but rather to take advantage from the low taxation and over-value assets that could generate capital gains in the future, such as real estate. This response can be easily adopted provided that such assets are self-assessed by taxpayers.

\textsuperscript{19}Other types of assets have been omitted because of the low number of inheritors reporting positive amounts.

\textsuperscript{20}The adjusted value corresponds to the 80\% of the cadastral value corrected with a multiplying coefficient defined at municipal level every year.

\textsuperscript{21}The bunching at 1.25 reflects a misunderstanding of the assessment rules. The adjusted administrative value defined by the Catalan Tax Agency is also used in the transfer tax, but with one difference: the cadastral value is not multiplied by 0.8. Therefore, some inheritance taxpayers take as reference the adjusted administrative value applied for the transfer tax and not for the inheritance tax.
Figure 7: Impact on reported inheritances

(a) Changes in reported inheritances

(b) RDD Estimates -ITT-

Notes subfigure (b): The figure shows OLS point estimates and 95% confidence intervals for different time bandwidths (weeks). The numbers just above the x-axis are the observations used in each time bandwidth. Standard errors are clustered by taxpayers who inherit from the same deceased. The sample considered are close heirs whose reported inheritances exceed €311,000 (top 5%). The dependent variable is log of reported inheritances.
Figure 8: Impact on reported inheritances (II)

(a) RDD Estimates - TOT -

(b) RDD Estimates. Comparison between ITT and TOT

Notes subfigure (a): The figure shows IV point estimates and 95% confidence intervals for different time bandwidths (weeks). The numbers just above the x-axis are the observations used in each time bandwidth. Standard errors are clustered by taxpayers who inherit from the same deceased. The sample considered are close heirs whose reported inheritances exceed €311,000 (top 5%). The dependent variable is log of reported inheritances.

Notes subfigure (b): The figure shows OLS point estimates from Figure 7(b) and IV point estimates from Figure 8(a).
Figure 9: Placebo test: distant inheritors

(a) Changes in reported inheritances

(b) RDD Estimates

Notes subfigure (b): The figure shows OLS point estimates and 95% confidence intervals for different time bandwidths (weeks). The numbers just above the x-axis are the observations used in each time bandwidth. Standard errors are clustered by taxpayers who inherit from the same deceased. The sample considered are distant heirs placed at the top 30% of inheritances distribution. The dependent variable is log of reported inheritances.
Figure 10: Placebo test: close inheritors placed at percentiles 80-90

(a) Changes in reported inheritances

(b) RDD Estimates

Notes subfigure (b): The figure shows OLS point estimates and 95% confidence intervals for different time bandwidths (weeks). The numbers just above the x-axis are the observations used in each time bandwidth. Standard errors are clustered by taxpayers who inherit from the same deceased. The sample considered are close heirs placed at percentiles 80-90 of inheritances distribution. The dependent variable is log of reported inheritances.
Figure 11: Placebo test: cut-off at January 1, 2012

(a) Changes in reported inheritances

(b) RDD Estimates

Notes subfigure (b): The figure shows OLS point estimates and 95% confidence intervals for different time bandwidths (weeks). The numbers just above the x-axis are the observations used in each time bandwidth. Standard errors are clustered by taxpayers who inherit from the same deceased. The sample considered are close heirs whose reported inheritances exceed €311,000 (top 5%). The dependent variable is log of reported inheritances.
Figure 12: Responses by types of assets

(a) Real estate

(b) Financial assets

Notes: Subfigures (a) and (b) shows OLS point estimates and 95% confidence intervals for different time bandwiths (weeks). The numbers just above the x-axis are the observations used in each time bandwidth. Standard errors are clustered by taxpayers who inherit from the same deceased. The sample considered are close heirs whose reported inheritances exceed E311,000 (top 5%) and report positive real estate for subfigure (a) and positive financial assets for subfigure (b). The dependent variable in subfigure (a) and (b) is log of reported real estate and financial assets, respectively.
Figure 13: Real estate assessment

(a) Changes in real estate assessment

(b) RDD estimates -ITT-

Notes subfigure (b): The figure shows OLS point estimates and 95% confidence intervals for different time bandwidths (weeks). The numbers just above the x-axis are the observations used in each time bandwidth. Standard errors are clustered by taxpayers who inherit from the same deceased. The sample considered are close heirs whose reported inheritances exceed €311,000 (top 5%). The dependent variable is the ratio of real estate assessment over its administrative adjusted value.
6.2 Long term responses

Figure 14 provides the difference-in-differences estimates resulting from specification (1) when using as a dependent variable the log of reported inheritances. The first point that needs to be made is that the coefficient estimates from the pre-reform period (2008 to 2010) confirm the parallel trends assumption and thus validate the identification strategy of this methodology.

Looking at the post-reform coefficients, results reflect an immediate response in the first half of 2011, with a magnitude of 40%, which is very similar to the estimates obtained from the RDD setting. The effect remains statistically significant until the second half of 2013 and, interestingly, it vanishes in the first half of 2014, when the 99% tax credit is reduced.

Figure 14: Evolution of reported inheritances, 2008-2015

Notes: The total number of observations is 15,653; 3,988 obs (25%) for treated group, 11,665 obs (75%) for control group. Figure in the left shows the evolution of reported inheritances (in logs) for treated (descendants) and control group (distant heirs), relative to the 2nd half of 2010. Figure in the right shows the difference-in-differences estimates. Standard errors are clustered by taxpayers who inherit from the same deceased.
To confirm what we learned from the RDD results, this is, the mechanism driving the responses is the over-assessment of real estate, we will compare again the properties’ reported values with their adjusted administrative value defined by the tax administration. Figure 15 provides the difference-in-differences estimates resulting from specification (1) when using the real estate assessment ratio\(^{22}\) as a dependent variable.

Again, parallel trends assumption holds and the post-reform coefficients remain positive and statistically significant until the end of 2013, just before the 99% tax credit is reduced. These results reinforce the conclusion reached so far about real estate over-assessment.

Figure 15: Evolution of real estate assessment ratio, 2008-2015

Notes: The total number of observations is 10,571; 2,851 obs (27%) for treated group, 7,720 obs (73%) for control group. Figure in the left shows the evolution of the real estate assessment ratio for treated (descendants) and control group (distant heirs), relative to the 2nd half of 2010. Figure in the right shows the difference-in-differences estimates. Standard errors are clustered by taxpayers who inherit from the same deceased.

\(^{22}\)The ratio is computed as a taxpayer average of reported real estate over its adjusted administrative value.
Last, Figure 16 provides the difference-in-differences estimates resulting from specification (1) when using as a dependent variable the portion inherited by each taxpayer. By looking at the coefficient estimates one can see that the 2011 tax cut did not affect the portion inherited by the descendants, so it did not influence how inheritances are distributed.

Figure 16: Evolution of portion inherited, 2008-2015

Notes: The total number of observations is 15,653; 3,988 obs (25%) for treated group, 11,665 obs (75%) for control group. Figure in the left shows the evolution of the portion inherited for treated (descendants) and control group (distant heirs), relative to the 2nd half of 2010. Figure in the right shows the difference-in-differences estimates. Standard errors are clustered by taxpayers who inherit from the same deceased.
7 Conclusions

Although the debate about wealth and inheritance taxation has revived in recent times, especially when considering the rise in income and wealth inequality, convincing empirical evidence on behavioural responses to this kind of taxation is still scarce (Kopczuk 2017). This paper contributes to this literature by providing new empirical evidence on behavioural responses to inheritance taxation.

Using the universe of inheritance tax returns of Catalan tax residents from 2008 to 2015, the paper exploits a natural experiment resulting from an important tax reform: the quasi-repeal of the inheritance tax for bequests given to close relatives. By implementing a regression discontinuity design and a difference-in-differences strategy, it estimates the effect of such reform on reported inheritances and bequests distribution.

Results suggest that taxpayers adopt reporting rather than real responses. Main findings indicate that taxpayers facing very low (below 1%) tax rates increase reported inheritances by 40%. When looking at responses by types of assets inherited, estimates suggest that low inheritance taxation does not encourage inheritors to declare wealth unreported by the deceased (such as offshore accounts). On the contrary, taxpayers benefit from the low inheritance taxation by over-valuing real estate, which could generate capital gains in the future. This behaviour cannot be associated to evasion of the inheritance tax but helps to evade future personal income taxes and, consequently, it has a direct and negative impact on personal income tax revenues.

Such responses can take place because of the non-availability of real estate market prices, fact that complicates its correct assessment and control for taxpayers and tax administration, respectively. Therefore, these responses could be avoided by replacing the real estate self-assessment from taxpayers with the provision of accurate market price estimations from the tax administration. With an extensive use of information beyond administrative records and the employment of big data techniques, this might be a feasible solution. In fact, it is a desirable solution, because it would increase equity and fairness in the tax system, not only in the inheritance tax, but also in others such as transfer, wealth or personal income taxes.
References


Appendix

Figure A1: Histogram of real estate assessment over its adjusted administrative value

Notes: Real estate assessment ratio is computed as a taxpayer average of reported real estate over its adjusted administrative value. All inheritance taxpayers between 2008 and 2015 who have reported the information that allows to compute the adjusted administrative value are considered.