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ABSTRACT: In the throes of economic crisis, the Spanish government decided to reintroduce the Wealth Tax, appealing to redistributive motives and its need for greater revenues. This paper studies how individuals reacted to the reintroduction of this tax by drawing on the universe of wealth tax returns submitted to the Catalan Tax Agency between 2011 and 2015. Thus, we exploit the variation in treatment exposure to analyse taxpayers' responses, in terms not only of wealth accumulation, but also of the potential avoidance strategies adopted. Indeed, our results reflect avoidance rather than real responses. They show that while facing higher wealth taxes did not have a negative effect on taxpayers' savings, it did encourage them to change their asset and income composition to take advantage of wealth tax exemptions (mostly business-related) and the existence of a limit on wealth tax liability. This translates into an elasticity of taxable wealth with respect to the net-of-tax rate of return of 0.64, or, put differently, a 0.1 percentage point increase in the average wealth tax rate leads to a reduction in taxable wealth of 3.24% over 4 years. Overall, these avoidance responses are quite marked in terms of tax revenues: they represent a 4-year accumulated revenue loss of 2.6 times the 2011 estimated wealth tax revenues. The existence of such responses mostly related to the design of the wealth tax has relevant policy implications not only in terms of revenues but also insofar as it undermines the tax's redistributive role.

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1 Introduction

In the mid-eighties, about half the OECD countries imposed an annual net wealth tax, but today it is maintained solely by Spain, Norway and Switzerland (OECD, 2018). However, rising wealth inequality[1] has revived the debate about the desirability of wealth taxes, not only in academic but also in political and public circles.[2] To date, though, there is a lack of convincing empirical evidence about the behavioural responses associated with wealth taxation that might help analysts form a well-grounded position on the need to implement such a tax (Seim, 2017; Brülhart et al., 2017; Zoutman, 2018; Londoño Vélez and Ávila-Mahecha, 2019; Jacobsen et al., 2019).

The aim of this paper, therefore, is to contribute to this literature by studying how taxpayers reacted to the reintroduction of the Spanish Net Wealth Tax in 2011. Spain provides a good setting in which to study this tax given that it is one of the few countries that continues to impose it. Moreover, it is generally accepted that tax evasion is more widespread here than in other European countries, so our results might have relevant tax policy implications. Finally, behavioural responses to wealth taxes in the country have not been previously examined.[3]

In Spain, wealth taxation has been transferred to sub-central governments, who have the legislative power to determine certain aspects of its structure. This is particularly relevant when we consider the reintroduction of the tax and its implementation. For this reason, in this study we have opted to focus on one of these sub-central governments (also for questions of data availability), that of Catalonia, which is in fact the region that collects the highest share of Spain's overall wealth tax revenues (about 52% in 2011[4] and 46% in 2015[5]).

Using a panel of tax return micro-data from the universe of Catalan wealth taxpayers between 2011 and 2015, we analyse whether wealth taxes affect wealth

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[1]Following Piketty (2014), several studies have attempted to estimate the evolution of wealth concentration. Zucman (2019) provides a review.

[2]Clear evidence of this is the recent wealth tax proposal made by a US senator, Elizabeth Warren: https://www.warren.senate.gov/newsroom/press-releases/senator-warren-unveils-proposal-to-tax-wealth-of-ultra-rich-americans.
Evidence from the opposite camp comes from France, where the abolition of the net wealth tax in January 2018 led to social unrest, its reinstatement being one of the key demands of yellow vest protesters. See, for instance https://www.wsj.com/articles/france-could-keep-wealth-tax-in-bid-to-placate-yellow-vests-1544025588; http://lavdn.lavoixdunord.fr/518614/article/2019-01-09/le-ps-lance-une-plateforme-numerique-pour-pousser-son-retablissement or http://piketty.blog.lemonde.fr/2018/12/11/yellow-vests-and-tax-justice/.

[3]There exist other studies analysing the Spanish Wealth Tax (e.g. Alvaredo and Saez, 2009; Durán-Cabré and Esteller-Moré, 2010) but they focus mainly on the evolution of wealth concentration. Alvaredo and Saez (2009) also assess, at an aggregate level, the effects of the introduction of business exemption.

[4]https://www.agenciatributaria.es/AEAT/Contenidos_Comunes/La_Agencia_Tributaria/Estadisticas/Publicaciones/sites/patrimonio/2011/jrubikf3a8b3676ae1f33ed00f20cdccba2a93cbf97232f.html

[5]https://www.agenciatributaria.es/AEAT/Contenidos_Comunes/La_Agencia_Tributaria/Estadisticas/Publicaciones/sites/patrimonio/2015/jrubik53b6039ed4d69b32b967df1627a59aab8da95302.html

accumulation and taxable wealth. Additionally, we identify potential avoidance strategies attributable to the design of the Wealth Tax, related primarily to tax exemptions and the existence of a limit on wealth tax liability. Specifically, we examine whether taxpayers reorganize their wealth composition and change the realization of income to benefit from them. Moreover, we also look at the effect of wealth taxes on (reported) gifts. Finally, we seek to verify whether there is a positive relation between wealth tax rates and the probability of a taxpayer not filing wealth tax returns in subsequent years.

As there are no data for the period when the wealth tax was not being imposed, we take advantage of the unexpected reintroduction of the tax by the Catalan Government at the end of 2011. This serves as our control year. We use the variation in treatment exposure, measured through the average tax rates for 2011, to identify the effects of the wealth tax. This variation, driven mainly by different ratios of taxable wealth over total reported wealth and different shares of realized long-term capital gains over taxable income, occurs not only across different levels of wealth, but also within similar levels. Hence, we control non-parametrically for taxpayers' 2011 wealth, income, asset portfolio, age and other relevant characteristics.

When focusing on a balanced panel of the top 50% richest taxpayers, our results show that the taxpayers' response to the reintroduction of the wealth tax was significant. This translates into an elasticity of taxable wealth with respect to the net-of-tax rate of return of 0.64, or, put differently, a 0.1 percentage point increase in the average wealth tax rate leads to a reduction in taxable wealth of 3.24% over 4 years. This effect reflects avoidance rather than real responses. Indeed, while facing higher wealth taxes does not have a negative effect on savings, it does encourage taxpayers to change their asset and income composition to take advantage of wealth tax exemptions (mostly business-related) and the limit on wealth tax liability. The intensity of the responses varies depending on the initial importance of taxpayers' business shares, favouring the use of business exemptions over the limit on tax liability if initial business shares are high, and vice versa. Overall, these avoidance responses are high in terms of tax revenues, representing a 4-year accumulated revenue loss that is 2.6 times the 2011 estimated wealth tax revenues.

As such, this paper provides new empirical evidence to the nascent literature studying behavioural responses to wealth taxation. According to the specific methodology applied, the existing literature can be divided into two main groups: one employs bunching strategies (Seim, 2017; Londoño Vélez and Ávila-Mahecha, 2019) while the other undertakes difference-in-differences and cross-sectional analyses (Brülhart et al., 2017; Zoutman, 2018; Jacobsen et al., 2019).[6] The former report much smaller taxable wealth responses to wealth taxes than the latter, primarily reflecting tax evasion.[7] The mechanisms driving such large responses in the latter studies are unclear.

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[6]Note, however, that Brülhart et al. (2017) and Jacobsen et al. (2019) complement their main findings with bunching evidence.

[7]The specific magnitudes as reported in individual studies are detailed below in the Results section.

Seim (2017) uses Swedish administrative data and exploits the variation across wealth tax brackets, while Brülhart et al. (2017) exploit the variation in wealth tax rates across the Swiss Cantons and municipalities. Jacobsen et al. (2019) employ Danish administrative data and consider two different sources of variation: first, changes in the exemption threshold for couples and, second, changes in marginal tax rates for taxpayers unbound by a tax ceiling. Zoutman (2018) uses a Dutch capital-income and wealth tax reform that created variation in the rate-of-return after taxation at each level of income and wealth and, finally, Londoño Vélez and Ávila-Mahecha (2019) draw on Colombian administrative data and exploit the time variation derived from several wealth tax reforms and discontinuities in the wealth tax schedule.

The main contribution of our paper - which by methodology belongs to the second group of studies identified above - is that it provides both an assessment of the effect of wealth taxes on taxable wealth and an analysis of other types of response, focused above all on tax avoidance strategies, which allows us to provide evidence of the mechanisms driving the results. Thus, the paper also contributes to the literature on capital taxation and portfolio choice.[8] While most earlier studies have sought to analyse the effect of personal income taxes on investment in financial assets[9], this paper provides evidence on asset portfolio responses to wealth taxation, not only in terms of financial assets, but also that of housing and businesses. On the one hand, higher tax rates lead taxpayers to increase the importance of their exempt assets - in the main their company holdings - although we also find a statistically significant (albeit small) effect on their main dwelling exemption. This finding is in accordance with the empirically documented use of closely-held businesses as tax shelters (Alstadsæter, Kopczuk and Telle, 2014). On the other hand, higher tax rates lead taxpayers to increase the importance they attach to listed equity and investment funds, which enables them to exploit the tax liability limit.

Likewise, in relation to the application of this limit, our paper documents that facing higher tax rates results in taxpayers reducing their taxable income and increasing the importance of their long-term capital gains within realized income. In this regard, our study contributes to the extant literature on the responses of taxable income to personal income taxes (see Saez, Slemrod and Giertz (2012) for a general review and Neisser (2018) for an empirical review) and to the literature studying the effect of taxes on capital gains realizations[10]. Finally, we provide

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[8]See Schalck (2017), Bergstresser and Pontiff (2013), Desai and Dharmapala (2011), Alan et al. (2010), Poterba and Samwick (2002). For a review of the earlier literature, see Poterba (2002).

[9]One exception is Bergstresser and Pontiff (2013), who also consider corporate income taxation.

[10]Some recent empirical studies include Jacob (2018, 2016, 2013), Díaz-Caro and Crespo-Cebada (2016) and Daunfeldt, Praski-Ståhlgren and Rudholm (2010). In general, they study the effect of capital gains taxation on their realization (also known as the lock-in effect) with the exception of Jacob (2016), who studies the effect of labour income taxes on capital gains realizations. For a broad review of capital gains responses to taxes, see Hanlon and Heitzman (2010). With a particular focus on the wealthiest individuals, Auerbach, Burman and Siegel (2000) show that it is in fact the high-income, high-wealth and more sophisticated taxpayers

evidence of gift responses to wealth taxes, which in turn can be related to the literature studying the effect of gifts and estate taxation on inter-vivos transfers (see Kopczuk, 2016, for a review)[11]. Unlike the former responses, the increase in - reported - gifts does not persist over time, only being documented during the first two years after the reintroduction of the tax.

The main conclusion we draw from this study is that wealth taxes do not reduce wealth accumulation, and that the taxpayers most affected by the reintroduction of the tax manage to reduce their tax liability significantly by employing avoidance strategies. These responses are estimated by examining the top 50% richest tax-payers that submit wealth tax returns every year. In addition, we find a positive relation between the 2011 wealth tax rates and subsequent non-tax filing. Thus, in broad terms, this paper contributes to the literature on capital and estate taxation (see Kopczuk, 2016, for a review) and to that on tax avoidance and evasion (Slemrod and Yitzhaki, 2002; Slemrod, 2018).

The rest of the paper proceeds as follows. Section 2 describes the specific charac-teristics of the Spanish Wealth Tax and the circumstances surrounding its reintro-duction in 2011. Section 3 presents the data and descriptive statistics. Section 4 outlines the methodology employed. Section 5 shows the estimation results; and Section 6 concludes.

2 Spanish Wealth Tax: Evolution and characteristics

The Spanish Wealth Tax was first introduced in 1977 as an extraordinary and temporary measure, but after more than fifteen years the temporary nature of the tax was revoked by Act 19/1991. Until that moment, the wealth tax had mainly been used as an instrument for census and control purposes. However, four addi-tional objectives were pursued with the wealth tax reform: taxing the additional ability to pay derived from wealth holdings; achieving a better allocation of re-sources; serving as a redistributive tool and complementing personal income tax and inheritance and gift tax.[12]

The Wealth Tax is levied annually on December 31 and applies to all forms of wealth: real estate, bank accounts, bonds, shares, investment funds, life insur-ance, vehicles, boats, aircrafts, jewellery, art and antiques, intellectual or indus-trial property rights, etc. However, the legislation has incorporated a number of exemptions: starting in 1991 with elements of historical heritage, art treasures, pension plans and other financial rights[13], wealth tax exemptions were extended to business assets in 1994 and "closely-held" companies (both unlisted - in 1994 - and listed - in 1998 -)[14]. Finally, main residences have been exempt from the tax

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that are most likely to avoid capital gains taxation.

[11]In addition to studying the effect of estate and gift taxation on transfers, Joulfaian (2005) also considers the impact of capital gains taxation.

[12]Memorandum of Act 19/1991, June 6.

[13]Limited up to a certain amount. For further information, see Article 4, Act 19/1991.

[14]Certain conditions must be satisfied for business assets and companies to be exempt from the Wealth Tax. These requirements are not related to a firm's size, but rather to a minimum ownership share (5% individually or 20% within the family group), a minimum remuneration for

(up to a limit) since 2000.

The Spanish Wealth Tax is only levied on taxable wealth exceeding a minimum threshold, a limit that has been modified over time. Wealth tax returns have to be submitted in two different situations: (i) when taxpayers face a positive tax liability, or (ii) when, although their tax liability is zero because their taxable wealth is below the threshold, their gross wealth (including both taxable and non-taxable assets) is above a certain level[15]. Tax liability is obtained by applying progressive tax rates[16] to the net tax base, i.e. taxable wealth minus the minimum threshold. Moreover, a limit exists on wealth tax liability; specifically, the law sets a ceiling on wealth tax liability when taxable income is relatively low compared to taxable wealth.[17] It should be noted that, although forming part of the legal definition of taxable income, long-term capital gains (i.e. those derived from assets owned for longer than twelve months) are excluded from the ceiling computations.[18]

Although the main structure of the tax continues to be regulated by Spain's Central government, since the mid-1980s, wealth tax revenues have been transferred to the regional governments. Some years later, they were also given some limited legislative powers; thus, they can regulate the minimum threshold, tax rates and tax credits. Additionally, they are also responsible for the administration and control of the tax. This responsibility has been criticized for undermining the "control" function of the tax, given the difficulties encountered by the central and regional tax administrations to work together (Durán-Cabré and Esteller-Moré, 2007).

In addition to the greater fraud risk associated with low rates of tax control (Durán-Cabré and Esteller-Moré, 2010), many experts have stressed the inefficiencies and inequities derived from the design of this tax (i.e. assessment rules that differ from market prices, tax exemptions, etc.).[19] Apart from giving rise to horizontal inequities among taxpayers with different asset portfolios but with similar levels of wealth, its specific characteristics significantly distort the incidence and redistributive role of the tax given that it is primarily the richest taxpayers who benefit from them (e.g. Arcarons and Calonge, 2007; Alvaredo and Saez, 2009).

Taking into account these limitations, at the end of 2008 the Central government

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the performance of managerial duties (by at least one member of the family group) and the fact that the company carries out an economic activity. See Appendix A for further information.

[15]Two million euros in 2011 and 601,012.10 euros in 2007.

[16]Tax rates set by the Central government range from 0.2 to 2.5%.

[17]This limit on wealth tax liability is not unique to the Spanish Wealth Tax. For instance, in France, some Swiss Cantons (OECD, 2018) and Denmark (Jacobsen et al., 2019) have operated similar ceiling provisions. Indeed, Jacobsen et al. (2019) also exploit this tax feature.

[18]Specifically, overall wealth and income tax liabilities cannot exceed 60% of taxable income. The excess, if any, is deducted from the initial wealth tax liability. However, this reduction cannot exceed 80% of the initial wealth tax liability. In short: Limited wealth tax liability=MAX(60% taxable income-income tax liability, 20% initial wealth tax liability), if [initial wealth tax liability + income tax liability]> 60% taxable income. Note that in these computations, the sum of long-term capital gains and losses, if positive, is excluded from taxable income and the income tax liability needs to be adjusted accordingly.

[19]Enciso (2006), Durán-Cabré and Esteller-Moré (2007, 2014), Fernández de Beaumont and Martín (2010), Carbajo (2015), among others.

decided to abolish the tax given its inability to meet the objectives that justified its introduction in the first place.[20]

2.1 The chaotic reintroduction of the Spanish Wealth Tax

Surprisingly, the same Central government who suppressed the tax at the end of 2008 decided to reintroduce it in 2011. The political party in power at that time - the PSOE, occupying the centre-left of the political spectrum - opted to implement the reform as a means of addressing the economic crisis. Its argument was that those with more resources should be made to contribute more to the economic recovery, and by so doing this would reinforce equity and allow a better redistribution of income and wealth.

Thus, the tax was reintroduced in mid-September of 2011 as a transitory measure and, a priori, it was only to be imposed in 2011 and 2012. However, the Budgetary Laws passed in subsequent years have each extended this "transitory" measure and the Spanish wealth tax remains in force. Two main changes were made with respect to the regulation applicable in 2007: (i) the minimum threshold providing exemption from tax liability was raised from 108,182.18[21] to 700,000 euros and (ii) the main residence exemption raised from 150,253.03 to 300,000 euros. These changes sought to exempt the middle-classes from paying the tax.

The reintroduction of the tax was characterised by the confusion to which it gave rise right up to the very last moment. In July 2011, a prominent member of the PSOE party - standing for election at the November polls but not a member of the existing cabinet - proposed the introduction of a Wealth Tax on the richest Spaniards as part of its manifesto. The proposal came under heavy criticism from many sides, but above all from that of the centre-right opposition party (PP), who expressed its dismay at the fact that it had been the PSOE who had originally abolished the tax at the beginning of its mandate. However, according to the opinion polls, the PSOE had lost support during its second term in office to the PP[22], who adopted a clear position against the wealth tax. Thus, in summer 2011, the proposal to reintroduce the wealth tax remained just that, a proposal.

Although the government ruled out any new tax reforms before the general election[23], rumours about an imminent reintroduction of the Wealth Tax emerged in August 2011[24]. The possibility was mentioned in various sources, even making the

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[20]Memorandum IV of Act 4/2008, December 23. Due to legal constrains, the Wealth Tax Law remained officially in force and Act 4/2008 simply introduced a 100% tax credit to the wealth tax liability.

[21]Regional governments have legislative capacity to fix a different minimum threshold. Before the abolishment of the tax, this ranged from 108,182.18 to 150,000 euros depending on the region, where larger values were applied for specific situations.

[22]In particular, according to voter intention surveys carried out by CIS (*Centro de Investigaciones Sociológicas*), PP became the most preferred political party to run the central government from mid-2010 onwards.

[23]http://www.europapress.es/economia/noticia-campa-descarta-nuevas-reformas-fiscales-20110811104212.html

[24]http://www.europapress.es/economia/fiscal-00347/noticia-economia-gobierno-estudia-subir-irpf-antes-recuperara-patrimonio-consejo-general-economistas-

front pages of several newspapers at the end of August[25][26]. However, the Central government remained equivocal on the matter[27]. On September 11, PSOE's general election candidate called on the government to reinstate the Wealth Tax, generating criticism across the board: Right-wing parties condemned government inconsistency in relation to the Wealth Tax, left-wing parties and organizations considered it an insufficient and belated measure, and various groups of experts stressed the inefficiencies and limitations of the tax.

The government failed to provide any specific details about the "new" Wealth Tax until one day before its reintroduction[28]. On September 16, the Council of Ministers agreed to its reinstatement and the legislation was modified accordingly[29].

As discussed above, the Wealth Tax had been transferred to the Autonomous Communities so it was they who would have the legislative power to decide whether to levy it or not. Thus, even though the Central government had approved its reintroduction, in the end it fell on the regional governments to implement it or not. And, indeed, from the very outset, some of these governments, including those of the Madrid Community and Catalonia, expressed their disagreement with the measure.

Thus, the centre-right regional government in Madrid gave guarantees that it would maintain the 100% tax credit introduced with the suppression of the tax, while the centre-right nationalist Catalan government also expressed its opposition to reintroducing the Wealth Tax, in line with the significant cuts to the Catalan inheritance tax made earlier in June that same year. However, with the reform passed, the Catalan government failed to legislate on the actual implementation of the tax. Indeed, the Catalan government saw the reform as a short-lived measure, given that the November General Elections were close and all the indications were that the PP, who had come out against the reintroduction of the tax, would be swept into power. This explains why the Catalan government postponed its decision on the Wealth Tax until the new Central government was formed.[30]

At the end of November 2011, the Catalan government announced that it would, after all, levy the wealth tax, if the newly elected Central government decided to retain it[31], which turned out to be the case. It was not until mid-December that

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20110819183751.html

[25]http://www.europapress.es/nacional/noticia-primeras-paginas-diarios-llegados-noche-redaccion-20110823001848.html

[26]http://www.europapress.es/nacional/noticia-primeras-paginas-diarios-llegados-noche-redaccion-20110826002711.html

[27]http://www.europapress.es/economia/noticia-salgado-no-aclara-si-piensa-recuperar-patrimonio-20110823150753.html

[28]http://www.europapress.es/economia/fiscal-00347/noticia-economia-ampl-recuperacion-patrimonio-sera-temporal-afectara-160000-contribuyentes-aportara-1080-20110915132138.html

[29]*Real Decreto-ley 13/2011, de 16 de septiembre, por el que se restablece el Impuesto sobre el Patrimonio, con carácter temporal.*

[30]http://www.europapress.es/catalunya/noticia-catalunya-aparca-decision-impuesto-patrimonio-dudas-aplicacion-20110920154146.htm

[31]http://www.europapress.es/catalunya/noticia-catalunya-no-subira-impuestos-

the Catalan government confirmed that it would reintroduce the tax in Catalonia, applying the same conditions foreseen in the state legislation[32], and it was not until March 2012 (with effect from December 31, 2011) that it approved the corresponding legislative changes to implement the tax. Consequently, Catalan taxpayers did not learn that they would have to pay the wealth tax corresponding to 2011 until the end of that year, limiting their possibilities of responding to its reintroduction.[33]

Some months later, towards the end of September 2012, the Central government announced the extension of the Wealth Tax to 2013.[34] Similarly, at the end of September 2013, the government prolonged the tax again to 2014, and so on, down to the present day. In Catalonia, at the end of 2012, the Catalan government actually agreed to a slight increase in the wealth tax rates and lowered the minimum threshold to 500,000 euros from 2012 onwards.[35]

2.2 How to avoid the Spanish wealth tax

Given the specific characteristics of the Spanish wealth tax, we need to comment on the mechanisms that allow the tax liability to be reduced as this helps explain the outcomes we present in our empirical analysis.

An obvious way to overcome the tax burden attributable to the progressivity of the tax is by decreasing wealth. This can be achieved by making gifts, although they are subject to gift taxes[36]. However, the design of the tax allows taxpayers to adopt other strategies to reduce, or even eliminate, their tax liability without decreasing their stock of wealth. Taxpayers do not even need to hire a tax advisor - although many do - nor have a detailed knowledge of Tax Law to learn about these strategies, as there are many explanations and suggestions available on the internet.[37]

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aplicara-patrimonio-si-pp-mantiene-20111122171408.html

[32]http://www.europapress.es/economia/macroeconomia-00338/noticia-economia-ampcataluna-estudiara-medidas-legales-reclamar-gobierno-759-millones-disposicion-estatut-20111207103034.html

[33]There is anecdotal evidence in the form of readers' letters to one of Catalonia's leading newspapers complaining about the impossibility of making plans with respect to the wealth tax due to the lack of information and time constraints (see, for instance, La Vanguardia newspaper, November 28, 2011, p. 22, article *'Hay que planificar'*).

[34]http://www.europapress.es/economia/macroeconomia-00338/noticia-economia-gobierno-crea-impuesto-loterias-prorroga-patrimonio-elimina-deducciones-sociedades-20120927175205.htm

[35]Statutory wealth tax rates were increased by 5%, except for the last tax bracket (net tax base above 10.7 million euros) were the increase was 10%.

[36]Gifts taxes depend on the family relationship between donor and recipient and on the recipient's region of residence. In Catalonia, for instance, tax rates range between 5-9% and 11.12-64% for gifts to close and distant relatives, respectively. Additionally, in the case of giving real estate, the donor would face two taxes on capital gains (personal income tax and a local tax on urban land transmissions).

[37]Google provides 16.5M entries (April 10, 2019) when searching *Como pagar menos impuesto patrimonio* (How to pay less wealth tax). Some examples are (websites in Spanish):
https://www.consultingdms.com/impuesto-patrimonio-en-espana-10-formulas-legales-para-evitarlo-o-reducirlo/;
https://www.impuestosparaandarporcasa.es/2011/09/cuidado-con-lo-que-haceis-

These strategies are related to reducing taxable wealth in favour of exempt assets, making use of the limit on wealth tax liability or changing tax residence to another region where the wealth tax is not levied (e.g. Madrid). Examples for implementing the first option include: i) changing fiscal residence to that of the dwelling with the highest assessment so as to take advantage of the main-residence exemption[38]; ii) saving through pension plans; iii) investing in art treasures; or iv) increasing business exemptions. The taxpayer can achieve the latter by arranging their own businesses/shares in such a way that they satisfy the exemption requirements foreseen in the Law (see Appendix A). If these conditions are already satisfied, the exemption value can be increased by capitalizing the company, for instance. In the case of the first three examples above, it should be stressed that their effectiveness for reducing taxable wealth is limited as exemptions are bounded[39].

The alternatives for exploiting the limit on wealth tax liability are also diverse. They require the taxpayer to reduce realized income and to invest in assets that can generate long-term capital gains[40]. Both options can be achieved by investing in investment funds, since these assets do not generate regular income - such as dividends or interest - but only capital gains (or losses) when sold. Shares are another type of asset that can help the taxpayer benefit from the limit on tax liability.

Finally, the most radical strategy would be to move to Madrid, where the wealth tax is not levied (and other taxes, such as personal income tax, are also lower). However, if a tax audit were to be conducted the taxpayer would have to demonstrate that this change of fiscal residence was neither fictitious nor motivated by reasons of tax avoidance.

The most convenient strategy depends on the income-wealth ratio and the asset portfolio of each taxpayer. For instance, for those who already own a business it might be easier and less costly to take advantage of the business exemption. Alternatively, those who have lower income and significant investments in financial assets might find it easier to benefit from the limit on tax liability. Taxpayers with high income and high job mobility might consider relocating to Madrid.

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para-no-pagar-impuesto-del-patrimonio;
https://cincodias.elpais.com/cincodias/2016/10/13/abante_asesores/1476347818_147634.html.

[38]This can only be done if the taxpayer owns several housing properties. According to the Spanish Survey of Household Finances (wave 2011), 89% of individuals in the last decile of wealth distribution - that is, those most comparable to the population under study - own other real estate properties besides their main dwelling (Banco de España, 2014).

[39]Main residence exemption is limited up to 300,000 euros. The yearly contribution to pension plans was limited to 10,000 euros (12,500 euros for those older than 50). The exemption on art treasures depends on the type of asset and ranges from 2,404.05 to 90,151.82 euros.

[40]As explained at the beginning of Section 2, long-term capital gains are excluded from the computation of the limit on wealth tax liability.

3 The data

The main data source used in this paper is the universe of anonymized wealth tax returns filed by Catalan tax residents for the years 2011 to 2015. We have complemented this database with an indicator of the taxpayer's age and information from inheritance and gift tax returns.[41] All the data have been provided by the Catalan Tax Agency.

The main database contains, at the micro level, all the information reported in the wealth tax returns aggregated by types of asset. That is, the total stock of wealth classified into real estate and main residence exemption, bank accounts, business assets, bonds, investment funds, non-exempted quoted shares and unlisted companies, exempted quoted shares and unlisted companies, life insurance, vehicles, jewellery, artwork, property rights and "other", including all taxable wealth not previously categorized. Unfortunately, some exempt assets such as historical heritage, art treasures and pension plans do not have to be reported, which might underestimate the overall stock of taxpayers' wealth. Nevertheless, according to the Spanish Survey of Household Finances (SHF) - wave 2011 - conducted by the Bank of Spain, assets of this type represent a small fraction (around 4%) of households' net wealth.[42] Apart from wealth portfolio, tax returns also include information on total taxable income and personal income tax liability. Regarding personal characteristics, little information is reported: just marital status and place of residence. As previously mentioned, though, we are also able to consider age.

Table 1 provides descriptive statistics for 2011 wealth tax returns.[43] Statistics are provided by wealth deciles and total number of observations. Here, certain features should be stressed: i) as total reported wealth increases, the difference between taxable wealth and total wealth also increases; and ii) there is significant variation in the average tax rate within the same wealth decile. We return to this last point in the following section. Figure 1 shows the average asset portfolio, including all reported assets (both taxable and exempt), by wealth deciles. The importance of unlisted companies increases with wealth, while the reverse occurs with real estate properties and bank accounts or bonds.

The data from the 2011 tax returns submitted to the Catalan Tax Agency show there were 42,294 tax filers facing a positive tax liability and 1,942 tax filers with zero tax liability but gross wealth exceeding 2 million euros. Putting the total number of tax filers - 44,236 - in perspective, they represent about 1.27% of personal income tax filers[44] and about 0.59% of individuals residing in Catalonia in

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[41]We are able to know whether a taxpayer dies after 2011 or has declared a gift from 2008 onwards.

[42]This figure can be extracted from Table 2(cont.) and Table 4(cont.) from Banco de España (2014). We focus on the statistics for the last decile of the wealth distribution because it is the most comparable to the population under study.

[43]All wealth tax filers are considered, that is, those who face a positive tax liability and those who must submit the tax return because their overall gross wealth exceeds 2 million euros, although their taxable base is below the minimum threshold.

[44]Information obtained from the statistics published by the Spanish Tax Administration:

2011[45]. Of these 2011 wealth tax filers, 36,373 (82.22%) continued to submit a wealth tax return in 2015. Of the taxpayers who disappeared from the sample (17.78%), 6.42% died and the remaining 11.36% disappeared for other reasons (wealth losses, mobility, evasion, etc.). In our empirical analysis we exclude those taxpayers that died. Additionally, we only consider those tax filers who submitted the 2011 tax return, which means those taxpayers who began to submit wealth tax returns later (from year 2012 onwards) are not included in our study. In fact, most of our estimations use a balanced panel of tax filers from the top 50% of the observed wealth distribution[46], according to the stock of wealth reported in 2011, who submitted wealth tax returns consecutively between 2011 and 2015. We provide further details about this in Section 4.

Finally, when a taxpayer voluntarily submits a supplementary return to declare additional wealth, we consider this last return in our analysis. This was a quite common occurrence among 2011 tax returns due to a tax amnesty issued by the Central government in November 2012.[47]

3.1 Some descriptive facts on outcomes of interest

Table 2 shows the evolution taken by Wealth Tax revenues between 2011 and 2015. Values are expressed in 2011 prices. The figures shown in Table 2 only consider those tax filers who submitted, at least, a 2011 tax return. In the case of the 2011 wealth tax revenues, two different indicators are given: a) the amount of revenues actually collected; and b) an estimation of the revenues that would have been collected if the tax changes approved in 2012 had already been applied to 2011 wealth[48]. This estimation is provided to enable comparability across years. A notable trend emerging from Table 2 is that wealth tax revenues decreased by 19.23% between 2011 and 2015. When considering just those taxpayers who submitted the tax return every year between 2011 and 2015, there was a fall of 3.64%. Revenues fell by 8.37% when considering that group of taxpayers included in most of our estimations, i.e. those placed among the top 50% of the observed wealth distribution filing wealth tax returns every year. Another point that can be extracted from Table 2 is the importance, in terms of revenues, of taxpayers who stop filing wealth tax returns. If we sum all collected revenues (2011.a to 2015) for rows [1] and [2] we obtain 1,854M and 1,680M euros, respectively. This translates into a wealth tax revenue loss of almost 174M euros (expressed in 2011 prices) attributable to taxpayers who no longer submitted wealth tax returns during the

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2012-2015 period. Recall, of these 174M euros, only 17.88% can be explained by taxpayers who died.

Table 3 provides some descriptive figures for the evolution of reported wealth and tax avoidance strategies described in Section 2.2. All figures refer to taxpayers placed at the top 50% of observed wealth distribution who filed wealth tax returns every year between 2011 and 2015. Contrary to the evolution of wealth tax revenues shown in row [3] of Table 2, overall reported wealth increased during this period and, so, the latter does not seem to explain the former. This in turn suggests there might be other factors, other than a fall in the stock of wealth (such as the adoption of avoidance strategies), that are driving the reduction in tax revenues. Indeed, a comparison of the 2011-2015 figures in Table 3 shows that the relevance of wealth exemptions, assets that allow an investor to obtain long-term capital gains and the limit on wealth tax liability have increased substantially over time.

In the case of the strategy of changing tax residence to another region, the only information available to us thus far is that 11.36% of 2011 tax filers disappeared from the sample in subsequent years for reasons other than death. If we focus on the 50% richest, the share is similar, at 10.15%. When looking at gifts reported to the Catalan Tax Agency, 5.92% of 2011 wealth taxpayers (7.70% for those in the top 50%) made a gift between 2008 and 2011, when the wealth tax was not in force. This share rose to 9.98% (14.26% for top 50%) for gifts made between 2012 and 2015.

These are, nevertheless, merely descriptive facts. In the following sections we consider the tax planning strategies explained above and examine the effect of wealth taxes on wealth accumulation, on asset portfolio, on the probability of making a gift, on taxable income and on other relevant outcomes.

4 Methodology

4.1 Measuring the impact of the reintroduction of the wealth tax

As discussed, the objective of this paper is to study how taxpayers responded to the reintroduction of the wealth tax in terms of wealth accumulation, wealth composition and other outcomes we describe below. The ideal setting to carry out this study would be that in which it was possible to compare - before and after the reform - wealth taxpayers to similar individuals not subject to the tax. However, this ideal control group does not exist. Therefore, instead, we use as our identification strategy the variation in exposure to the treatment (i.e. the reintroduction of the tax).

Figure 2, panel (a), shows the 2011 average tax rates, defined as the wealth tax liability over total reported wealth, for different levels of wealth. Additionally, it shows the highest average tax rate a taxpayer would face for a given level of wealth, assuming all reported wealth is taxed (i.e. there are no exemptions other

than the minimum threshold of 700,000 euros that applies to everyone) and the limit on tax liability is not operative.

Note that for a given level of wealth, some taxpayers face an average tax rate close (or equal) to the maximum, whereas others face a much lower (or even zero) average tax rate. In other words, taxpayers with similar levels of wealth were differently affected by the reintroduction of the wealth tax. This dispersion in tax rates originates from different sources: differences in taxable wealth due to main residence and business exemptions and differences in the tax liability when the limit applies. Using the average tax rate as a measure of exposure to the treatment allows us to compile all these factors into a single indicator. Figure A1 in Appendix B shows 2011 average tax rates for different types of taxpayer: a) those for whom only the main-dwelling exemption is applied, if any; b) those who also report business exemptions (including both listed and unlisted companies); c) those who qualify for the limit on tax liability and d) those who satisfy both b) and c). Most of the variation in the tax rates originated from situations b), c) and d), given that the main-dwelling exemption is bounded up to 300,000 euros.

Figure 2, panel (b), shows an estimation of the average tax rates that taxpayers would have faced in 2011 if the wealth tax changes approved in 2012 had been applied in the previous year. The picture does not change greatly from panel (a). This is the case because, again, tax changes would differently affect taxpayers with similar levels of wealth due to the existence of wealth tax exemptions and the limit on wealth tax liability. Therefore, both indicators (real and estimated average tax rates) provide very similar measures of taxpayers' exposure to the wealth tax.

Most of the literature uses marginal tax rates to analyse responses to tax rate increases (or decreases)[49], usually in the last tax bracket. However, it is not the aim of this paper to study responses to a tax change but rather to a tax (re)introduction. It seeks as such to examine how exposure to this reform affected the evolution of wealth and its components. In this context, we believe marginal tax rates to be a poorer measure of treatment intensity, especially for the wealthiest. This is the case because tax brackets are wide[50] and, thus, taxpayers with different tax liabilities may face the same marginal tax rate. Therefore, for the case under study we consider it more appropriate to use average rather than marginal tax rates as our explanatory variable.[51]

Returning to Figure 2, it is evident that the variation in tax rates increases with wealth and that it is quite low for the bottom 50% of the observed wealth distribution. Precisely because our identification strategy relies on the variation in treatment exposure, henceforth we focus our analysis on the top 50% of the ob-

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[49]See, for instance, Saez, Slemrod and Giertz (2012) for a review on the elasticity of taxable income.

[50]Table A2 in Appendix C shows the statutory tax rates in Catalonia for 2011.

[51]An alternative explanatory variable could be an average tax rate expressed in terms of income rather than wealth. However, we believe the average tax rate expressed over wealth to be more accurate. Some taxpayers in our data misreport information on income and, additionally, wealth is a stock whereas income is a flow, which is more likely to fluctuate and, so, provide a distorted indicator.

served wealth distribution. In fact, according to the figures provided in Table 2, the bottom 50% only accounts for a small part of the 2011 collected wealth tax revenues, so the potential responses we fail to estimate should have little impact in terms of revenues.

Using the 2011 average tax rates as our explanatory variable has, therefore, the advantage of providing an accurate indicator of the treatment exposure, but it also has a drawback: it depends on taxpayers' 2011 wealth, income and asset portfolio. To deal with this issue, we control non-parametrically for taxpayers' 2011 wealth, income, asset portfolio, age and other characteristics that might influence our dependent variables (see the following section for further details).

4.2 Measuring behavioural responses to the reintroduction of the wealth tax

Unfortunately, we have no information on taxpayers' wealth for the period when the wealth tax was not in force, as it was simply not being collected. However, taking into account the largely unexpected and belated reintroduction of the tax in Catalonia (see Section 2.1), we argue that 2011 can serve as a control year.

This assumption is further reinforced by the fact that wealth is a stock, which is not easily adjusted instantaneously, and in any case, such adjustments are costly. The initial short-term duration of the measure (just 2 years) increased these adjustment costs. Moreover, as discussed in Section 2, the assessment rules do not always coincide with the market value, but depend on specific criteria, a situation that complicates the asset valuation adjustment. For instance, wealth deposited in bank accounts is valued at the highest of the 4th quarter average balance or the balance at December 31. For quoted shares and quoted bonds, the 4th term average value is also used. Banks and investment entities do not provide their customers with all this information until the first quarter of the following year when they have to file their income and wealth tax returns. Unlisted companies are assessed according to the book value obtained from their last audited balance sheet, i.e. 2010 balance sheets for the 2011 wealth tax returns. In the case of real estate, this is not assessed according to its market price either, but by the highest between its administrative and acquisition values.

The tax administration does not automatically receive information on wealth except for real estate values. However, it does automatically receive information on capital income, which can be easily related to wealth. In this sense, it is difficult for taxpayers to hide wealth that generates income directly reported to the tax administration. The situation is obviously different for unproductive assets, such as antiques or jewellery, and indeed very few tax filers report wealth of this kind. In any case, according to survey evidence, this wealth represents a very small fraction of taxpayers' total worth.[52]

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[52]According to the Spanish Survey of Household Finances (wave 2011), jewellery, works of art and antiques represent around 0.9% of net wealth for the last decile of the wealth distribution, i.e. the one most comparable to the taxpayers under study here.

While we cannot directly test the assumption that taxpayers were largely unable to react to the reintroduction of the wealth tax in 2011, we can inspect related indicators such as gifts. This is a rapid and effective manner of reducing wealth. Thus, if taxpayers had made a concerted effort to rapidly reduce their wealth at the end of 2011, we should observe a spike in the number of gifts declared during that period. However, gifts data suggest this not to be the case. Figure A2 in Appendix B shows the frequency of gifts declared in Catalonia during the last 8 weeks of every year between 2009 and 2014. Gifts declared during the last 8 weeks of year 2011 are no higher than in previous years, when the wealth tax was not in force.

In any case, we do not need a complete lack of response in 2011 for our identification strategy. What we, in fact, require is that, after controlling for 2011 reported wealth, income, asset portfolio, age and other personal characteristics (see below), taxpayers are comparable and would behave in the same way in the absence of the wealth tax. This requires a similar reporting (and under-reporting) behaviour among similar taxpayers based on their 2011 tax returns. In the case of significant under-reporting behaviour in 2011 due to the reintroduction of the wealth tax (which we consider implausible for the reasons outlined above)[53], the responses we estimate would be a lower bound.

The empirical specification we implement is the following:

$$Dep.var_{i,t} = \sum_{y \neq 2011} \alpha_y \cdot Y_{y=t} \cdot atr_i^{11} + \gamma_t + \delta_i + \sum_{y \neq 2011} \lambda_y \cdot Y_{y=t} \cdot X_i^{11} + \nu_{i,t} \qquad (1)$$

where $Dep.var_{i,t}$ are the different dependent variables that we explain below, $Y_{y=t}$ is a year dummy that takes a value of 1 when the year equals t, atr_i^{11} is 2011 average tax rates, α_y is our parameter of interest[54], γ_t captures year fixed effects, δ_i is an individual fixed effect and X_i^{11} is a set of non-parametric controls detailed below and based on the reference year, 2011. In the case of atr_i^{11}, we use both the real and the "estimated" 2011 average tax rates shown in Figure 2.

The dependent variables we examine are: log of taxable wealth, log of total reported wealth, log of taxable income, the probability of making (and declaring) a gift[55], the probability of facing the limit on tax liability[56], the share of long-term capital gains over taxable income, the share of exempt assets over total reported assets and different components of taxpayers' asset portfolio; specifically, the share of (i) real estate; (ii) business assets and unlisted companies; (iii) listed equity and investment funds; and (iv) bank accounts and bonds, distinguishing between exempt and taxable assets. Indeed, we are interested in the evolution of these variables with respect to the base year; hence, the estimates are normalized to zero in 2011. Given that the type and magnitude of the responses might vary

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[53]Here, we do not consider offshore evaded wealth, which would not have been reported either in the absence of the wealth tax due to the existence of income taxes.

[54]We later relate this coefficient with elasticities with respect to the net-of-tax rate of return.

[55]We define a dummy which takes a value of 1 if a taxpayer makes a gift in year t (and it is reported to the Catalan tax authorities), and 0 otherwise.

[56]We define a dummy which takes a value of 1 if a taxpayer faces the limit on tax liability in year t, and 0 otherwise.

depending on the initial wealth composition, we examine heterogeneous effects according to the relative importance of unlisted companies and business assets over total reported assets in 2011.

We also show the estimation results from specification (1) without including the set of non-parametric controls X_i^{11} interacted with year dummies $Y_{y=t}$. To be able to talk about causal effects, the underlying assumption behind this specification would require that wealth components evolved in the same way for all taxpayers in the absence of the wealth tax, once time and individual fixed effects have been taken into consideration. However, we consider this a strong assumption to make, especially because we cannot test it, given the absence of data for the period when the wealth tax was not in force. For this reason, we include the control variables defined below.

To capture non-tax trends driven by changes in asset prices and asset-specific returns[57], we create deciles of the following asset shares: i) housing; ii) listed equity and investment funds; iii) unlisted companies and business assets; and iv) bank accounts and bonds. Since we only have information on overall taxable income, but not on capital income specifically, we control both for taxable income[58] and wealth deciles to further address differences in returns, given that there is evidence of a positive correlation between returns and the level of wealth (Fagereng et al., 2018). Additionally, controlling for income and wealth levels avoids mean reversion issues. To deal with differences in saving rates and attitudes towards inheritance and gift tax we control for age groups with the following cut-offs: 45, 65 and 75 years.[59] To further control for differences in saving rates we also include deciles of the share of debt over total assets. All these control variables are defined according to the information reported in 2011 wealth tax returns and interacted with year dummies $Y_{y=t}$. Finally, as the tax amnesty mentioned in Section 3 took place during the period under study, this might have affected the reporting behaviour from 2012 onwards. Thus, we also include a dummy indicating tax amnesty participation interacted with year dummies.[60] For reference purposes, we define this set of controls as "decile controls".

Constrained by the fact that we cannot test the parallel trends assumption, we also use an alternative set of non-parametric controls including the same variables detailed above, but defined more narrowly to dissipate the correlation between 2011 average tax rates and 2011 taxpayers' wealth, income and asset portfolio. In

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[57]Considering the specific assessment rules provided in the Wealth Tax Law, changes in asset prices might not necessarily be reflected in tax returns (for instance, those related to real estate). However, changes in asset returns might affect taxpayers' investment and saving behaviour.

[58]We define an extra category for those taxpayers who do not report information on income (representing 10% of the observations used in the main estimations). We also checked that our results do not substantially change when excluding these observations.

[59]We define an extra category for those taxpayers whose age is non-available (representing just 0.06% of the observations used in the main estimations).

[60]We do not know exactly whether a taxpayer participated in the tax amnesty or not, but we can identify those taxpayers who submitted a supplementary 2011 wealth tax form when the tax amnesty took place (October-November 2012). Therefore, we consider as tax amnesty participants those taxpayers who filed an additional 2011 wealth tax form during, or later than, October 2012.

particular, wealth and income are ranked every 5 and 4 percentiles, respectively. Asset shares are ranked every 2.5 percentage points, with the exception of housing shares, which are ranked every 2 percentage points. The remaining variables have the same definition as above. Again, all the control variables are defined according to the information reported in the 2011 wealth tax returns and interacted with year dummies $Y_{y=t}$. For reference purposes, we define this set of controls as "narrow controls".

Table A1 in Appendix C shows the relation between 2011 average tax rates and 2011 taxpayers' wealth, income and asset portfolio when no controls are included and when "decile" and "narrow" controls are considered.

In summary, for each dependent variable we show three different estimates:

    a- Those obtained when controlling only for time and individual fixed effects.

    b- Those obtained when using the "decile controls" as X_i^{11}.

    c- Those obtained when using the "narrow controls" as X_i^{11}.

Next, we need to address the potential mechanical effect of wealth taxes. If wealth taxes are paid out of savings, then they mechanically reduce wealth, even in the absence of behavioural responses. In order to account for this potential mechanical effect, we adjust yearly reported wealth and taxable wealth with the wealth tax liabilities paid up to that date by applying a 3% net rate of return.[61][62] The mechanical effect, however, would not be present if wealth taxes were paid through consumption, substituting other expenditures for such payments. Since we have no information to test these hypotheses, our results for taxable and total reported wealth are presented both omitting and adjusting for the mechanical effect. Results concerning wealth composition, though, only provide overall effects (behavioural+mechanical, if any), since we would need to make strong assumptions about the specific assets used to pay wealth taxes to adjust for the mechanical effect.

4.3 Further discussion of the identification assumptions

We would like to make clear where the variation in average tax rates comes from, after including the set of non-parametric controls. The answer is from the exemptions and the limit on tax liability. Thus, while we control for the overall housing, listed equities and unlisted companies share, the specific importance of the exemptions within these shares varies across taxpayers. For instance, imagine two identical taxpayers with just one difference: taxpayer Z owns 4% of two different

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[61]Assuming that wealth taxes are paid out of financial assets, we compute an average gross rate of return to financial assets using the 2011 Survey of Household Finances microdata. This average is 4% for households whose net wealth is above 1.5M euros (this is the lowest net wealth value in our estimation sample). In turn, we compute the net rate of return applying capital income tax rates (25% for years 2012-2014 and 21.5% for 2015).

[62]For instance, 2012 reported wealth is adjusted with (2011 wealth tax liability)*1.03. Successively, 2013 reported wealth will be adjusted with (2011 wealth tax liability)*1.03^2 and (2012 wealth tax liability)*1.03, and so on.

unlisted companies and taxpayer S owns 6% and 2%, respectively. The overall value of these assets is worth the same for both taxpayers; nevertheless, taxpayer S can exempt part of these shares from the wealth tax whereas taxpayer Z cannot, as his ownership share is below 5%[63]. Suppose now two other identical taxpayers with just one difference: taxpayer X owns a very expensive main dwelling, while taxpayer Y owns a small main dwelling and a second residence. The overall value of these assets is worth the same for both taxpayers. However, taxpayer X will face a lower average tax rate than taxpayer Y, given that only main-dwellings are exempt from the tax, up to 300,000 euros. Because of the existence of this limit, the variation originating from the main-dwelling exemption is also limited. The last source of variation comes from the importance of long-term capital gains in taxable income. To illustrate this, imagine two identical taxpayers who sell the same shares, obtaining the same capital gain. However, one of them purchased the shares 2 months earlier than the other and so the gains qualify as long-term, whereas the others do not. The first taxpayer faces the limit on tax liability; the second does not. Table 4 shows the relation between 2011 average tax rates and each particular source of variation, once controlling for the "narrow" set of non-parametric variables.

The underlying assumption behind these examples and the specification employed is that, once controlling for time and individual fixed effects and the set of controls detailed above, the specific importance of the exemptions and long-term capital gains would not affect the evolution of reported wealth and its components in the absence of the wealth tax. Unfortunately, we cannot demonstrate this, because, again, there are no data for the period when the wealth tax was not in force, but below we provide some arguments that should help to validate this assumption.

First, the exemption status for companies, both listed and unlisted, and for business assets is simply a legal definition included in the Wealth Tax Law. The conditions required by the Law to apply this exemption do not depend on a firm's characteristics or outputs, such as number of employees, sales volume, productivity indices, profits, etc., but rather on ownership share.[64] Moreover, there is no public register or list of companies potentially exempt from the wealth tax, so there is no way for them to be readily identified. Indeed, precisely because exemption status depends on ownership share, the same company might be exempt for one taxpayer and non-exempt for another. It is the individual taxpayer that is able to accredit their exemption with regard to their own shares, not the company itself. Finally, the definition of exemption included in the Wealth Tax Law is not used in any other domain, except that of the inheritance tax. Close heirs who inherit company shares that may be exempt from the wealth tax can apply a tax deduction on the inheritance tax. Therefore, besides the wealth tax, this exemption could be important for old wealth taxpayers. Given that we control for taxpayers' age this should not be an issue. Moreover, the Catalan government practically eliminated the inheritance tax for close inheritors in June 2011[65], a fact that virtually eradi-

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[63] A minimum 5% ownership share is one of the requirements to exempt business assets and holdings from the wealth tax. For further information, see Appendix A.

[64] The Law also requires that at least one member of the family group performs remunerated management functions within the firm. See Appendix A for more details.

[65] The Catalan government introduced a 99% tax discount for close inheritors and, conse-

cates the importance of this deduction.

In the case of the main-residence exemption, it is difficult to see why the relative importance of the value of this asset in relation to that of other residences should affect the evolution of reported wealth and its components, once housing shares, income and the set of controls described above have been taken into account. In relation to long-term capital gains, they are taxed at the same rates as financial capital income in personal income tax; thus, a priori there is no clear tax incentive, besides that of the wealth tax, to prioritize long-term capital gains realizations over other sources of capital income.

Finally, we should stress that we are focusing on the evolution of 2011 reported wealth and its components. It lies beyond the scope of this paper to talk about evaded wealth. As explained at the beginning of this section, we do not need to assume that there is no evaded wealth for our identification strategy to hold. This strategy relies on the comparability of taxpayers according to the information reported in the 2011 wealth tax returns, meaning it assumes that their reported wealth, income and asset portfolio would evolve similarly in the absence of the wealth tax, conditional on the set of control variables and fixed effects already explained. In turn, this assumption implies that the presence of evaded wealth should not affect differently the evolution of the reported variables during the period under analysis, once all the controls and fixed effects are taken into account. Evaded wealth should be related in the main to unproductive assets, such as jewellery or antiques, and to offshore accounts. The former do not generate returns and, as we have seen, represent a very low fraction of individuals' wealth, so they should not be an issue for our identification strategy. In the case of offshore accounts, it is difficult to identify a channel via which wealth held in tax havens could affect the evolution of reported assets, besides taxpayers' attitudes towards risk and other "evader" characteristics, which would be captured by individual fixed effects, or global economic circumstances, captured by year fixed effects.

4.4   Extensions and general methodological comments

Finally, we check whether treatment exposure is related to the probability of disappearing from the sample. To do this, we implement the following specification:

$$Disappear_i = \gamma + \alpha \cdot atr_i^{11} + \lambda \cdot X_i^{11} + \nu_i \qquad (2)$$

where $Disappear_i$ is a dummy which takes a value of 1 if a taxpayer who submitted a 2011 tax return subsequently disappears from the sample for reasons other than death. Alternatively, it takes a value of 0 for taxpayers who filed wealth tax returns every year between 2011 and 2015. The explanatory variable, atr_i^{11}, is the 2011 average tax rate, α is our parameter of interest and X_i^{11} is a set of non-parametric variables which include the "decile" or "narrow" controls defined above and two additional dummies which identify married tax filers and those who live in the province of Barcelona.[66] In contrast to specification (1), we are not able to capture unobserved individual characteristics; hence, the estimation results from

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quently, tax rates ranged between 0.07 and 0.32%.

[66]These two additional dummies are captured by individual fixed effects in specification (1).

(2) need to be treated with caution.

Before moving to the results, some additional methodological comments need to be made. First, all monetary values are expressed in 2011 euros and, second, standard errors are clustered by the married taxpayers identified in the sample. This is the case when they submit income tax returns jointly; however, they have to submit their wealth tax returns individually so as to report their own wealth. Finally, to deal with outliers, taxpayers placed in the top 0.5% of reported wealth and taxable income distributions are not considered in the estimations.

5   Results

5.1   Main estimations

Figures 3-11 show the coefficient estimates and 95% confidence intervals resulting from specification (1) for the multiple outcomes previously specified. Each figure provides three different sets of estimates: a) those obtained when controlling only for time and individual fixed effects (controls -a-); b) those obtained using the "decile controls" as X_i^{11} (controls -b-); and c) those obtained using the "narrow controls" as X_i^{11} (controls -c-). Estimations have been carried out using both the real and the "estimated" 2011 average tax rates as the explanatory variable; however, as they give very similar results, we only discuss the estimates obtained with the real average tax rates. Results obtained with the "estimated" average tax rates are provided in Appendix D.

In the case of the coefficient estimates from year 2013 onwards, we are unable to disentangle which part of the response can be attributed to the wealth tax reintroduction *per se* and which to the tax increase approved at the very end of 2012.[67] In any case, we are interested in the overall responses, even if the tax was implemented in two different steps.

5.1.1   Taxable and reported wealth responses

Figure 3 shows the coefficient estimates from specification (1) when considering taxable wealth. The panel to the left shows overall effects (behavioural+mechanical, if any), while the panel to the right shows behavioural effects, since taxable wealth has been adjusted for the mechanical effect, assuming in this case that wealth taxes are paid out of savings. The estimates obtained are very similar when using "controls -b-" and "controls -c-", which is also the case for most of the outcomes studied. Thus, the small differences in 2011 levels when using the set of "decile" controls do not seem to matter when accounting for the trends. The estimates obtained when controlling only for individual and time fixed effects, controls -a-,

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[67]The coefficient estimates for 2012 can be fully associated to a response to the wealth tax reintroduction. The 2012 wealth tax increase was passed on December 27, 2012 and until a few days before its approval had not been previously discussed. See: `http://www.europapress.es/catalunya/noticia-govern-reforma-impuesto-patrimonio-ingresar-70-90-millones-extra-20121227215328.html`.

are smaller (in absolute values), but follow a similar pattern.

The "control -c-" estimates, resulting from our preferred specification, reflect a negative effect of treatment exposure on taxable wealth accumulation. The response is already statistically significantly different from zero in 2012 and accumulates over time. The coefficient estimate associated with year 2012 suggests that as the 2011 average tax rate increases by 1 percentage point, taxable wealth lowers by 15.34%. This decrease accumulates to as much as 32.44% over 4 years. If we adjust taxable wealth with the (assumed) mechanical effect, the 2015 coefficient becomes -29.08%, suggesting that the behavioural (mechanical) effect accounts for 89.65% (10.35%) of the overall effect.

To interpret the coefficients, note that a 1 percentage point increase in the average tax rates represents a large experiment: applying it to the mean of 2011 average tax rates for the estimation sample, which is 0.30%, it would represent a tax increase of 333.33%. For this reason, from now on we refer to the estimates in terms of a 0.1 percentage point increase.[68]

The coefficients obtained are within the range reported in the extant literature on wealth taxes. Among the studies that employ similar methodologies to the one used here, the lowest estimate is reported by Zoutman (2018), who finds that a 0.1 percentage point change in the wealth tax reduces accumulated taxable wealth by 1.16% in the short-run (over 2 years) and 1.38% in the long-run (over 5 years). These estimates rise to 1.3 and 1.67%, respectively, when the author looks at households above the 75th wealth percentile, a sample that might be more comparable to ours. Yet, our equivalent short-run estimate (-2.25%) is still higher. Jacobsen et al. (2019) report an increase of taxable wealth of about 30% over 8 years for the top 1% of the wealth distribution, in response to an average tax cut of 1.56 percentage points. This estimate is almost 20% in the 4th year after the reform, which is also lower than our 4th-year coefficient. Using cross-canton data Brülhart et al. (2017) estimate that a 0.1 percentage-point rise in wealth taxes lowers reported wealth by 3.5% in aggregate. When using micro data for the Canton of Bern, they find that a 0.1 percentage point increase in wealth taxes reduces wealth accumulation by 2.3% over a 3-year period. This second magnitude is very close to our 3rd-year estimate of 2.86%. The studies employing bunching techniques - that is, Seim (2017) and Londoño Vélez and Ávila-Mahecha (2019) - report much lower estimates: a decrease in taxable wealth of 0.027% and 0.2%, respectively, if we interpret the coefficients in terms of a 0.1 percentage point increase in the wealth tax rates.[69]

Following the reasoning of Brülhart et al. (2017), we next express our coefficient

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[68]This is also the approach followed by Brülhart et al. (2017) and Zoutman (2018).

[69]The estimates in Seim (2017) and Londoño Vélez and Ávila-Mahecha (2019) are not directly comparable because they account for the elasticity of taxable wealth with respect to the net-of-wealth tax rate. Nevertheless, taking into account that wealth tax rates are low (1.5% in Seim 2017 and 1% for the first 2010 tax bracket in Londoño Vélez and Ávila-Mahecha 2019), we can use the property of logarithms: $log(1 + x) \approx x$, for small x, to express the estimates in terms of a 0.1 percentage point change in the wealth tax rates. Considering the upper-bound estimates in both cases, the comparable coefficients are -0.027 and -0.2, respectively.

estimates in terms of the implied net-of-tax rate on the annual returns to wealth. The mean of the average income (wealth) tax rates in 2011 is 24% (0.30%) for the estimation sample. Considering a gross rate of return to net wealth of 3%, computed from the 2011 Spanish Survey of Household Finances microdata[70], the mean average wealth tax rate corresponds to a 10% tax on capital return. Hence, the net-of-tax rate, considering both income and wealth taxes, is 1-(0.24+0.10)=66%. A 0.1 percentage point increase in the wealth tax represents a 3.33 percentage point increase in the tax on capital return, which leads to a net-of-tax rate of 1-(0.24+0.1333)=62.67%. Thus, a 0.1 percentage point increase in the wealth tax, which translates to a reduction of 5.05% in the net-of-tax rate, lowers accumulated taxable wealth by 3.24% over 4 years. Therefore, the elasticity of taxable wealth with respect to the net-of-tax rate of return is 3.24%/5.05%=0.64. Comparable estimates from other studies in the wealth taxation literature take values of 0.85 in Brülhart et al. (2017), 0.5 in Jacobsen et al. (2019)[71] and 0.08 in Londoño Vélez and Ávila-Mahecha (2019). Nevertheless, it should be noted that these estimates are sensitive to the assumed rate of return, as shown in Brülhart et al. (2017).

Figure 4 shows the coefficient estimates from specification (1) when considering total reported wealth. As in Figure 3, the panel to the left shows overall effects (behavioural+mechanical, if any), while the panel to the right shows behavioural effects, assuming the mechanical effect takes place. Interestingly, wealth taxes do not have a negative effect on wealth accumulation. Estimates from the left-hand panel suggest that wealth taxes do not have a significant impact on the evolution of total reported wealth. If we assume wealth taxes are paid out of savings (thus, mechanically reducing wealth), when we account for this effect in the right-hand panel, the estimates indicate that the taxpayers that are most exposed to the reintroduction of the tax increase their savings in the subsequent years. Specifically, as the 2011 average tax rate increases by 0.1 percentage point, reported wealth increases by 0.5% over a 4-year period. If we translate this estimate into an elasticity with respect to the net-of-tax rate of return following the same procedure as described above, it takes a value of -0.1. There could be several explanations for this: i) taxpayers derive some utility from wealth *per se*, also known as "capitalistic spirit" motive (see Kopczuk, 2010; Saez and Stantcheva, 2018) and, hence, they increase their savings to offset the mechanical effect of wealth taxes; and ii) taxpayers make use of tax avoidance strategies and defer the realization of capital income to take advantage of the limit on tax liability. The following sections seek to shed further light on this.

5.1.2 Avoidance responses

Figure 5 shows the coefficient estimates from specification (1) when considering potential tax avoidance strategies derived from the design of the wealth tax. As explained in Section 2.2, these strategies are related to the use of the limit on wealth

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[70]We compute an average gross rate of return to net wealth using the 2011 Survey of Household Finances microdata. This average is 3% for households whose net wealth is above 1.5M euros (this is the lowest net wealth value in our estimation sample).

[71]Elasticity computed for the top 1% of the wealth distribution over an 8-year period. The change in the net-of-tax rate of return is 61% and the accumulated effect on taxable wealth is about 30%.

tax liability and exempt assets. The left-hand panel shows a positive relationship between exposure to the reintroduced tax and the probability of facing the limit on wealth tax liability in subsequent years. Taxpayers respond quickly, since most of the effect has already taken place in 2012. This suggests that taxpayers take advantage of this tax feature every year and not on just one occasion. The 2012 coefficient indicates that the probability of facing the limit in 2012 increases by 3.69 percentage points as the 2011 average tax rate increases by 0.1 percentage points. This probability rises by 4.02 percentage points in 2015. This effect represents 0.28 times the share of taxpayers facing the limit in 2011.

The results in the right-hand panel of Figure 5 are not surprising if we take into consideration the estimates from Figures 3 and 4. Taxpayers take advantage of the wealth tax exemptions, which is why taxable wealth can fall without reducing total reported wealth. The 2015 coefficient indicates that a 0.1 percentage point increase in the 2011 average tax rate leads to a 1.81 percentage points rise in the share of exempt assets over a 4-year period. Put differently, the differences in the share of exempt assets existing in 2011 (see Table 4) are reduced by one quarter after 4 years.

As discussed in Section 2.2, there are two procedures that can help a taxpayer benefit from the limit on wealth tax liability: reducing their realized taxable income and increasing the importance of their realized long-term capital gains in taxable income. Figure 6 shows that taxpayers, in fact, employ both strategies. Estimates from the left-hand panel indicate that a 0.1 percentage point increase in the 2011 average tax rate leads to a reduction in taxable income of 1.98% over 4 years. This coefficient takes a value of (1.98%/5.05%)=0.39 when expressed as an elasticity of taxable income with respect to the net-of-tax rate of return.[72] This apparently large effect is less important when we consider its potential impact on wealth accumulation. Indeed, the 4-year average decrease in taxable income of almost 8,000 euros[73] only represents 0.20% of the 2011 average reported wealth. Furthermore, this effect on taxable income does not necessarily imply a reduction in savings, since it could also be explained by an increase in unrealized capital income. If part of the foregone income is capitalized, then it should not impact wealth accumulation. It is not unreasonable to believe this to be the case, given that, as we see below, the taxpayers that are most exposed to the wealth tax increase their preference for assets that allow them to produce capital income in the form of capital gains easily. However, we have no further information on income sources to confirm this.

Apart from lowering taxable income, the importance of realized long-term capital gains increases over time. The different evolution of both effects is not surprising, given that capital gains realization is much easier to adjust than other income sources. Indeed, the 2012 response in the share of long-term capital gains accounts for half of the 4-year effect, which explains the sharp rise in the probability of fac-

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[72]This estimate is not very different from the 0.278 capital income elasticity reported by Kleven and Schultz (2014).

[73]Considering the mean 2011 average tax rate of 0.30% and the 2011 average income of 134,277 euros.

ing the limit on tax liability shown in Figure 5. Moreover, the 2012 coefficient also tells us that in just one year taxpayers have almost reversed the differences in the share of long-term capital gains existing in 2011 (shown in Table 4). The estimated effect keeps rising up to a coefficient of 0.98 percentage points for 2015, which represents 0.23 times the average share of long-term capital gains in 2011.

Figures 7 to 10 show the responses of the taxpayers' asset portfolios to the reintroduction of the wealth tax. The left-hand panel in Figure 7 shows that, overall, there are no significant effects of wealth taxes on the share of housing. Yet, the right-hand panel estimates suggest that higher tax rates do seem to boost the use of the main-dwelling exemption, although the effect is quite small. The 4-year estimate takes a value of 0.06 percentage points, which represents 1.2% of the average share of exempt housing in 2011. Furthermore, this coefficient tells us that the differences in the share of exempt housing existing in 2011 (see Table 4) are reduced by 12.78% after 4 years.

The left-hand panel in Figure 8 indicates that facing higher wealth taxes has a negative effect on the overall importance of unlisted companies and business assets. This negative effect derives from taxable assets (middle panel), which are partly shifted to exempt assets (right-hand panel). The last coefficient tells us that a 0.1 percentage point increase in 2011 average tax rates leads to a rise in the share of exempt businesses of 0.96 percentage points over 4 years. This effect reduces the 2011 differences in the share of exempt businesses by 18.74%. The equivalent 4-year effect on taxable businesses is more than 2 times higher, with the opposite sign, which reflects a shift in preferences towards other types of asset. Estimates from Figure 9 confirm this is indeed the case. Facing higher wealth tax rates leads taxpayers to switch their holdings in unlisted companies and business assets to listed equity and investment funds. This response is not surprising when considering the tax liability limit. These latter assets allow taxpayers to realize capital gains much more easily than is the case with unlisted companies, and, moreover, it helps them reduce their annual capital income, especially the assets that do not produce realized income until they are sold. The results shown in Figure 6 are very much in line with this reasoning.

The 4th-year coefficient in the left-hand panel of Figure 9 indicates that a 0.1 percentage point increase in the 2011 average tax rate leads to a rise in the overall share of listed equity and investment funds of 1.15 percentage points. According to the last estimate in the right-hand panel, 70% of this effect comes from exempt assets.[74] This is a large response considering that the average share of exempt listed equity in 2011 was 1.58%. Put differently, this effect reduces the 2011 differences in the share of exempt listed companies by 46.5%.

To conclude this analysis of asset portfolio responses, Figure 10 shows very small effects on bank accounts and bonds (the 4th-year coefficient takes a value of -0.14 percentage points). This negative coefficient could reflect a potential mechanical

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[74]Holdings in listed companies may also be exempt from the wealth tax if the ownership share is at least 5% and other conditions specified in the Law are satisfied. See Appendix A for further information.

effect derived from wealth tax payments. Unfortunately, we have no further information to examine this question in greater depth.

Finally, Figure 11 shows the effect of facing higher tax rates on the probability of making a gift (as declared to the Catalan Tax Agency) in the subsequent years. The positive effect recorded in 2012 and 2013 disappears thereafter. The 2013 coefficient indicates that a 0.1 percentage point increase in the 2011 average tax rate leads to a rise in the probability of making a gift in 2013 of 0.27 percentage points. This effect represents 0.14 times the share of taxpayers who made a gift in 2011. The fact that this response does not persist over time, contrary to the other trends described up to this juncture, suggests that taxpayers prefer tax avoidance strategies that do not imply giving up wealth. This would point to a "capitalistic motive" underlying wealth accumulation, but it may also be driven by the fact that gifts are subject to gift taxes and the other avoidance strategies are less costly, at least in taxation terms.

5.2   Heterogeneous effects

Below we seek to verify whether the responses described above vary according to the initial circumstances of the taxpayers in our sample. If taxpayer responses are, indeed, driven by tax avoidance strategies, we would expect those already owning a business in 2011 to make greater use of the business exemption and those who did not to take advantage of the tax liability limit. This hypothesis is based on the fact that, for non-business owners, changing their entire wealth structure to set up a company for reasons of tax exemption is costly, especially if we consider the high degree of uncertainty regarding the tax's continuity.

To determine whether this was the case, we divide the estimation sample in two groups: those whose 2011 share of unlisted companies and business assets was below the median ("Business-Low") and those whose 2011 share was above ("Business-High"). The median takes a value of 19.45%. Figure A3 shows the 2011 average asset portfolio for each group. Histograms from Figure A4 in Appendix B show that, not surprisingly, "Business-High" taxpayers are younger (panel b) and overall earn higher taxable income (panel a).

Figures 12 to 20 show the coefficient estimates resulting from specification (1) for each of the two groups when using the set of "narrow" control variables. The outcomes analysed do not change from those already described. For purposes of comparison, the figures also include the coefficients derived from the main estimations previously shown (labelled "All"). In line with the hypothesis forwarded above, the results reflect a clear distinction in the strategies adopted by the two groups in response to the reintroduction of the tax (see, for instance, Figure 14). The only two outcomes for which the responses were the same are bank accounts and bonds share (Figure 19) and gifts (Figure 20).

Taxable wealth was reduced significantly more by "Business-High" taxpayers (Figure 12), in favour of exempt assets (right-hand panel in Figure 14). Figure 17 shows that facing higher tax rates in 2011 led "Business-High" taxpayers to rearrange

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their business assets and shares so that they were exempt from the tax. According to Figure 14, some of them also sought to benefit from the tax liability limit, presumably those who earned lower incomes, since the responses in the case of taxable income are not statistically significantly different from zero for this taxpayer group, whereas the importance of long-term capital gains increased slightly (Figure 15). Considering the little importance attached to listed equity and investment funds for this taxpayer group in 2011 (Figure A3), the switch towards this type of asset reflected in Figure 18 is likely to explain the effect on long-term capital gains.

If we focus on "Business-Low" taxpayers, Figure 14 shows that they clearly took advantage of the limit on tax liability. Facing higher tax rates in 2011 led "Business-Low" taxpayers to significantly reduce their taxable income and to increase their share of long-term capital gains in the subsequent years (Figure 15). Indeed, owning a higher share of listed equity and investment funds (Figure A3) makes it easier to realize long term capital gains. Yet, this group of taxpayers also exploited wealth exemptions. As shown in Figure 18, the taxpayers most exposed to wealth taxes in 2011 increased the importance of their share of exempt listed companies in the subsequent years. This response might have helped them take advantage of the tax liability limit and, at the same time, allowed them to reduce their taxable wealth. Additionally, Figure 16 illustrates a clear switch from taxable to exempt housing. This suggests that taxpayers changed their fiscal residence (though without necessarily changing their actual dwelling) to a property of higher value, to further exploit the main-dwelling exemption. Nevertheless, this effect is small because the exemption is limited up to 300,000 euros.

Responses related to taking advantage of the limit on wealth tax liability reflect only avoidance strategies, since taxpayers exploit the provisions foreseen by the Law. However, the extent to which the use of the exemptions constitutes tax avoidance or tax evasion is difficult to define, especially in the case of business exemptions. According to the Law, this exemption can only be equivalent to that part which is directly involved in a firm's economic activity. However, determining which assets are directly involved in the economic activity is clearly ambiguous as the law only provides general indications and, thus, ultimately, it is left up to the criteria of the taxpayers' themselves. The arbitrary nature of the tax regulations might in turn result in the potential abuse of this tax incentive. Indeed, Durán-Cabré et al. (2018), in estimating the tax gap in Catalonia for 2014, find that a sizable percentage of the tax gap in the wealth tax is attributable to the incorrect use of the business exemption.

To sum up, our results clearly indicate that taxpayers responded significantly to the reintroduction of the wealth tax by adopting a range of avoidance (and possibly also evasive) strategies. Just what the impact of this was in terms of tax revenues is examined in the following section.

5.3 Impact on tax revenues

As we have seen above, wealth tax rates have a negative effect on taxable wealth, which necessarily implies a negative effect on tax revenues. Given that wealth tax

rates changed in 2012, we compute the effect on tax revenues based on an estimate of 2011 wealth tax revenues assuming that the new tax rates were already in place. By so doing, we ensure we only capture behavioural responses.

Considering the 0.3% mean for the 2011 average tax rates and the "control-c-" coefficient estimates from the left-hand panel in Figure 3, the average decrease in taxable wealth (with respect to 2011) was 4.6% in 2012, 6.76% in 2013, 8.58% in 2014 and 9.73% in 2015. If we combine this with the 2011 average taxable wealth (2,358,664 euros) and the mean of estimated 2011 average tax rates expressed over taxable wealth (0.47%), this translates into an average decrease in tax liability of 510 euros in 2012, 750 euros in 2013, 951 euros in 2014 and 1,079 euros in 2015. If we express the aggregate effect of 17,853 taxpayers in terms of 2011 estimated wealth tax revenues, we obtain the following percentages: -3.42% for 2012, -5.02% for 2013, -6.38% for 2014 and -7.23% for 2015.

However, this aggregate effect does not account for the revenue loss derived from the progressivity in the tax schedule, which implies that the remaining taxable wealth is being taxed at lower average rates. Yet, the effect on tax revenues does not stop here due to the existence of responses regarding the limit on tax liability. Unlike the former, these responses directly affect the tax liability and, so, the impact on tax revenues might be higher. Consequently, to be able to capture the overall impact of the different set of responses, we estimate how initial exposure to the wealth tax explains the taxpayers' subsequent contributions to wealth tax revenues, relative to 2011. More specifically, we estimate specification (1) using as our dependent variable the tax liability of taxpayer i in year t, expressed over 2011 estimated wealth tax revenues. Here again, to exclude the mechanical effect resulting from 2012 tax changes, the 2011 tax liability is computed as if these tax changes were already in place.

In the first row of Table 5 we show the coefficient estimates resulting from specification (1) when using the set of "narrow" controls, and, in the second row, the aggregate estimates, which are obtained multiplying the former by the 0.3% mean of the 2011 average tax rates and the number of taxpayers from the estimation sample (17,853). The aggregate effect reveals a marked impact on wealth tax revenues. If we sum the annual estimates, the accumulated aggregate effect is -2.6. This number indicates that the tax avoidance strategies adopted by taxpayers between 2012 and 2015 were far from negligible, since they represent a 4-year revenue loss of 2.6 times the 2011 estimated wealth tax revenues.

On the other hand, the negative effect of wealth taxes on taxable income has a collateral negative effect on personal income tax revenues. Taking the coefficient estimates from the left-hand panel in Figure 6, the average decrease in taxable income is about 3,800 euros in 2013, 5,000 euros in 2014 and almost 8,000 euros in 2015.[75] Applying the 24% mean of 2011 average income tax rates, this translates into an aggregate effect of -2.45% for 2013, -3.18% for 2014 and -5.09% for 2015, expressed in terms of the 2011 income tax revenues generated by the estimation

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[75]Considering the mean 2011 average tax rate of 0.30% and the 2011 average income of 134,277 euro.

sample. When summing the annual estimates, the accumulated aggregate effect is -10.72%. Again, these estimates are a lower bound because they do not account for the revenue loss derived from the progressivity in the tax schedule.

5.4 Initial wealth tax exposure and subsequent tax filing

Finally, Table 6 shows the coefficient estimates resulting from specification (2). As previously stated, with this specification we are unable to capture unobserved individual characteristics that might bias the estimates; hence, these results should be treated with caution. Nevertheless, we believe it is still interesting to know, especially for auditing purposes, whether there is a positive relation between exposure to the reintroduction of the wealth tax and the probability of disappearing from the sample in the subsequent years. Estimates suggest this might indeed be the case. Specifically, as 2011 average tax rates increased by 0.1 percentage points, the probability of leaving the sample between 2012 and 2015 rose by 0.2 percentage points.

Columns (3) and (4) in Table 6 suggest that it is the "Business-High" taxpayers that are driving this result. A potential explanation could be that taxpayers in this group are younger (see Figure A4) and, hence, they might be more mobile. However, we cannot determine whether they moved elsewhere or stopped filing for other reasons (other than death); thus, further information would be needed to discover the mechanism responsible for this response.

6 Conclusions

The significant growth in wealth inequality has revived the debate centred on wealth taxation, both in public policy and in academia. However, as shown above, little is known about how existing wealth taxes (or those previously imposed) affect taxpayers' behaviour. This lack of empirical evidence complicates any valid evaluation of the desirability of such taxes. Against this backdrop, this paper has examined how Catalan taxpayers reacted to the reintroduction of the Wealth Tax in 2011. Using the universe of wealth tax returns submitted to the Catalan Tax Agency between 2011 and 2015, we have exploited the variation in treatment exposure to analyse taxpayers' responses, not only in terms of wealth accumulation, but also of their potential avoidance strategies.

The main conclusion to be drawn from the results is that taxpayers responded significantly to the wealth tax, not in terms of savings, but through the adoption of avoidance (and possibly also evasive) strategies. Specifically, while facing higher wealth taxes did not have a negative effect on wealth accumulation, it did encourage taxpayers to change their asset and income composition to take advantage of wealth tax exemptions and the limit set on wealth tax liability. As such, this paper has documented two different types of response, which are more or less predominant depending on the initial importance of a taxpayer's business assets and shares. The first type of response was precisely to reduce taxable wealth in favour of exempt assets, mainly in terms of company shares (both listed and unlisted). This translates into an elasticity of taxable wealth with respect to the net-of-tax

rate of return of 0.64. The second type of response - related to the application of a tax liability limit and adopted primarily by taxpayers holding few business shares - involved reducing their realized taxable income and increasing their long-term capital gains realizations, on the income side, and investing in listed companies and investment funds, on the asset portfolio side. Clearly, however, these income-asset portfolio responses were not independent of one another, as the latter helped achieve the former.

All in all, these avoidance responses are high in terms of foregone tax revenues, representing a 4-year accumulated revenue loss of 2.6 times the estimated wealth tax revenues for 2011. Hence, our results indicate that these specific tax features, initially created to incentivize small- and medium-sized businesses (in the case of the business exemption) and to prevent a confiscatory tax (in the case of the limit set on tax liability), actually have quite major perverse effects. The costs to which they give rise, in terms not only of revenues and tax auditing resources, but also of equity and efficiency, are scarcely justifiable if they serve as significant channels for tax avoidance. Moreover, these features severely undermine the redistributive role of the tax. Thus, all the evidence points to an unequivocal conclusion: the current Spanish Wealth Tax needs to be redesigned. However, this is not something that regional governments can do unaided, even though they are responsible for the administration of the tax; it requires the involvement of the Central government, which wields most of the legislative capacity with respect to the wealth tax.

A comprehensive tax base including all types of asset, with no differential treatment being applied across taxpayers with the same stock of wealth (as proposed by Saez and Zucman, 2019), would make the tax more efficient and equitable, as well as going some way to facilitating the auditing tasks for the tax administration. This in turn would allow a significant reduction in the current marginal tax rates without giving up the progressivity of the tax, as long as the minimum threshold is set high. By way of illustration, if only wealth stocks above 5 million euros were (fully) taxed - which represents roughly the top 10% of wealth taxpayers in 2011 and around 0.1% of personal income tax filers - a flat tax rate of 0.6% would be sufficient to collect revenues equivalent to the wealth tax income collected in 2011. And this flat tax rate is much lower than existing statutory tax rates for these levels of wealth.

Finally, the external validity of our results might be called into question, given that they are fully linked to the design of this particular wealth tax and its institutional context. So, while they can be readily extrapolated to the other Spanish regions that levy the same wealth tax and share a similar institutional context, they can hardly be extrapolated to other countries where wealth taxes are (or used to be) set differently. However, the findings reported here should be useful to policy makers and administrations thinking of implementing a wealth tax insofar as they illustrate the pitfalls to be avoided.

References

Alan, S., K. Atalay, T.F. Crossley and S.H. Jeon. 2010. "New Evidence on Taxes and Portfolio Choice." *Journal of Public Economics* 94:813–823.

Alstadsæter, A., W. Kopczuk and K. Telle. 2014. "Are Closely-Held Firms Tax Shelters?" *Tax Policy and the Economy* 28:1–32.

Alvaredo, F. and E. Saez. 2009. "Income and Wealth Concentration in Spain from a Historical and Fiscal Perspective." *Journal of the European Economic Association* 7(5):1140–1167.

Arcarons, J. and S. Calonge. 2007. "La Imposición sobre la riqueza: evaluación y microsimulación del Impuesto sobre el Patrimonio." *Revista del Instituto de Estudios Económicos* 4/07:231–259.

Auerbach, A.J., L.E. Burman and J.M. Siegel. 2000. Capital Gains Taxation and Tax Avoidance: New Evidence from Panel Data. In *Does Atlas Shrug? The Economic Consequences of Taxing the Rich*, ed. Joel Slemrod. Harvard University Press.

Banco de España. 2014. "Encuesta Financiera de las Familias (EFF) 2011: métodos, resultados y cambios desde 2008." *Boletín Económico* pp. 71–103.

Bergstresser, D. and J. Pontiff. 2013. "Investment Taxation and Portfolio Performance." *Journal of Public Economics* 97:245–257.

Brülhart, M., J. Gruber, M. Krapf and K. Schmidheiny. 2017. "The Elasticity of Taxable Wealth: Evidence From Switzerland." *working paper* .

Carbajo, D. 2015. "Oportunidad y necesidad de la imposición patrimonial." *Instituto de Estudios Fiscales, Crónica Tributaria: Boletín de Actualidad* 1:2–7.

Daunfeldt, S.O., U. Praski-Ståhlgren and Rudholm. 2010. "Do high taxes lock-in capital gains? Evidence from a dual income tax system." *Public Choice* 145(1):25–38.

Desai, M.A. and D. Dharmapala. 2011. "Dividend taxes and international portfolio choice." *The Review of Economics and Statistics* 93(1):266–284.

Díaz-Caro, C. and E. Crespo-Cebada. 2016. "Taxation of capital gains and Lock-in effect in the Spanish Dual Income Tax." *European Journal of Management and Business Economics* 25:15–21.

Durán-Cabré, J.M. and A. Esteller-Moré. 2007. "An Empirical Analysis of Capital Taxation: Equity vs. Tax Compliance." *Papeles de trabajo del Instituto de Estudios Fiscales* 4/07.

Durán-Cabré, J.M. and A. Esteller-Moré. 2010. "Tax Data for Wealth Concentration Analysis: an Application to Spanish Wealth Tax." *Review of Income and Wealth* 56:620–631.

Durán-Cabré, J.M. and A. Esteller-Moré. 2014. "La Imposición sobre la Riqueza en España." *Papeles de Economía Española* 139:70–85.

Durán-Cabré, J.M., A. Esteller-Moré, M. Mas-Montserrat and L. Salvadori. 2018. "La brecha fiscal: estudio y aplicación a los impuestos sobre la riqueza." *IEB Working Paper* .

Enciso, V. 2006. "El comportamiento paradójico de la recaudación en el impuesto sobre el patrimonio (o los perversos efectos de los criterios de valoración que aplica el tributo)." *Instituto de Estudios Fiscales, Crónica Tributaria* 120:33–56.

Fagereng, A., L. Guiso, D. Malacrino and L. Pistaferri. 2018. "Heterogeneity and Persistence in Returns to Wealth." *CESifo Working Paper* No. 7107.

Fernández de Beaumont, I. and J. Martín. 2010. "El impuesto sobre el patrimonio neto vs. l'impôt de solidarité sur la fortune: reflexión y análisis comparativo." *Instituto de Estudios Fiscales, Crónica Tributaria: Boletín de Actualidad* 8:11–20.

Hanlon, M. and S. Heitzman. 2010. "A review of tax research." *Journal of Accounting and Economics* 50(23):127–178.

Jacob, M. 2013. "Capital Gains Taxes and the Realization of Capital Gains and Losses - Evidence from German Income Tax Data." *FinanzArchiv/Public Finance Analysis* 69(1):30–56.

Jacob, M. 2016. "Cross-base tax elasticity of capital gains." *Applied Economics* 48(28):2611–2624.

Jacob, M. 2018. "Tax Regimes and Capital Gains Realizations." *European Accounting Review* 27(1):1–21.

Jacobsen, K., K. Jacobsen, H. Kleven and G. Zucman. 2019. "Wealth Taxation and Wealth Accumulation: Theory and Evidence from Denmark." *NBER working paper* 24371 (R&R, Quarterly Journal of Economics).

Joulfaian, D. 2005. "Choosing between gifts and bequests: How taxes affect the timing of wealth transfers." *Journal of Public Economics* 89(11-12):2069–2091.

Kleven, H. and E.A. Schultz. 2014. "Estimating Taxable Income Responses Using Danish Tax Reforms." *American Economic Journal: Economic Policy* 6(4):271–301.

Kopczuk, W. 2010. "Economics of estate taxation: a brief review of theory and evidence." *NBER Working Paper* 15741.

Kopczuk, W. 2016. "The Role of Bequests in Shaping Wealth Inequality: Evidence from Danish Wealth Records." *American Economic Review: Papers and Proceedings* 106(5):656–61.

Londoño Vélez, J. and J. Ávila-Mahecha. 2019. "Can Wealth Taxation Work in Developing Countries? Quasi-Experimental Evidence from Colombia." *working paper* .

Neisser, C. 2018. "The Elasticity of Taxable Income: A Meta-Regression Analysis." *IZA discussion paper* 11958.

OECD. 2018. "The Role and Design of Net Wealth Taxes in the OECD." *OECD Tax Policy Studies* .

Piketty, T. 2014. *Capital in the Twenty-First Century*. Harvard University Press.

Poterba, J. 2002. Taxation and portfolio structure: issues and implications. In *Household Portfolios*, ed. L. Guiso, M. Haliassos and T. Japelli. MIT Press.

Poterba, J. and A.A. Samwick. 2002. "Taxation and household portfolio composition: US evidence from the 1980s and 1990s." *Journal of Public Economics* 87:5–38.

Saez, E. and G. Zucman. 2019. "How Would a Progressive Wealth Tax Work? Evidence from the Economics Literature." *mimeo* .

Saez, E., J. Slemrod and S.H. Giertz. 2012. "The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review." *Journal of Economic Literature* 50(1):3–50.

Saez, E. and S. Stantcheva. 2018. "A simpler theory of optimal capital taxation." *Journal of Public Economics* 162:120–142.

Schalck, C. 2017. "Tax measures and household financial behaviour: Evidence from France." *The Quarterly Review of Economics and Finance* 66:127–135.

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

Slemrod, J. 2018. "Tax Compliance and Enforcement." *NBER Working Paper Series* .

Slemrod, J. and S. Yitzhaki. 2002. Tax Avoidance, Evasion, and Administration. In *Handbook of Public Economics, Vol. 3*, ed. A. Auerbach and M. Feldstein. Amsterdam: North-Holland pp. 1423–1470.

Zoutman, F.T. 2018. "The Elasticity of Taxable Wealth: Evidence from the Netherlands." *working paper* (R&R at Scandinavian Journal of Economics).

Zucman, G. 2019. "Global Wealth Inequality." *NBER working paper, forthcoming, Annual Review of Economics* 11.

Table 1: Descriptive statistics by wealth deciles, 2011

| | | Wealth deciles (%) | | | | Total |
		0-10	40-50	80-90	90-100	
Total reported wealth	mean	797,053	1,383,696	3,990,827	14,799,237	3,047,847
	std. dev.	*383,089*	*59,185*	*614,566*	*26,543,059*	*9,309,675*
Taxable wealth	mean	752,735	1,206,829	2,424,218	6,402,095	1,852,263
	std. dev.	*414,306*	*170,433*	*1,406,150*	*11,493,279*	*4,007,279*
Income	mean	48,937	76,164	170,631	453,006	126,333
	std. dev.	*65,922*	*126,925*	*320,785*	*1,911,277*	*648,811*
WT liability	mean	138	1,751	14,606	51,817	8,714
	std. dev.	*92*	*780*	*13,684*	*129,621*	*43,920*
Average tax rate (%)	mean	0.017	0.126	0.364	0.370	0.182
	std. dev.	*0.011*	*0.054*	*0.324*	*0.399*	*0.228*

Notes: All amounts are expressed in euros, except the average tax rate, which is computed as the Wealth Tax (WT) liability over total reported wealth and is expressed in percentage points. Wealth deciles are defined according to total wealth (taxable+exempt) reported in 2011. The number of observations is 44,236, except for income statistics which is 38,915, given that some taxpayers do not report this information.

Table 2: Evolution of wealth tax revenues, 2011-2015

	2011 a.real	2011 b.estimate	2012	2013	2014	2015	Increase 11b-15 %
[1] Total revenues *(in million €)*	385	455	397	353	351	367	-19.23
[2] Revenues from taxpayers who submit WT returns every year							
Total amount *(in million €)*	316	374	339	330	334	361	-3.64
Weight over total revenues *(%)*	82.03	82.28	85.41	93.57	95.22	98.17	
[3] Same as [2], top 50% of wealth distribution							
Total amount *(in million €)*	302	343	306	291	291	315	-8.37
Weight over total revenues *(%)*	78.33	75.50	76.98	82.65	82.91	85.65	

Notes: Monetary values are expressed in 2011 prices. Figures provided in row [1] are computed considering only those tax filers who submitted, at least, the tax return for year 2011. Therefore, they do not include revenues from taxpayers who started submitting wealth tax (WT) returns for a later year, since they do not form part of this study. Figures in rows [2] and [3] consider only those taxpayers who filed wealth tax returns every year between 2011 and 2015. To enable comparability across years, two different indicators are given with respect to 2011 revenues: a) revenues actually collected and b) an estimation of the revenues that would have been collected if the tax changes approved in 2012 had already been applied to 2011 wealth.

Table 3: Evolution of variables of interest, 2011-2015

	2011	2012	2013	2014	2015	Increase 11-15 %
Total reported wealth *(in million €)*	91,916	91,692	93,754	95,517	97,726	6.32
Exempt wealth						
Total reported *(in million €)*	41,314	42,072	44,062	44,608	46,321	12.12
Weight over taxable wealth *(%)*	81.65	84.79	88.67	87.63	90.11	
Taxpayers reporting exempt assets *(%)*	92.26	92.79	92.90	92.95	92.97	
Quoted shares and investment funds						
Total reported *(in million €)*	13,870	14,860	17,475	20,029	20,869	50.46
Weight over taxable wealth *(%)*	27.41	29.95	35.17	39.34	40.60	
Taxpayers reporting these assets *(%)*	79.83	82.12	83.28	84.83	86.06	
Limit on the wealth tax liability						
Revenue loss *(in million €)*	190	256	282	306	294	54.78
Weight over collected WT revenues *(%)*	62.89	83.70	96.72	105.13	93.39	
Taxpayers facing the limit *(%)*	14.26	20.88	22.43	25.31	23.73	

Notes: Monetary values are expressed in 2011 prices. Figures provided in this table consider only those taxpayers in the top 50% of the observed wealth distribution who filed wealth tax returns every year between 2011 and 2015. "Quoted shares and investment funds" include taxable assets only.

Table 4: Sources of variation in treatment exposure, 2011

Dep. Var.	Exempt assets	Exempt housing	Exempt listed equity	Exempt unlisted co.	Long term capital gains
All					
2011 atr	-0.7173***	-0.0412***	-0.1747***	-0.5014***	-0.0644***
	(0.0085)	(0.0013)	(0.0064)	(0.0087)	(0.0061)
Dep. var. mean	0.301	0.0495	0.0171	0.2344	0.0432
Observations	20,371	20,371	20,371	20,371	18,083
5-year filers					
2011 atr	-0.7244***	-0.0434***	-0.1731***	-0.5079***	-0.0640***
	(0.0089)	(0.0015)	(0.0070)	(0.0093)	(0.0066)
Dep. var. mean	0.2907	0.0501	0.0158	0.2248	0.0429
Observations	17,853	17,853	17,853	17,853	16,008
Controls	"narrow"	"narrow"	"narrow"	"narrow"	"narrow"
Year	2011	2011	2011	2011	2011

Notes: Robust standard errors, clustered by marriages, in parentheses. Only taxpayers in the top 50% of the observed 2011 wealth distribution are considered. Top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. _All_ estimates refer to all 2011 taxpayers in the top 50%; _5-year filers_ estimates refer to those who filed wealth tax returns every year between 2011 and 2015. The first four dependent variables are expressed in shares over total assets. The last dependent variable is expressed as the share of long term capital gains over taxable income. The number of observations in the last column is not as high because some taxpayers do not report information on income. "Narrow" controls include non-parametric variables which capture taxpayers' wealth, income, asset portfolio, age, indebtedness share and tax amnesty participation. For a detailed definition of these controls see Section 4.2.
***p<0.01, **p<0.05, *p<0.1.

Table 5: Impact of taxpayers' responses on wealth tax revenues

	2012	2013	2014	2015
a) Individual effect				
2011 atr	-0.000086***	-0.000120***	-0.000138***	-0.000139***
	(0.000005)	(0.000007)	(0.000007)	(0.000007)
b) Aggregate effect				
Deviation from 2011	-0.4585***	-0.6445***	-0.7414***	-0.7454***
estimated revenues	(0.0290)	(0.0364)	(0.0372)	(0.0390)

Notes: *Row -a-* provides coefficient estimates and standard errors, in parentheses, from specification (1) using the set of control variables -c- and *real* atr_i^{11} as the explanatory variable. For a detailed definition of these variables see Section 4.2. The dependent variable is the tax liability of taxpayer i in year t, expressed over the 2011 estimated wealth tax revenues. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15 (N: 17,853 taxpayers*5years). Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers.
Row -b- provides the annual aggregate impact of taxpayers' responses in terms of the estimated wealth tax revenues for 2011. These estimates are obtained by multiplying coefficients from row -a- by the mean 2011 atr (0.30%) and the number of taxpayers in the estimation sample.
***p<0.01, **p<0.05, *p<0.1.

Table 6: Initial wealth tax exposure and subsequent tax filing

	(1)	(2)	(3)	(4)
2011 atr	0.0202**	0.0247**	-0.0050	0.0236*
	(0.0096)	(0.0099)	(0.0170)	(0.0125)
Observations	20,371	20,371	10,186	10,185
Controls	Decile	Narrow	Narrow	Narrow
Sample	All	All	Business-Low	Business-High

Notes: Robust standard errors, clustered by marriages, in parentheses. Only taxpayers in the top 50% of the observed 2011 wealth distribution are considered. Top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. "Decile" and "Narrow" controls include non-parametric variables which capture taxpayers' wealth, income, asset portfolio, age, indebtedness share and tax amnesty participation. For a detailed definition of these controls see Section 4.2. "Business-Low(High)" taxpayers are those whose 2011 share of unlisted companies and business assets is below(above) the median. The dependent variable is a dummy which takes a value of 1 if a taxpayer stops filing wealth tax returns after 2011 for reasons other than death, and 0 otherwise.
***p<0.01, **p<0.05, *p<0.1.

Figure 1: Asset portfolio by wealth deciles, 2011
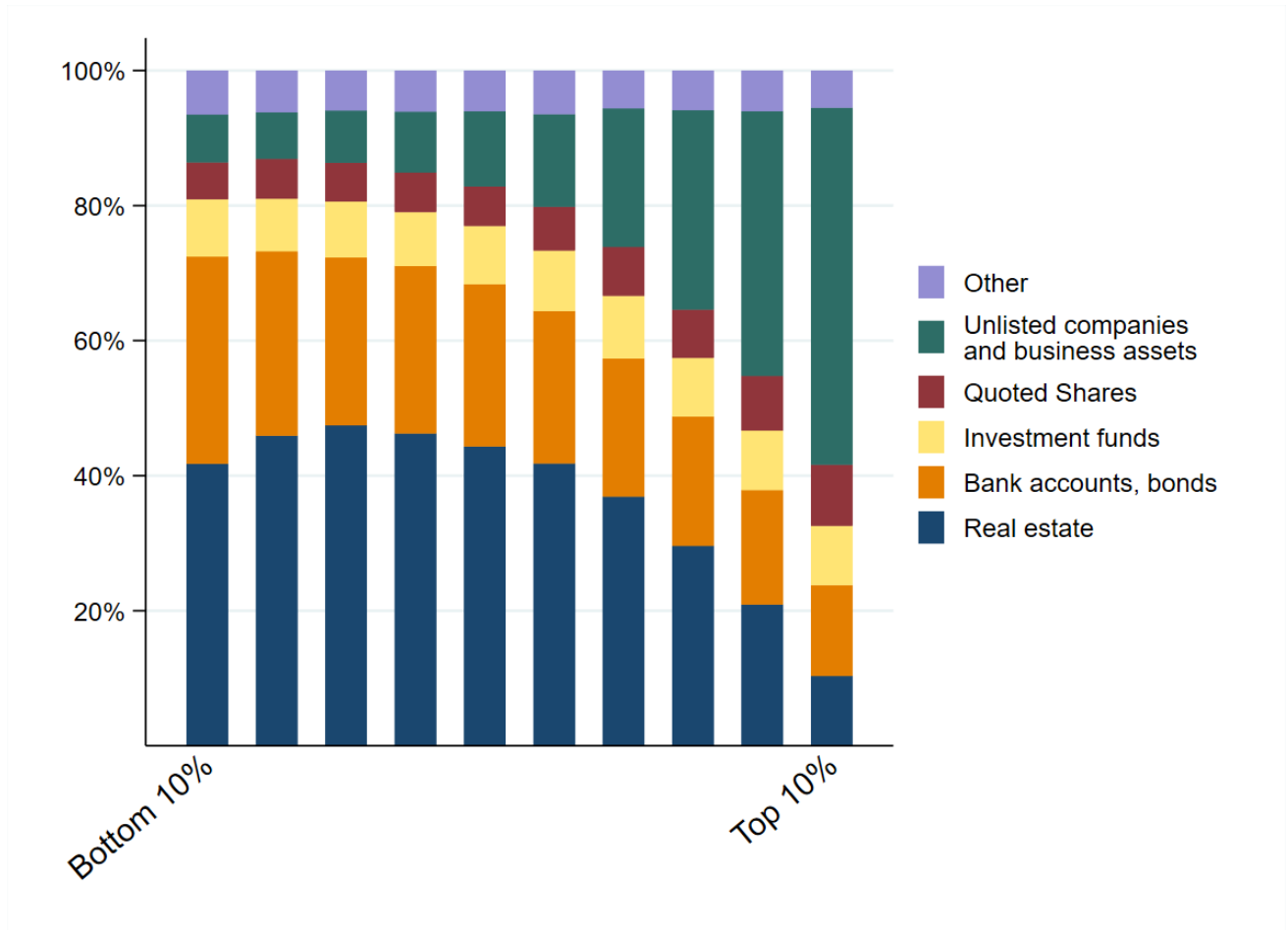
Notes: Wealth deciles are defined according to total wealth (taxable+exempt) reported in 2011. The number of observations is 44,236. Real estate includes taxpayers' main dwelling, which is exempt from the wealth tax. Quoted shares, unlisted companies and business assets include both taxable and exempt assets.
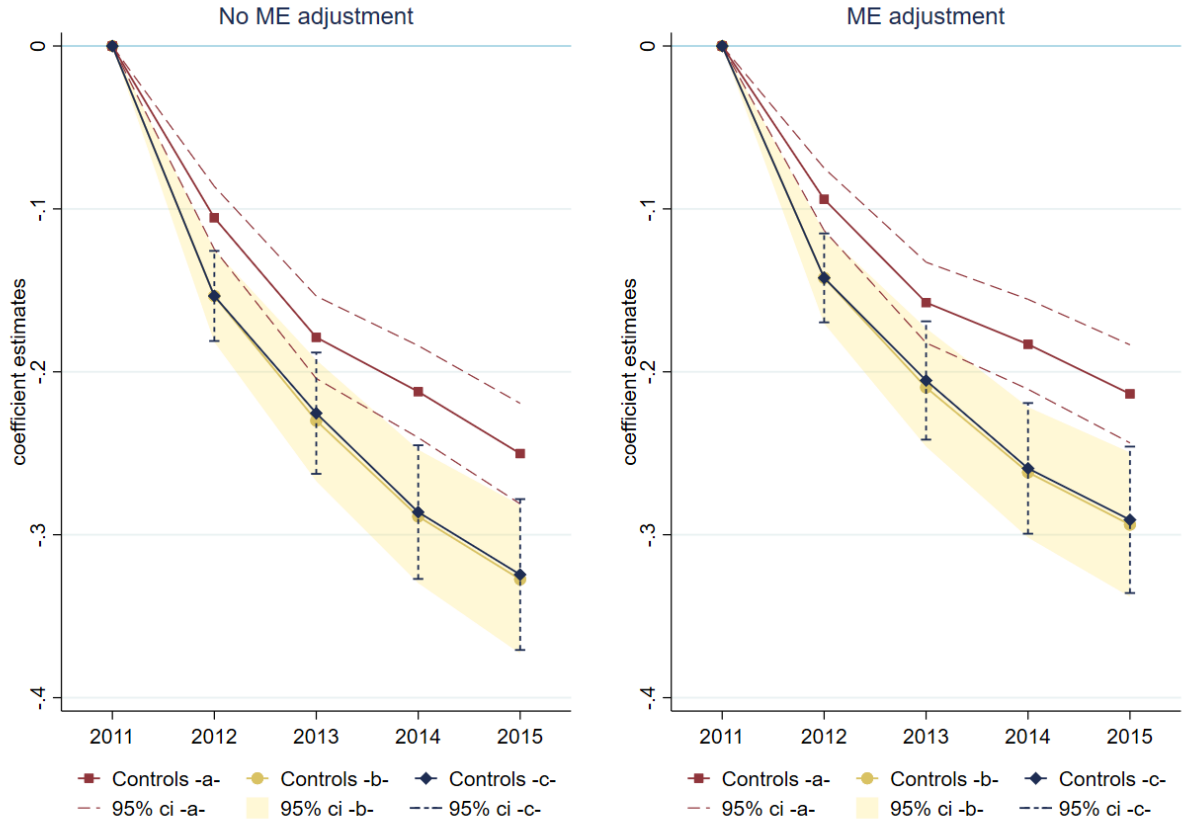
Figure 2: Average tax rates, 2011

(a) Real
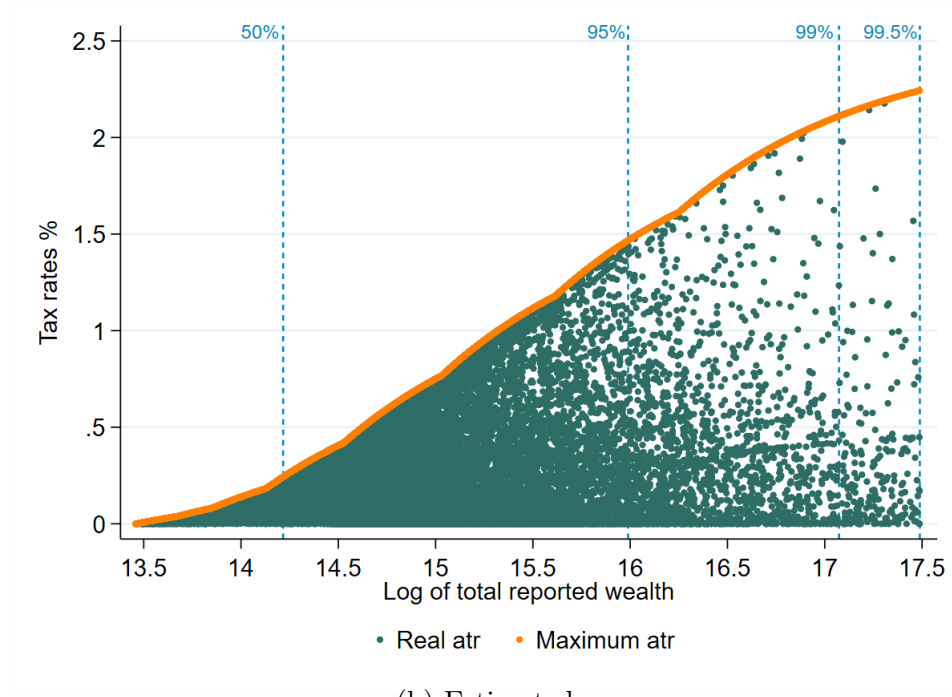
(b) Estimated
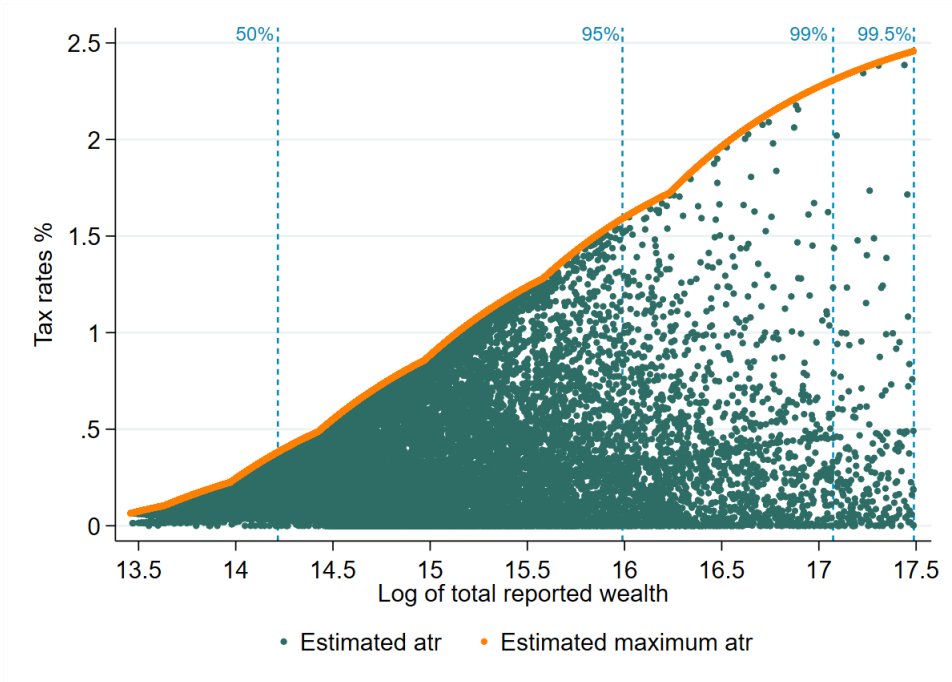
Notes: All average tax rates are expressed in percentage points and computed over the total reported wealth for 2011. The percentages next to the vertical dashed lines show the cumulative distribution of 2011 Catalan wealth taxpayers along total reported wealth.

Notes for panel (a): Maximum average tax rate is computed applying the 2011 statutory tax rates to the overall stock of reported wealth exceeding the minimum threshold (700,000€), assuming there are no wealth exemptions and the limit on tax liability does not apply.

Notes for panel (b): The estimated average tax rate is computed replicating the wealth tax liability calculations specified in the law, using 2011 taxable wealth and income and 2012 tax rates and minimum threshold. The estimated maximum average tax rate is computed by applying the tax rates and minimum threshold approved in 2012 to the overall stock of wealth reported in 2011, assuming there are no wealth exemptions and the limit on tax liability does not apply.
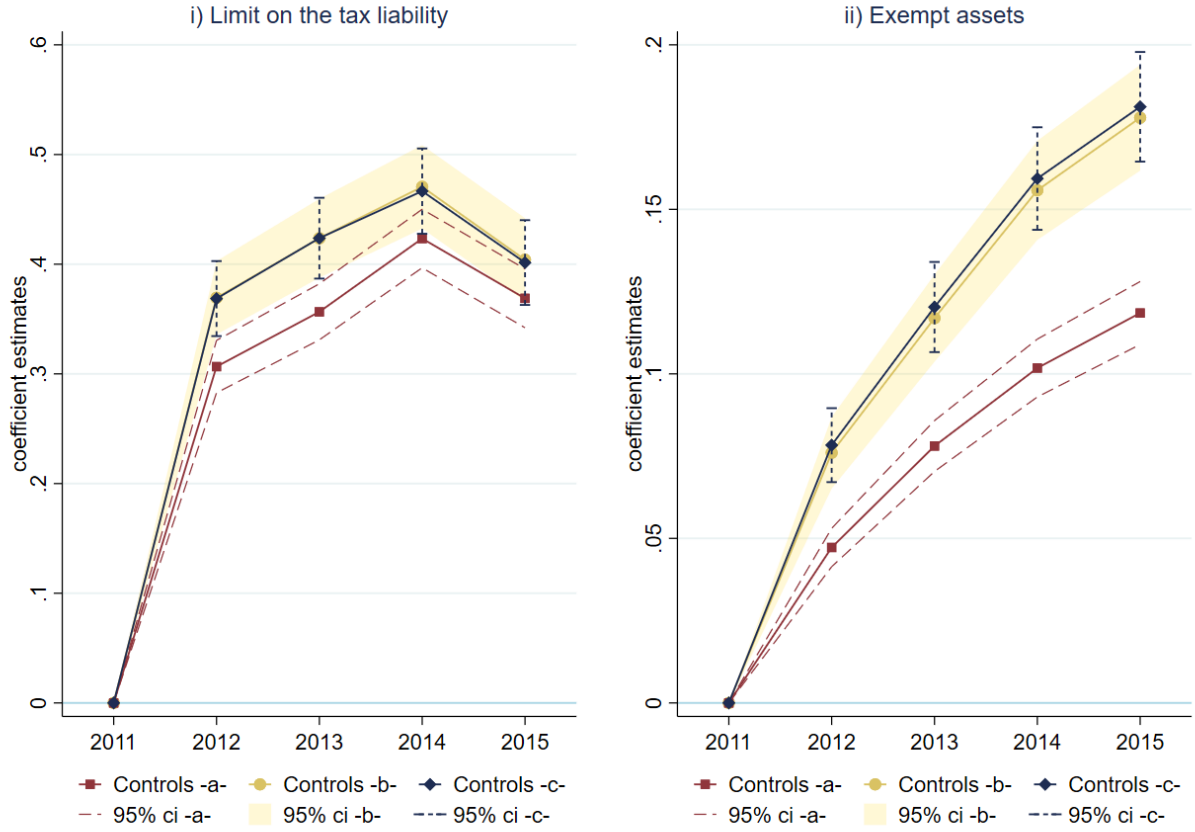
Figure 3: Effect on taxable wealth

Notes: Both figures provide coefficient estimates and 95% confidence intervals from specification (1) with *real* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable is the log of taxable wealth. It is (not) adjusted for the mechanical effect -ME- in the right (left) panel.
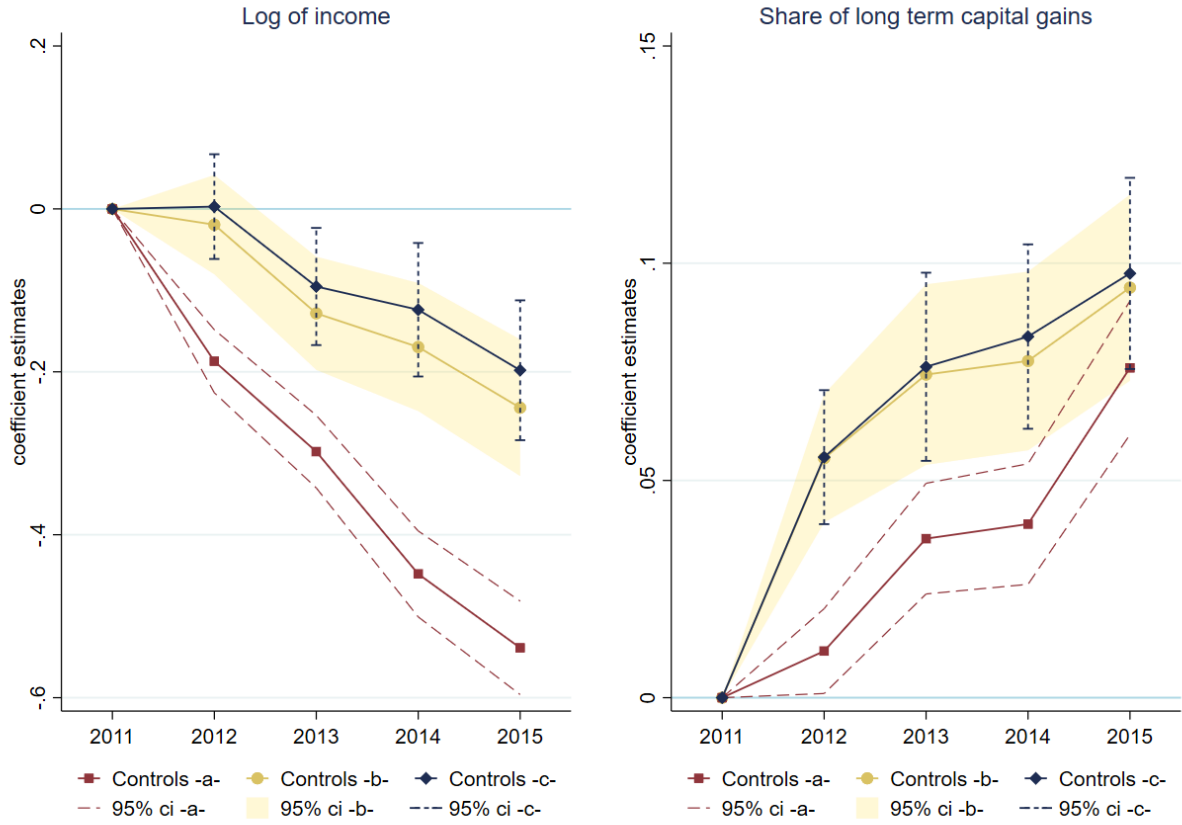N: 88,325 obs

Figure 4: Effect on total reported wealth

Notes: Both figures provide coefficient estimates and 95% confidence intervals from specification (1) with *real* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable is the log of total reported wealth. It is (not) adjusted for the mechanical effect -ME- in the right (left) panel.
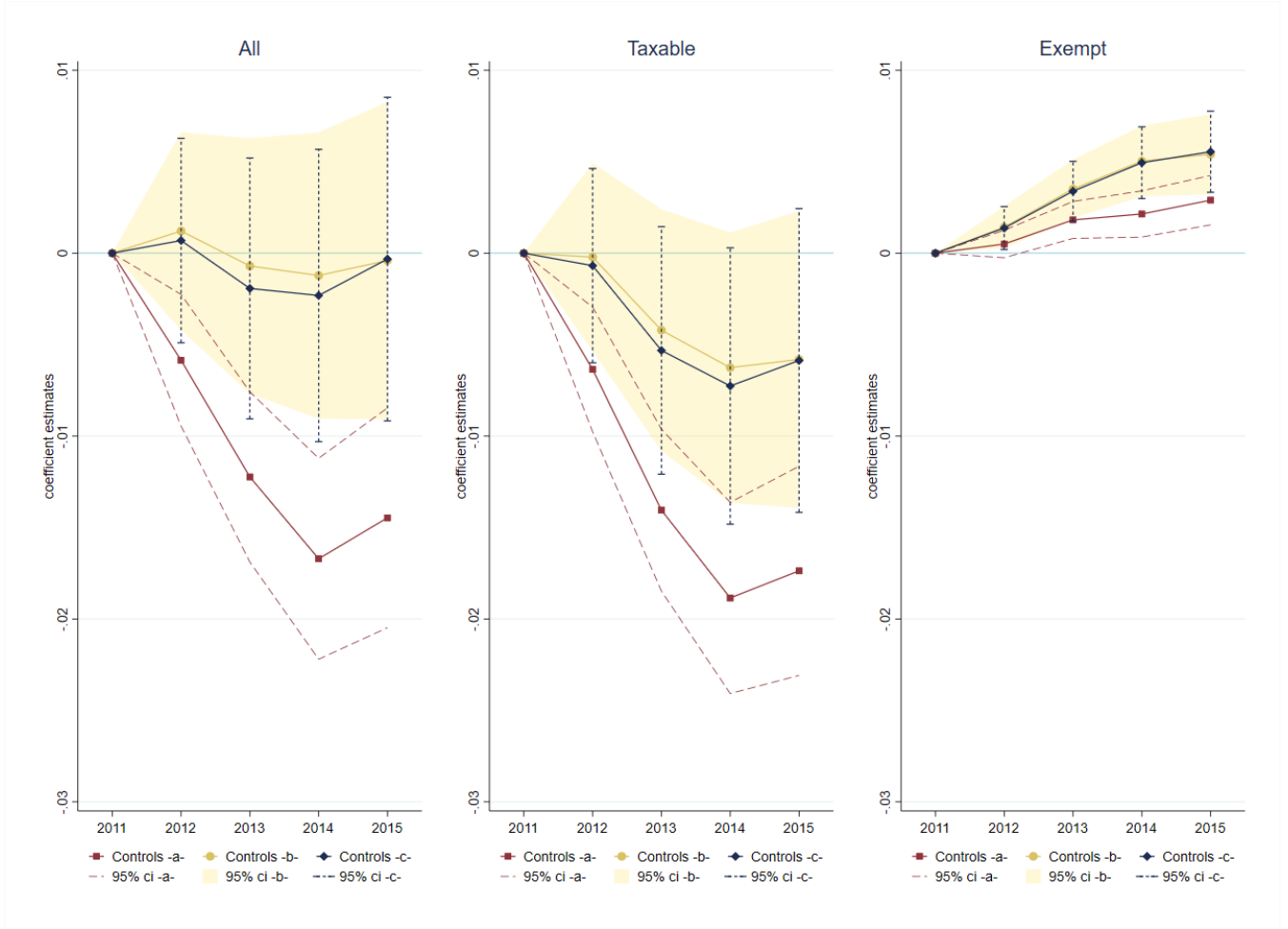N: 89,265 obs

Figure 5: Effect on potential tax avoidance strategies

Notes: Both figures provide coefficient estimates and 95% confidence intervals from specification (1) with *real* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable in the left-hand panel is a dummy which equals 1 if a taxpayer faces the limit on the tax liability in year t, and 0 otherwise. The dependent variable in the right-hand panel is the share of exempt assets over total reported assets.
N: 89,265 obs

Figure 6: Effect on income and long-term capital gains
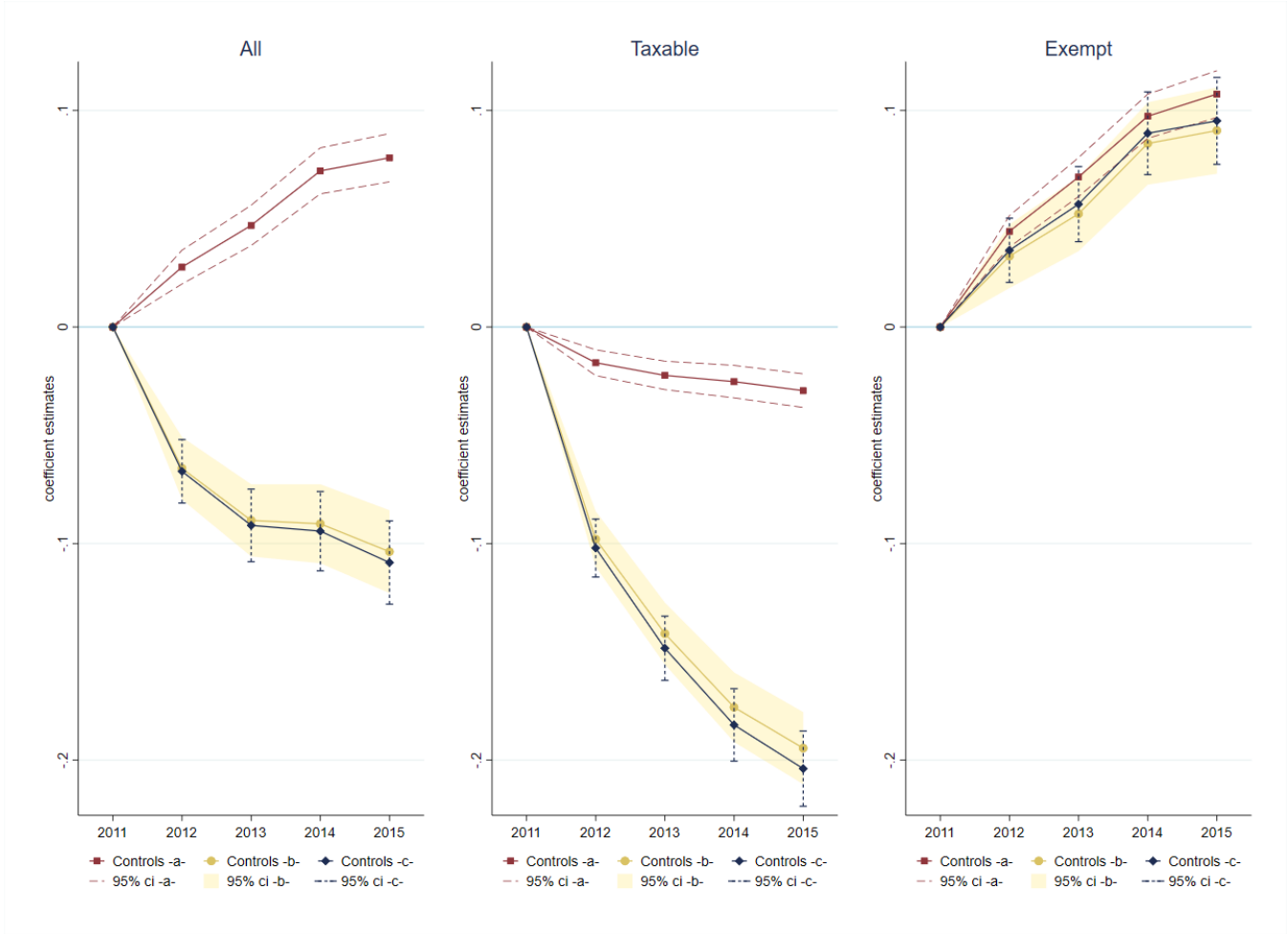

Notes: Both figures provide coefficient estimates and 95% confidence intervals from specification (1) with *real atr_i^{11}* as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable in the left-hand panel is the log of taxable income. The dependent variable in the right-hand panel is the share of long term capital gains over taxable income.

N: 69,405 obs
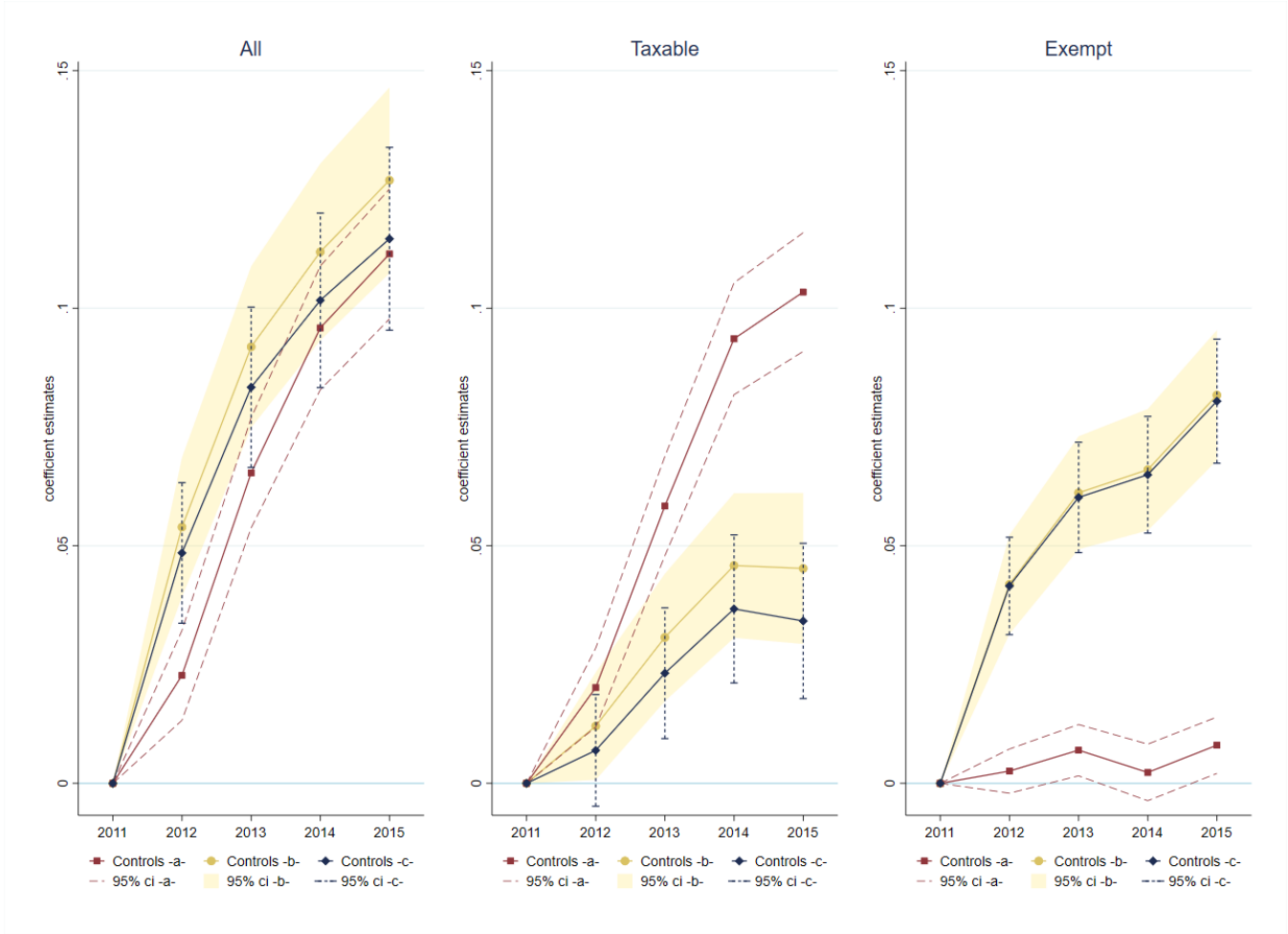
Figure 7: Effect on real estate

Notes: All figures provide coefficient estimates and 95% confidence intervals from specification (1) with *real* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable for the panels (from left to right) is the share of (all/taxable/exempt) real estate over total reported assets.

N: 89,265 obs

Figure 8: Effect on unlisted companies and business assets

Notes: All figures provide coefficient estimates and 95% confidence intervals from specification (1) with *real* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable for the panels (from left to right) is the share of (all/taxable/exempt) unlisted companies and business assets over total reported assets.
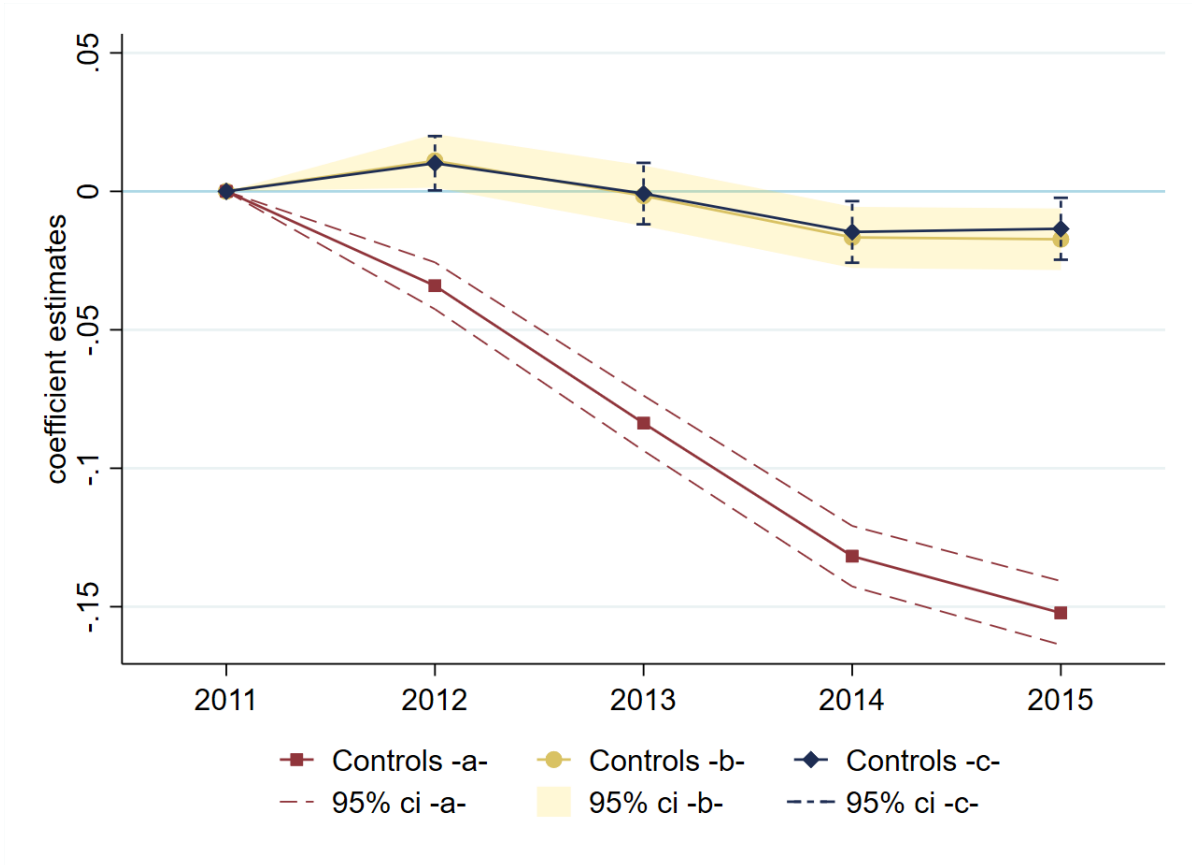N: 89,265 obs

Figure 9: Effect on listed equity and investment funds

Notes: All figures provide coefficient estimates and 95% confidence intervals from specification (1) with *real* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable for the panels (from left to right) is the share of (all/taxable/exempt) listed equity and investment funds over total reported assets.
N: 89,265 obs

Figure 10: Effect on bank accounts and bonds

Notes: The figure provides coefficient estimates and 95% confidence intervals from specification (1) with *real* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable is the share of bank accounts and bonds over total reported assets.
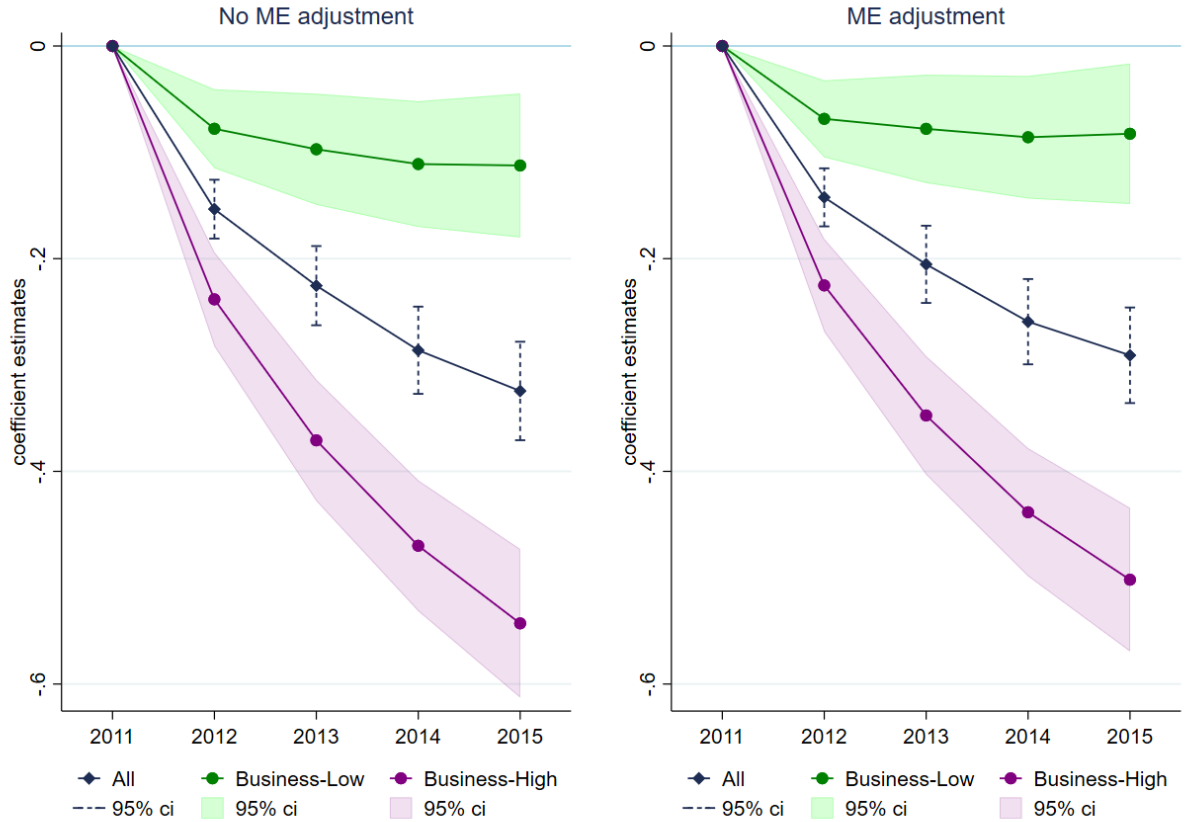N: 89,265 obs

Figure 11: Effect on gifts

Notes: The figure provides coefficient estimates and 95% confidence intervals from specification (1) with *real* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable is a dummy which equals 1 if a taxpayer makes a gift - declared to the Catalan Tax Agency - in year t, and 0 otherwise.
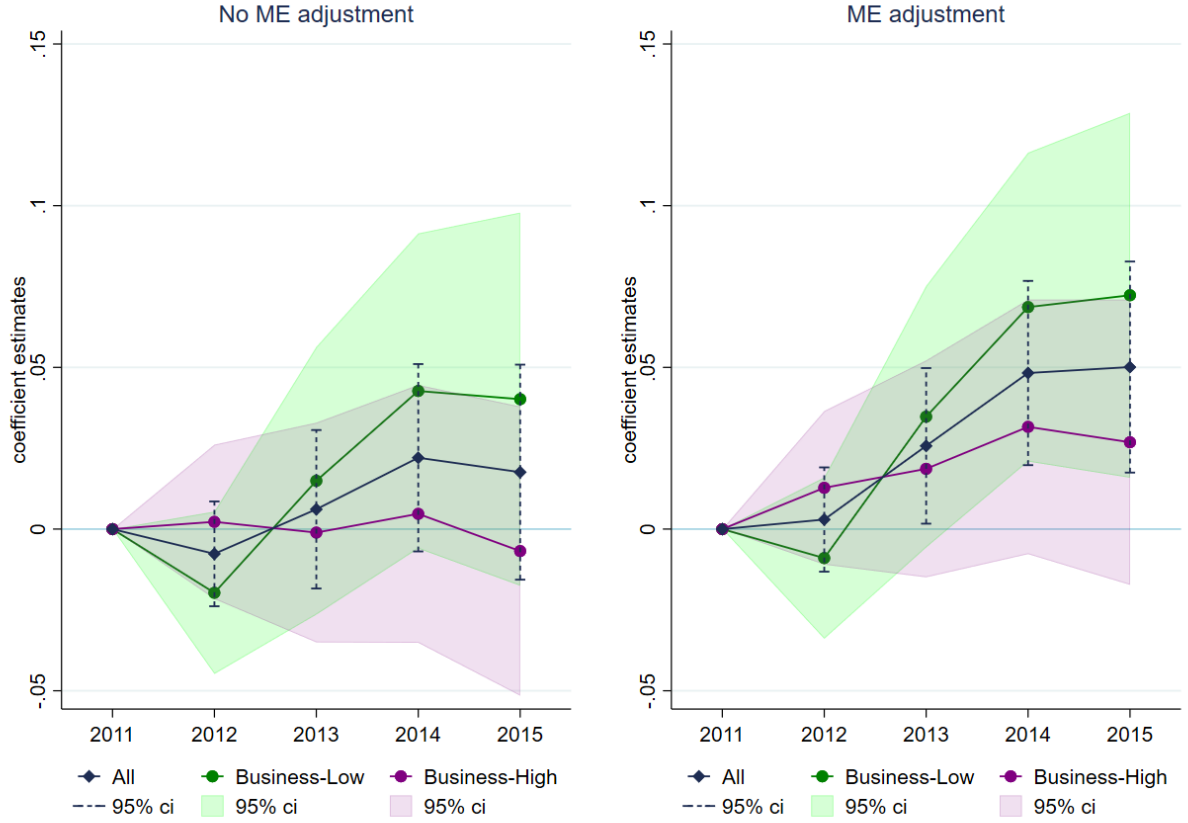N: 89,265 obs

Figure 12: Heterogeneous effects on taxable wealth

Notes: Both figures provide coefficient estimates and 95% confidence intervals resulting from specification (1) using the set of control variables -c- and *real* atr_i^{11} as the explanatory variable. For a detailed definition of these variables see Section 4.2. Each figure shows three different estimates: "All", obtained when using the full estimation sample, and "Business-Low(High)", comprising those taxpayers whose 2011 share of unlisted companies and business assets over total reported assets is below(above) the median. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable is the log of taxable wealth. It is (not) adjusted for the mechanical effect -ME- in the right-(left-) hand panel.
N: 88,325 obs (All); 45,630 obs (Business-Low); 42,695 (Business-High).

Figure 13: Heterogeneous effects on total reported wealth

Notes: Both figures provide coefficient estimates and 95% confidence intervals resulting from specification (1) using the set of control variables -c- and $real\ atr_i^{11}$ as the explanatory variable. For a detailed definition of these variables see Section 4.2. Each figure shows three different estimates: "All", obtained when using the full estimation sample, and "Business-Low(High)", comprising those taxpayers whose 2011 share of unlisted companies and business assets over total reported assets is below(above) the median. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable is the log of total reported wealth. It is (not) adjusted for the mechanical effect -ME- in the right-(left-) hand panel.

N: 89,265 obs (All); 45,700 obs (Business-Low); 43,565 (Business-High).
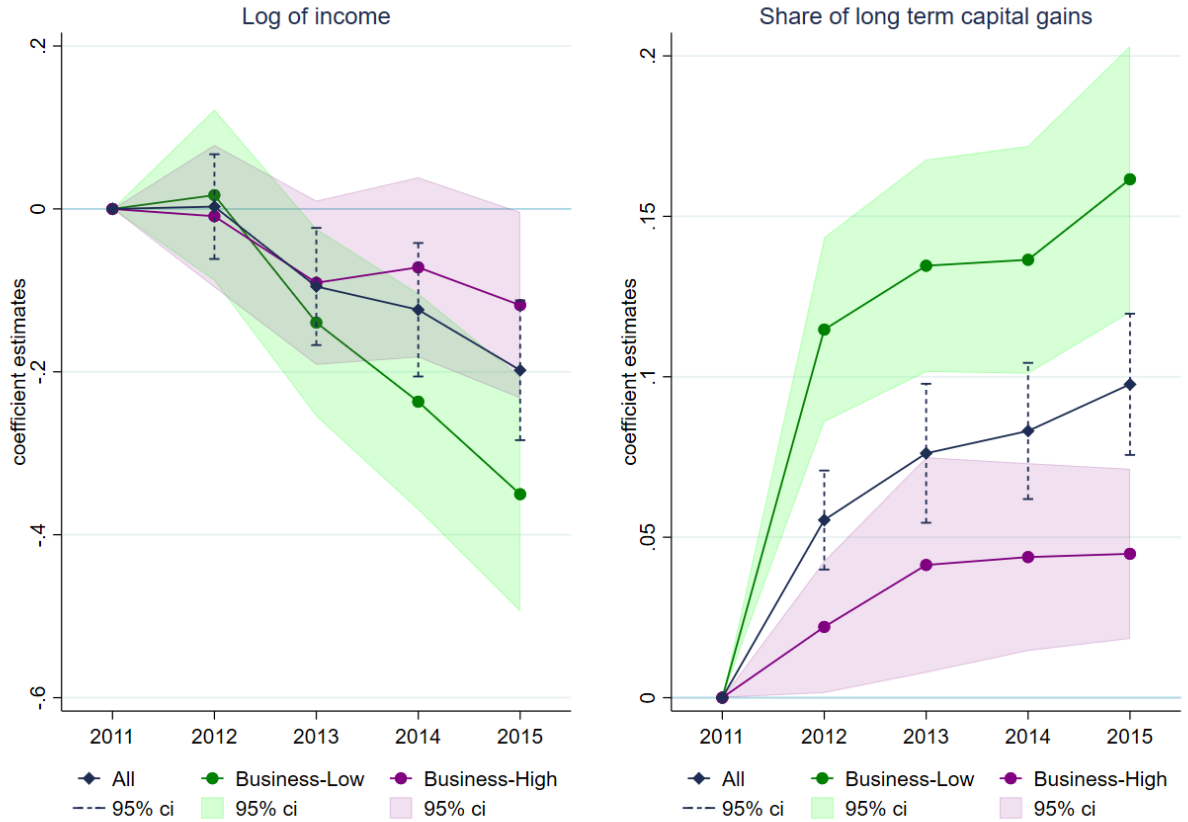
Figure 14: Heterogeneous effects on potential tax avoidance strategies

Notes: Both figures provide coefficient estimates and 95% confidence intervals resulting from specification (1) using the set of control variables -c- and $real\ atr_i^{11}$ as the explanatory variable. For a detailed definition of these variables see Section 4.2. Each figure shows three different estimates: "All", obtained when using the full estimation sample, and "Business-Low(High)", comprising those taxpayers whose 2011 share of unlisted companies and business assets over total reported assets is below(above) the median. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable in the left-hand panel is a dummy which equals 1 if a taxpayer faces the limit on the tax liability in year t, and 0 otherwise. The dependent variable in the right-hand panel is the share of exempt assets over total reported assets.
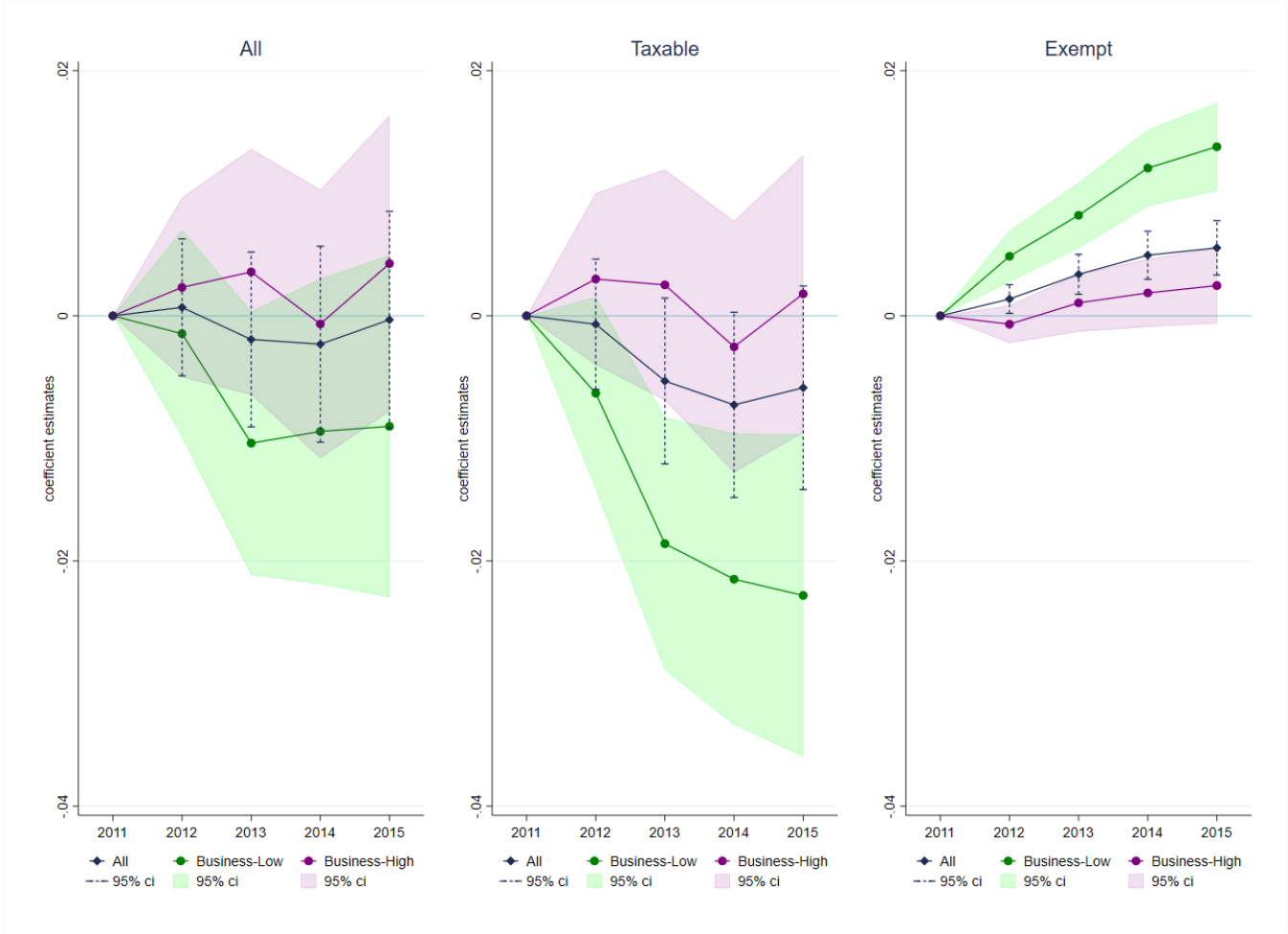N: 89,265 obs (All); 45,700 obs (Business-Low); 43,565 (Business-High).

Figure 15: Heterogeneous effects on income and long-term capital gains

Notes: Both figures provide coefficient estimates and 95% confidence intervals resulting from specification (1) using the set of control variables -c- and $real\ atr_i^{11}$ as the explanatory variable. For a detailed definition of these variables see Section 4.2. Each figure shows three different estimates: "All", obtained when using the full estimation sample, and "Business-Low(High)", comprising those taxpayers whose 2011 share of unlisted companies and business assets over total reported assets is below(above) the median. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable in the left-hand panel is the log of taxable income. The dependent variable in the right-hand panel is the share of long term capital gains over taxable income.
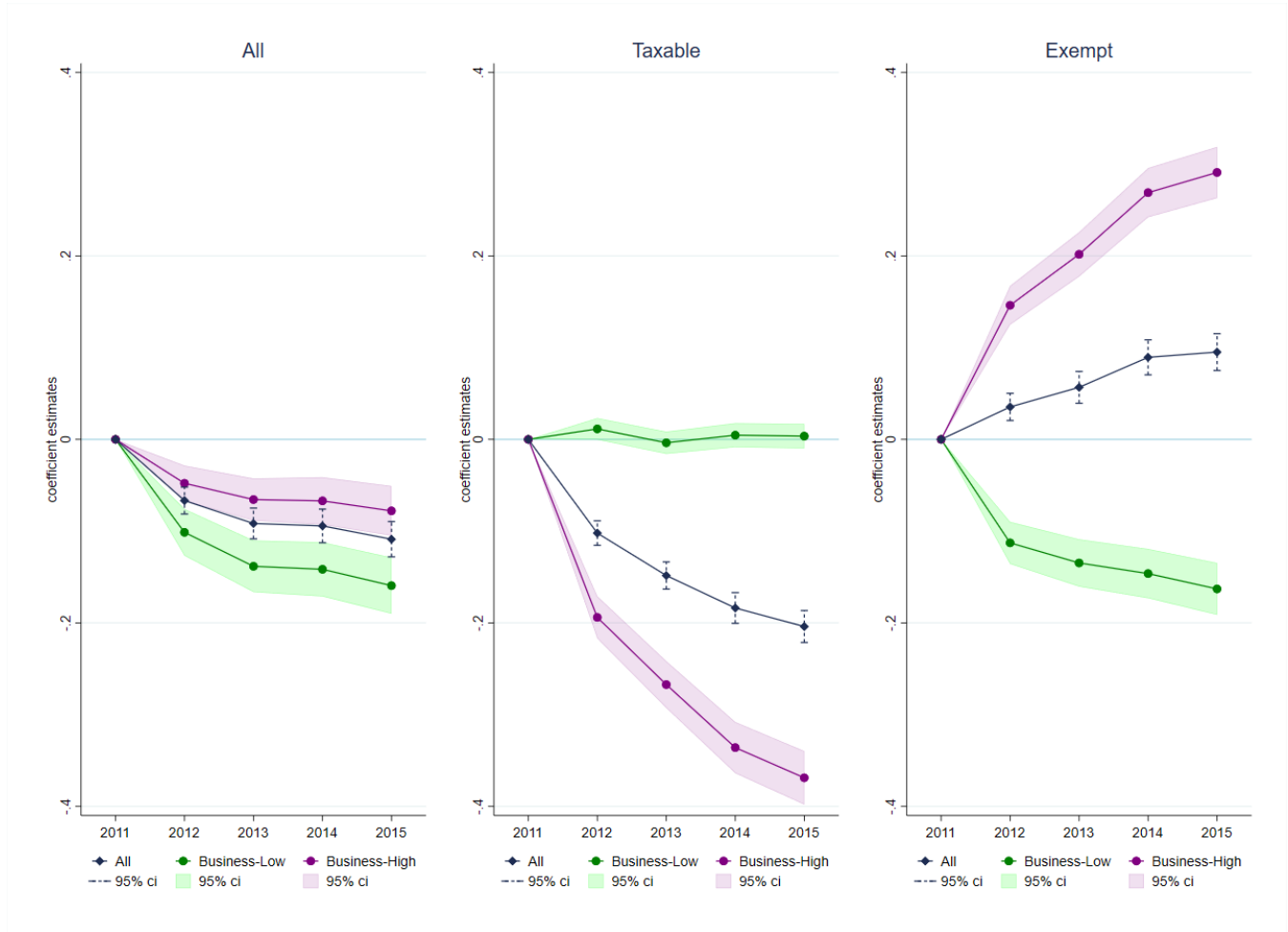N: 69,405 obs (All); 35,980 obs (Business-Low); 33,425 (Business-High).

Figure 16: Heterogeneous effects on real estate

Notes: All figures provide coefficient estimates and 95% confidence intervals resulting from specification (1) using the set of control variables -c- and $real\ atr_i^{11}$ as the explanatory variable. For a detailed definition of these variables see Section 4.2. Each figure shows three different estimates: "All", obtained when using the full estimation sample, and "Business-Low(High)", comprising those taxpayers whose 2011 share of unlisted companies and business assets over total reported assets is below(above) the median. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable for the panels (from left to right) is the share of (all/taxable/exempt) real estate over total reported assets.
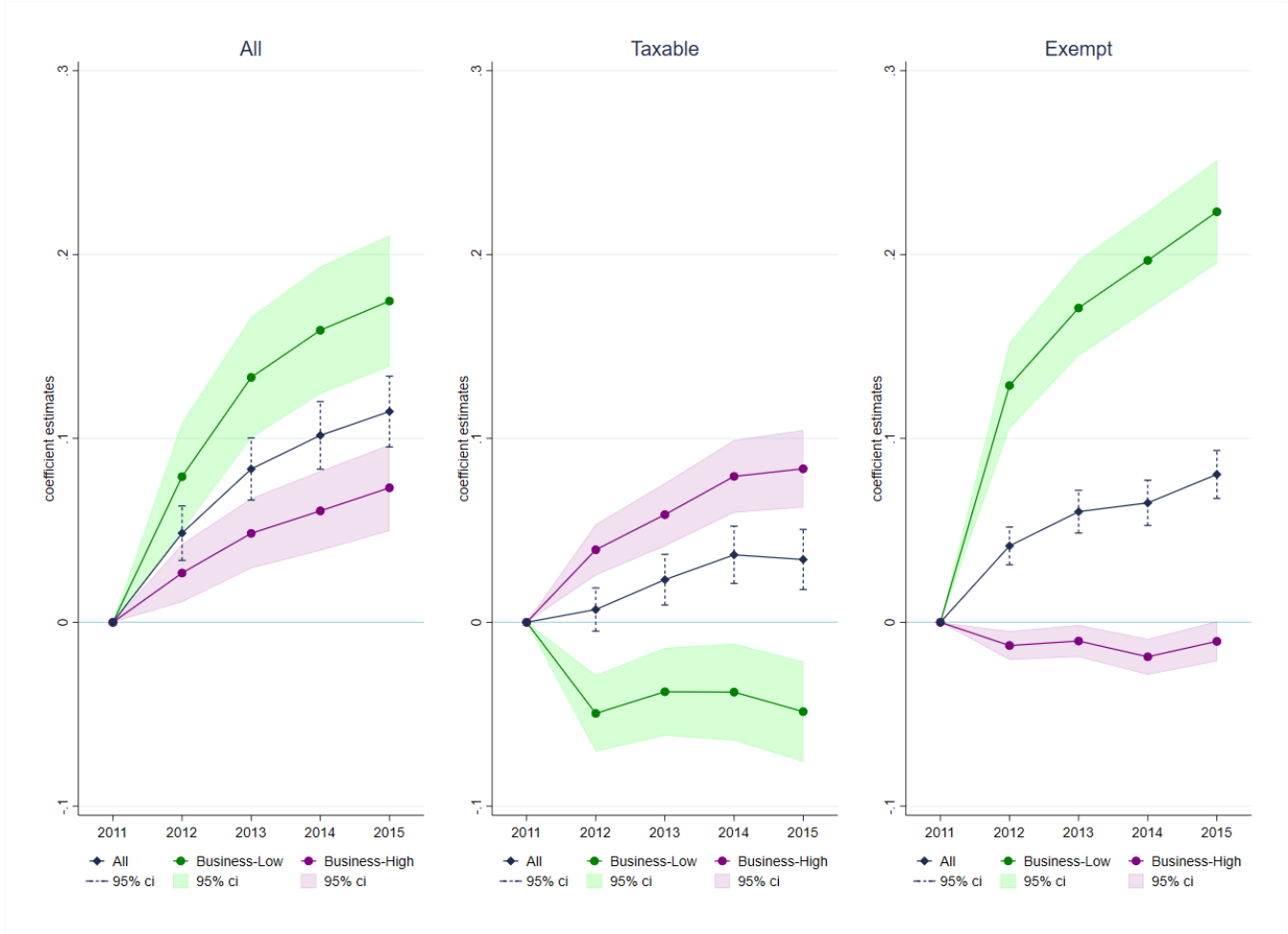N: 89,265 obs (All); 45,700 obs (Business-Low); 43,565 (Business-High).

Figure 17: Heterogeneous effects on unlisted companies and business assets

Notes: All figures provide coefficient estimates and 95% confidence intervals resulting from specification (1) using the set of control variables -c- and $real\ atr_i^{11}$ as the explanatory variable. For a detailed definition of these variables see Section 4.2. Each figure shows three different estimates: "All", obtained when using the full estimation sample, and "Business-Low(High)", comprising those taxpayers whose 2011 share of unlisted companies and business assets over total reported assets is below(above) the median. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable for the panels (from left to right) is the share of (all/taxable/exempt) unlisted companies and business assets over total reported assets.

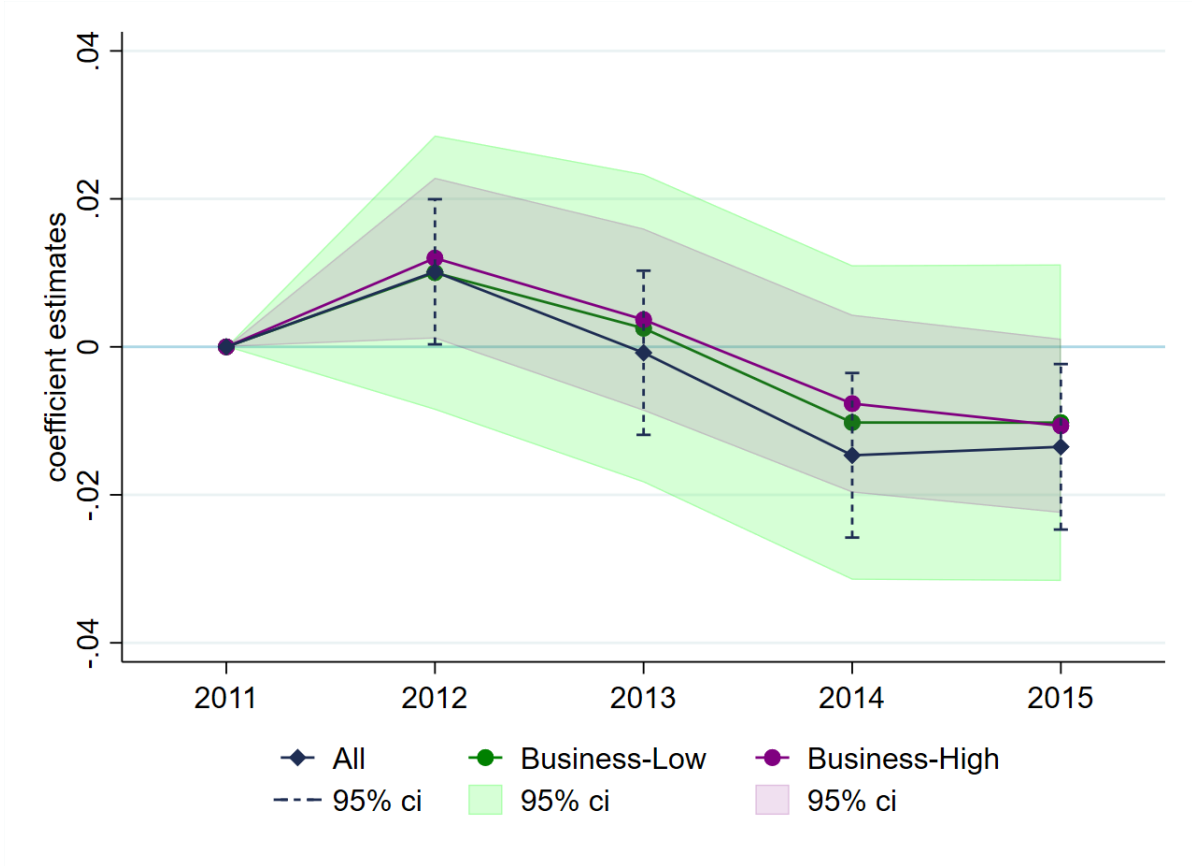N: 89,265 obs (All); 45,700 obs (Business-Low); 43,565 (Business-High).

Figure 18: Heterogeneous effects on listed equity and investment funds

Notes: All figures provide coefficient estimates and 95% confidence intervals resulting from spec-ification (1) using the set of control variables -c- and $real\ atr_i^{11}$ as the explanatory variable. For a detailed definition of these variables see Section 4.2. Each figure shows three different estimates: "All", obtained when using the full estimation sample, and "Business-Low(High)", comprising those taxpayers whose 2011 share of unlisted companies and business assets over total reported assets is below(above) the median. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable for the panels (from left to right) is the share of (all/taxable/exempt) listed equity and invest-ment funds over total reported assets.
N: 89,265 obs (All); 45,700 obs (Business-Low); 43,565 (Business-High).
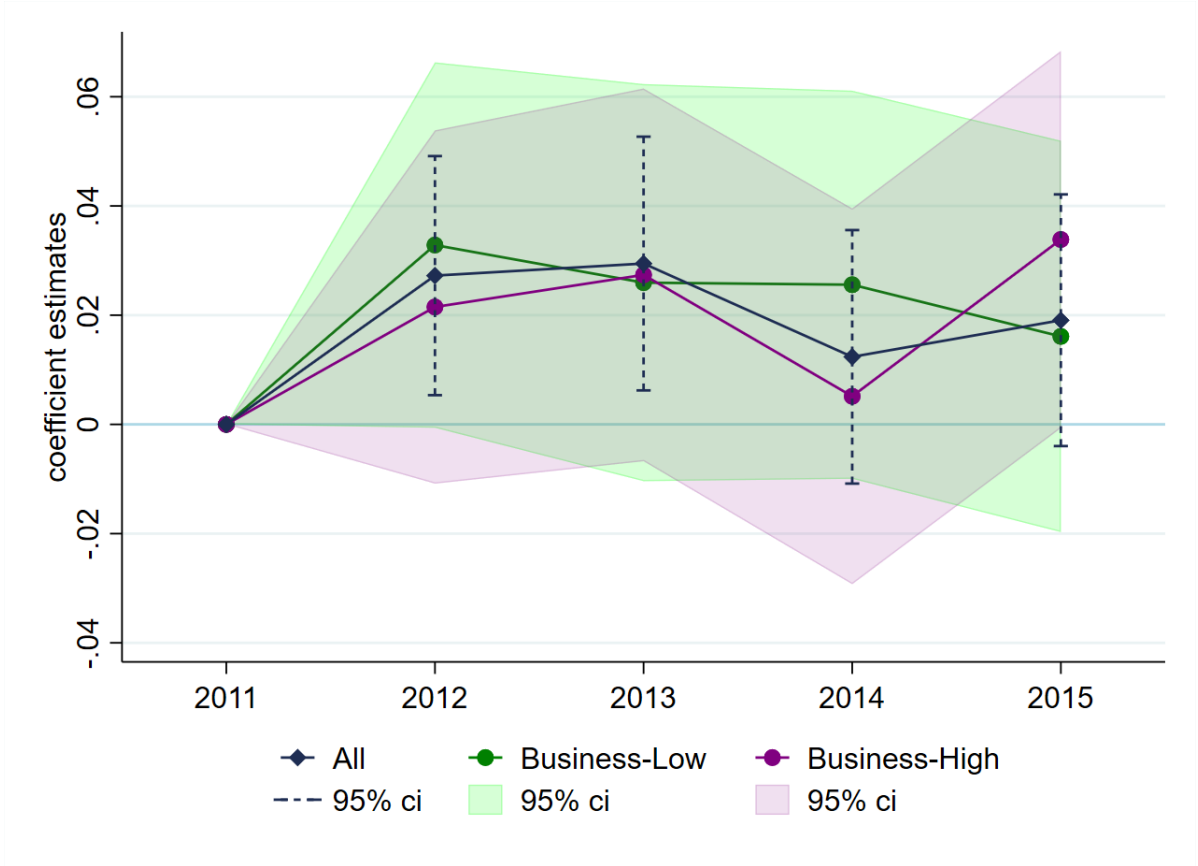
Figure 19: Heterogeneous effects on bank accounts and bonds

Notes: The figure provides coefficient estimates and 95% confidence intervals resulting from specification (1) using the set of control variables -c- and *real* atr_i^{11} as the explanatory variable. For a detailed definition of these variables see Section 4.2. Three different estimates are shown: "All", obtained when using the full estimation sample, and "Business-Low(High)", comprising those taxpayers whose 2011 share of unlisted companies and business assets over total reported assets is below(above) the median. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable is the share of bank accounts and bonds over total reported assets.
N: 89,265 obs (All); 45,700 obs (Business-Low); 43,565 (Business-High).

Figure 20: Heterogeneous effects on gifts

Notes: The figure provides coefficient estimates and 95% confidence intervals resulting from specification (1) using the set of control variables -c- and $real\ atr_i^{11}$ as the explanatory variable. For a detailed definition of these variables see Section 4.2. Three different estimates are shown: "All", obtained when using the full estimation sample, and "Business-Low(High)", comprising those taxpayers whose 2011 share of unlisted companies and business assets over total reported assets is below(above) the median. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable is a dummy which equals 1 if a taxpayer makes a gift - declared to the Catalan Tax Agency - in year t, and 0 otherwise.

N: 89,265 obs (All); 45,700 obs (Business-Low); 43,565 (Business-High).

Appendix A   Business exemption

In 1994 the government introduced an exemption for business assets and closely held business shares in an effort at fostering entrepreneurial investment.[76] In 1998, this exemption was extended to listed shares.[77] However, certain conditions have to be met for these tax incentives to apply. The main requirement for the business asset exemption is that at least 50% of the taxpayers total income comes from business activities. The exemption for company shares, both listed and unlisted, applies when: (i) the company carries out an economic activity[78], (ii) the taxpayer owns at least 5%[79] of the company individually or 20% when considering the family group, and (iii) one of the family members is engaged in the management of the company and receives a retribution for these functions that represents at least 50% of their labour and business income (analogous retributions coming from other companies which also satisfy these conditions are excluded from the computation). In the case of the exemption for business shares, not only the taxpayer but the entire family group can exempt their holdings from the wealth tax if they satisfy the stipulated conditions.

According to the law, the exemption only extends as far as the share of net assets directly involved in the economic activity of the company. In this regard, although the legislation provides general instructions to determine when assets are directly involved in the economic activity[80], ultimately it is the taxpayer's responsibility to demonstrate this circumstance in the case of a tax audit being conducted.

Indeed, the way the Law was designed and its related case law initially developed greatly benefited those taxpayers able to apply the exemption. By creating the correct holding structure, a taxpayer could basically include any kind of wealth as indirect shares, since the conditions only needed to be satisfied with respect to the direct holding.[81][82] It was not until 2007 that the legislation included the need to assess the portion of net assets directly involved in the economic activity of the indirect shares.[83]

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[76] Act 22/1993, December 29th, later developed by Royal Decree 2481/1994, December 23rd.

[77] Act 66/1997, December 30th.

[78] Article 4.8. from Act 19/1991, June 6th, and Royal Decree 1704/1999, November 5th, specify the requirements to determine whether a company carries out an economic activity and all other conditions needed to apply this wealth tax exemption.

[79] 20% during 1994 and 15% until 2002. The current ownership share is well below the 25% share required in other countries such as France or Sweden (OECD, 2018).

[80] Article 6.3. from Royal Decree 1704/1999, November 5th.

[81] The Wealth Tax Law foresees that a company which owns at least 5% of other corporations with the aim of managing their shares is carrying out an economic activity, and these shares are considered as being directly involved in the economic activity.

[82] SICAVs (Investment companies with variable capital) are the only asset type to have had their right to be exempt from the wealth tax denied by the Supreme Court, regardless of ownership via indirect shares. Indeed, this is justified by the fact that the Wealth Tax Law specifically excludes assets of this type from exemption. See Supreme Court Resolutions 21/05/2013 (Rec. 2689/2011), 03/06/13 (Rec. 2248/2011) and 16/07/2015 (Rec. 171/2014) for further information.

[83] Reform approved by Act 35/2006, November 28th.

Appendix B   Descriptive Figures

Figure A1: Average tax rates, 2011
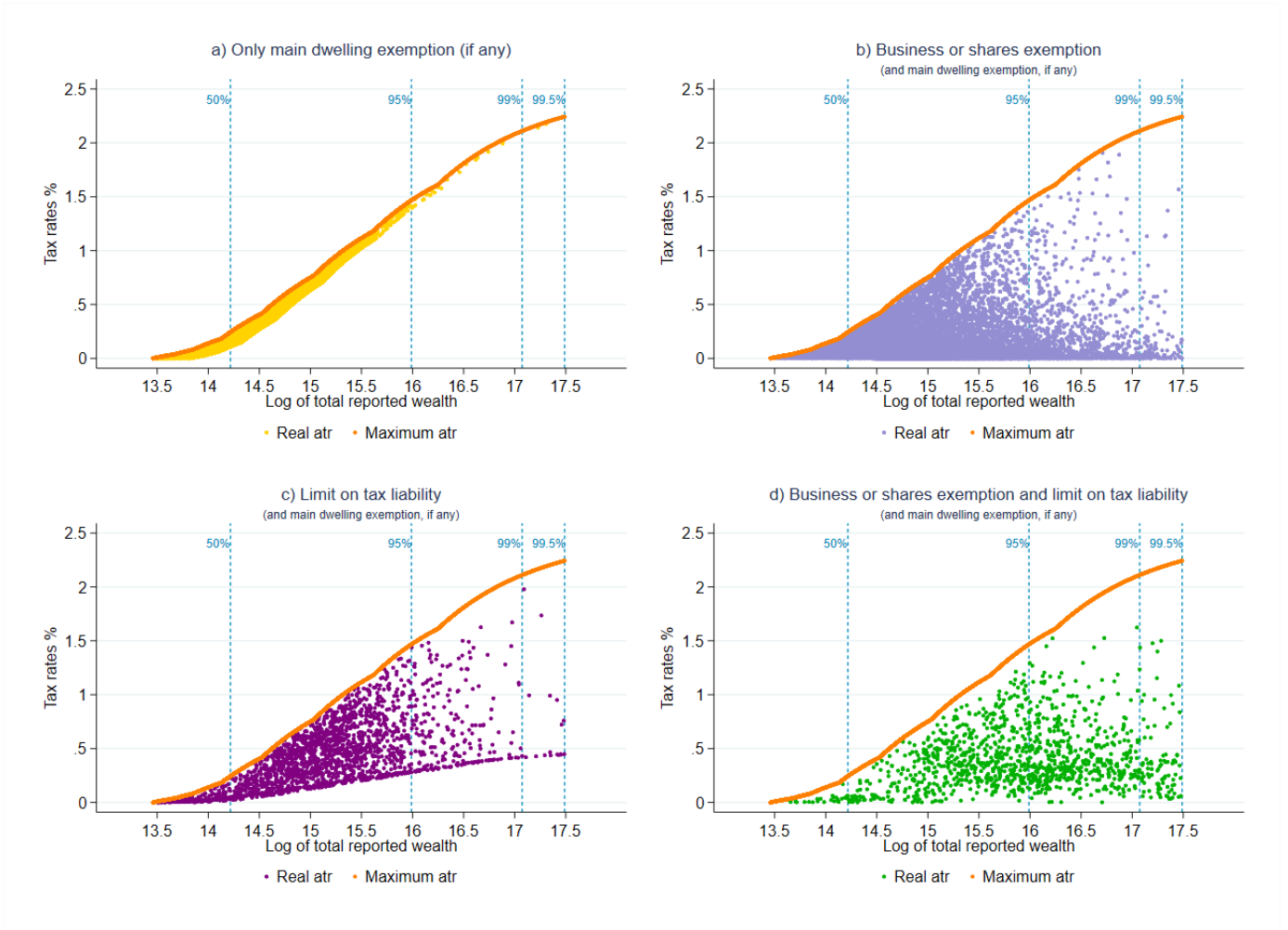
Notes: Panel a) shows the average tax rates of taxpayers who only apply main-dwelling exemption, if any. Panel b) shows the average tax rates of taxpayers who also report business exemptions (including both listed and unlisted companies). Panel c) shows the average tax rates of taxpayers who face the limit on tax liability. Panel d) shows the average tax rates of taxpayers who satisfy both cases b) and c). The real average tax rate is computed as the wealth tax liability over total reported wealth for 2011, in percentage points. Maximum average tax rate is computed applying the 2011 statutory tax rates to the overall stock of reported wealth exceeding the minimum threshold (700,000€), assuming there are no wealth exemptions and the limit on tax liability does not apply. The percentages next to the vertical dashed lines show the cumulative distribution of 2011 Catalan wealth taxpayers along total reported wealth.

Figure A2: Frequency of gifts made during the last 8 weeks of the year
between 2009 and 2014
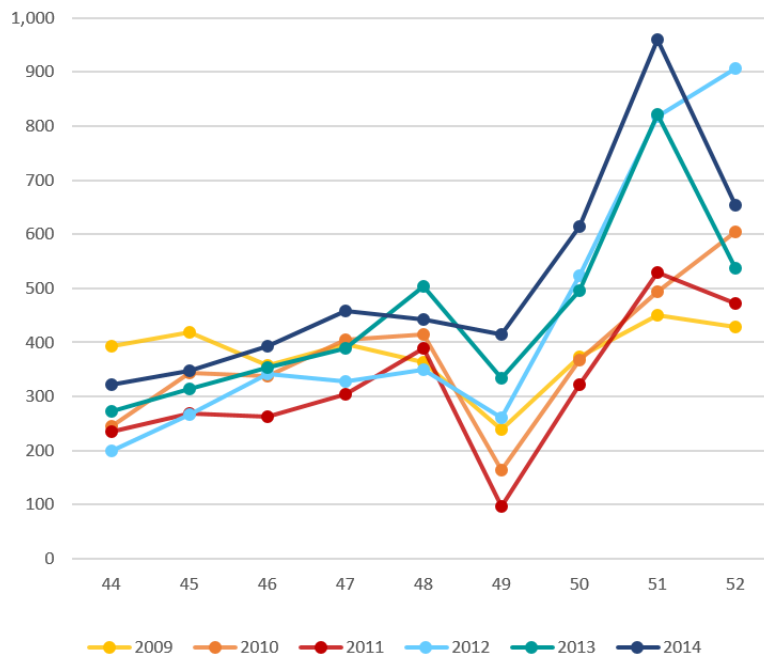
Notes: This figure only includes gifts reported to the Catalan Tax Agency.

Figure A3: 2011 average asset portfolio by taxpayer groups:
Business-Low vs. Business-High
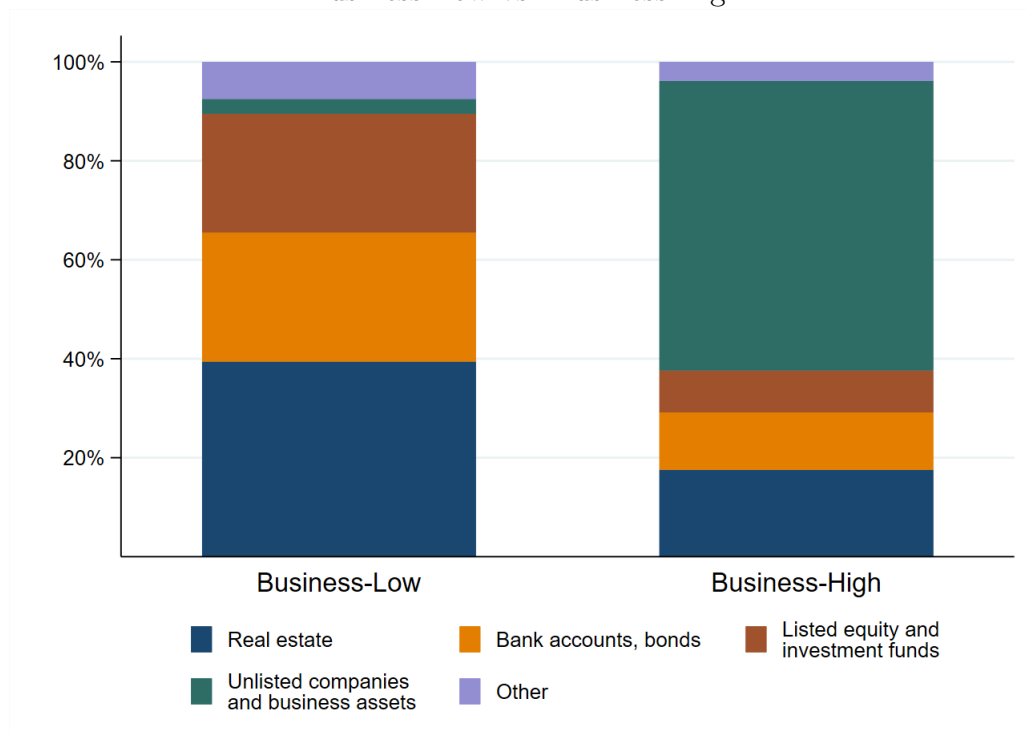
Notes: "Business-Low(High)" taxpayers are those whose 2011 share of unlisted companies and business assets is below(above) the median. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15.

Figure A4: Differences between "Business-Low" and "Business-High" taxpayers

(a) 2011 income distribution
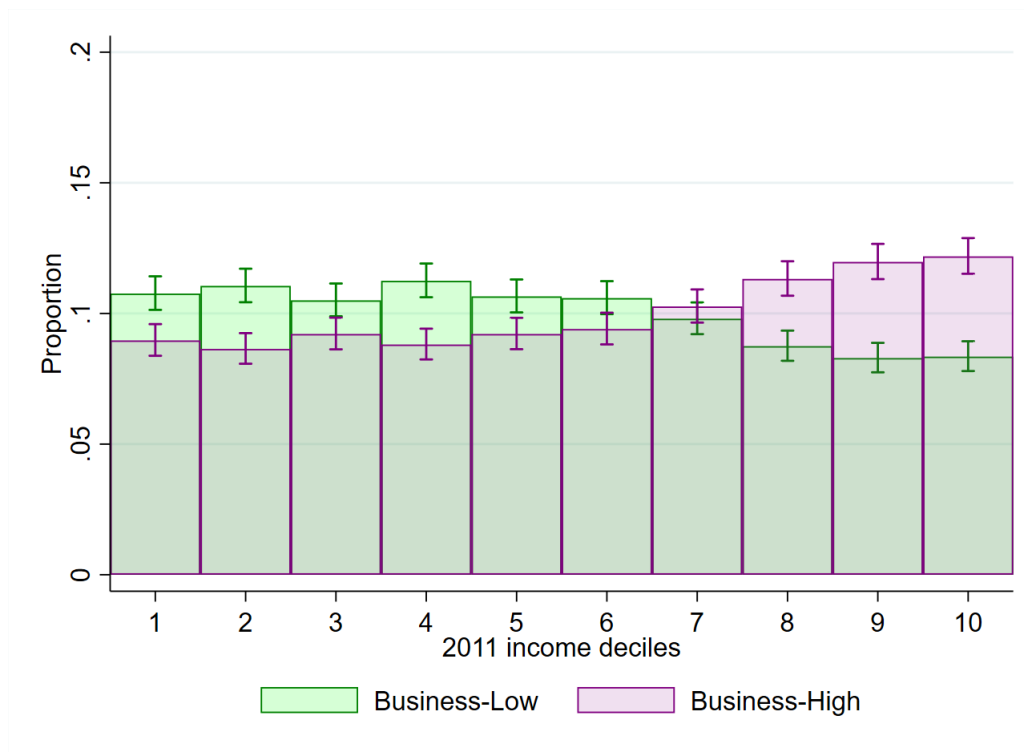
(b) 2011 age distribution

Notes: Both figures provide proportion estimates and 95% confidence intervals from the distribution of each taxpayer group across 2011 income deciles (panel a) and age groups (panel b). "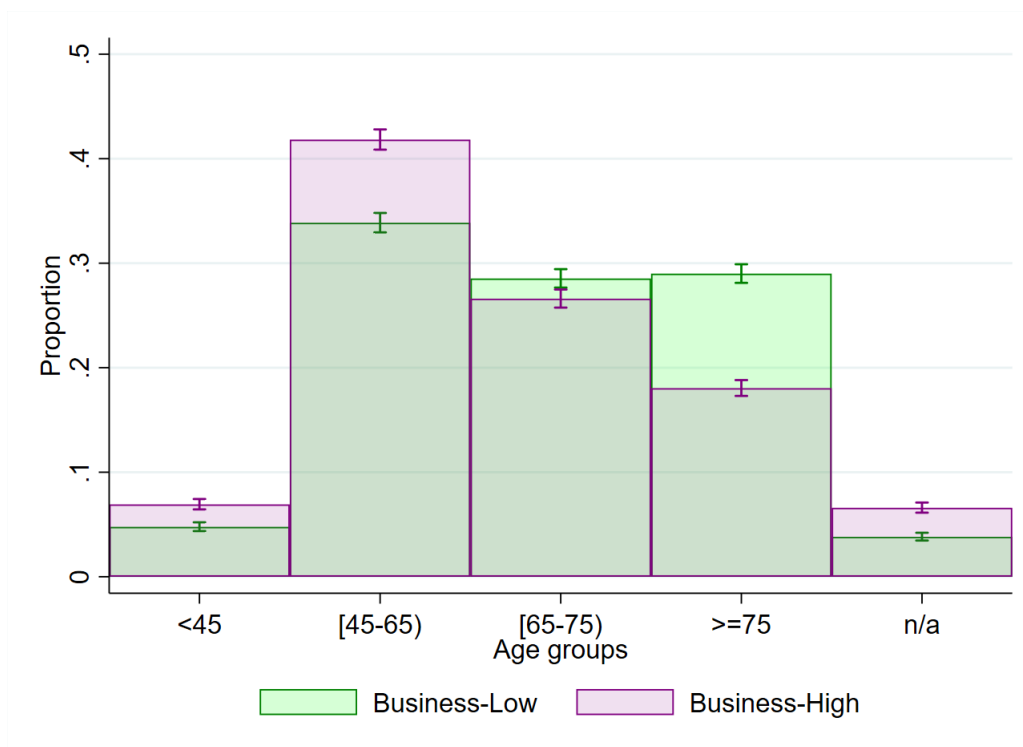Business-Low(High)" taxpayers are those whose 2011 share of unlisted companies and business assets is below(above) the median. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15.

Appendix C   Descriptive Tables

Table A1: Relation between average tax rates and taxpayers'
wealth, income and asset portfolio

Dep. var	Log of wealth		Log of taxable income		Housing		Listed equity		Unlisted companies		Bank accounts and bonds	
	all	5y filers	all	5y filers	all	5y filers	all	5y filers	all	5y filers	all	5y filers
No controls												
2011 atr	0.4695***	0.4505***	1.1775***	1.1321***	0.0552***	0.0564***	0.1949***	0.1979***	-0.6016***	-0.5984***	0.2713***	0.2678***
	(0.0174)	(0.0189)	(0.0255)	(0.0269)	(0.0067)	(0.0074)	(0.0066)	(0.0071)	(0.0088)	(0.0094)	(0.0062)	(0.0067)
"Decile" controls												
2011 atr	0.0224**	0.0262**	0.0917***	0.0754***	-0.0003	0.0005	-0.0163***	-0.0164***	-0.0201***	-0.0219***	0.0075***	0.0068***
	(0.0107)	(0.0113)	(0.0146)	(0.0150)	(0.0011)	(0.0012)	(0.0023)	(0.0025)	(0.0014)	(0.0015)	(0.0018)	(0.0019)
"Narrow" controls												
2011 atr	-0.0025	0.0060	0.0100	-0.0032	-0.0003	-0.0003	-0.0003	-0.0003	-0.0000	0.0001	0.0000	-0.0001
	(0.0067)	(0.0068)	(0.0102)	(0.0109)	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Dep. var. mean	14.9554	14.9412	11.3635	11.3458	0.2815	0.2877	0.1628	0.1643	0.3127	0.3009	0.1855	0.1901
Observations	20,371	17,853	18,083	16,008	20,371	17,853	20,371	17,853	20,371	17,853	20,371	17,853

Notes: Robust standard errors, clustered by marriages, in parentheses. Only taxpayers in the top 50% of the observed 2011 wealth distribution are considered. Top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. *All* estimates refer to all 2011 taxpayers in the top 50%; *5y filers* estimates refer to those who filed wealth tax returns every year between 2011 and 2015. The last four dependent variables are expressed in shares over total assets. The number of observations related to *Log of taxable income* estimates is not as high because some taxpayers do not report information on income. "Decile" and "Narrow" controls include non-parametric variables which capture taxpayers' wealth, income, asset portfolio, age, indebtedness share and tax amnesty participation. For a detailed definition of these controls see Section 4.2.
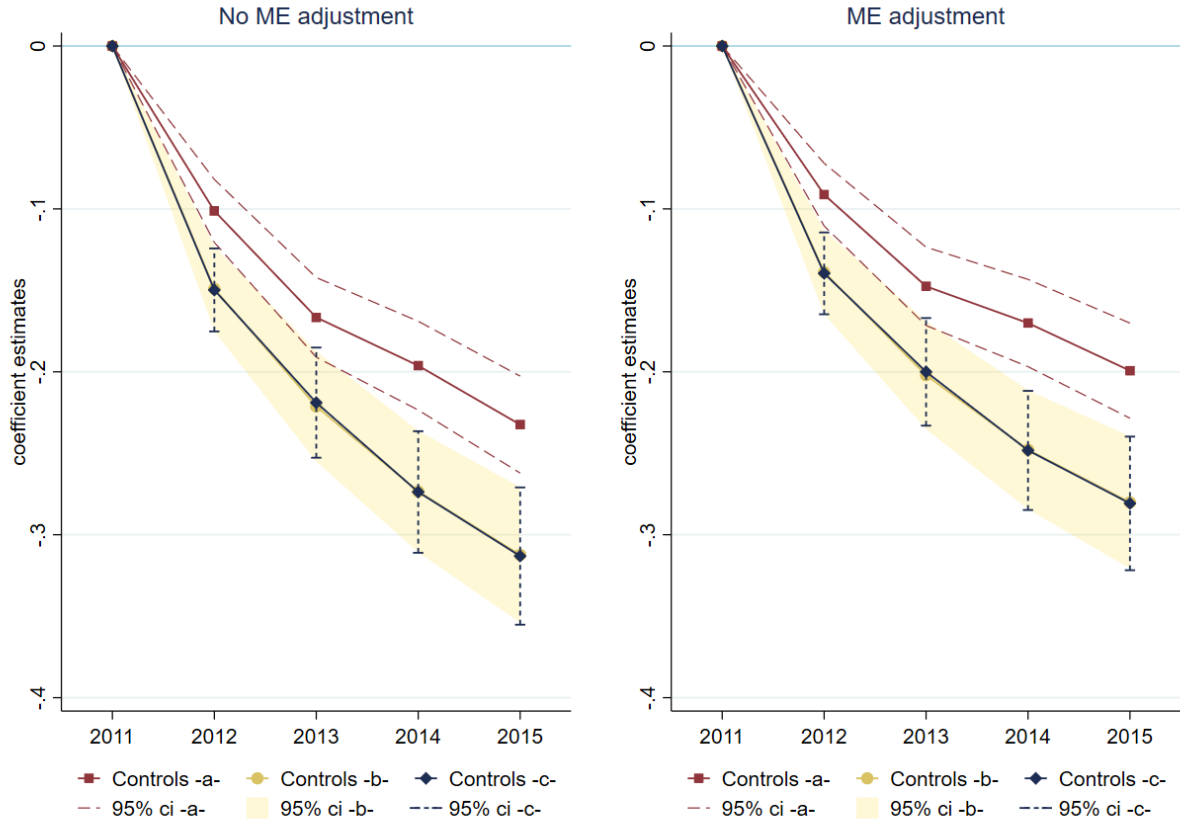***p<0.01, **p<0.05, *p<0.1.

Table A2: Statutory tax rates, 2011

Tax bracket (in euros)	Marginal tax rate (%)
0.00	0.2
167,129.45	0.3
334,252.88	0.5
668,499.75	0.9
1,336,999.51	1.3
2,673,999.01	1.7
5,347,998.03	2.1
10,695,996.06	2.5

Appendix D   Main estimation results using *"estimated atr"* as the explanatory variable
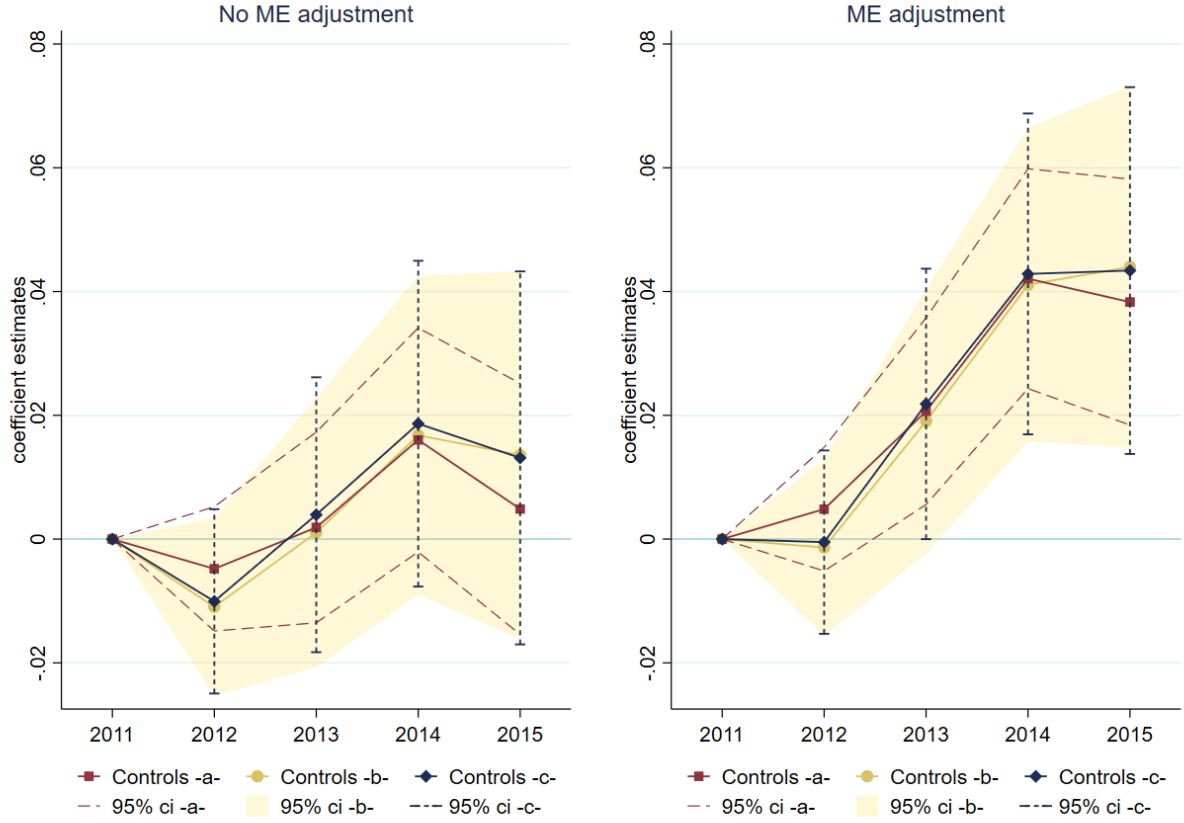
Figure A5: Effect on taxable wealth

Notes: Both figures provide coefficient estimates and 95% confidence intervals from specification (1) with *estimated atr*$_i^{11}$ as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable is the log of taxable wealth. It is (not) adjusted for the mechanical effect -ME- in the right (left) panel.
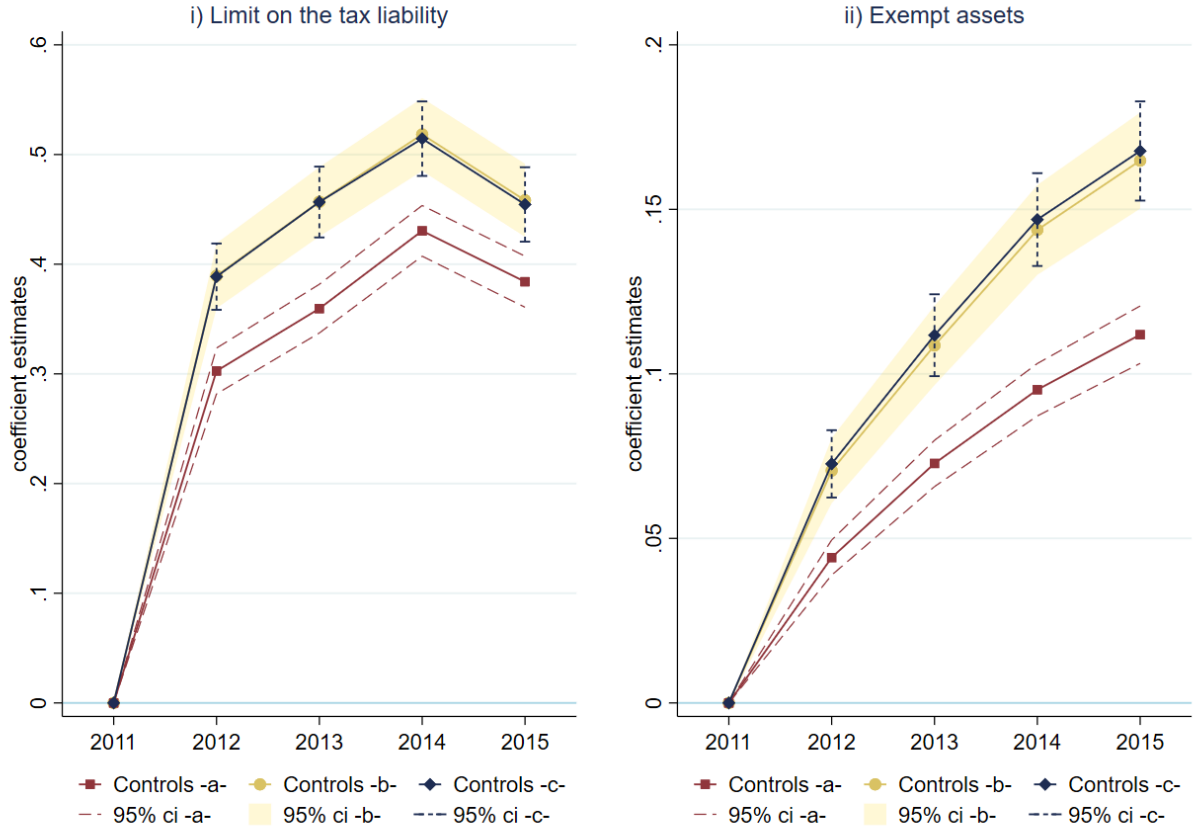N: 88,325 obs

Figure A6: Effect on total reported wealth

Notes: Both figures provide coefficient estimates and 95% confidence intervals from specification (1) with *estimated* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable is the log of total reported wealth. It is (not) adjusted for the mechanical effect -ME- in the right (left) panel.
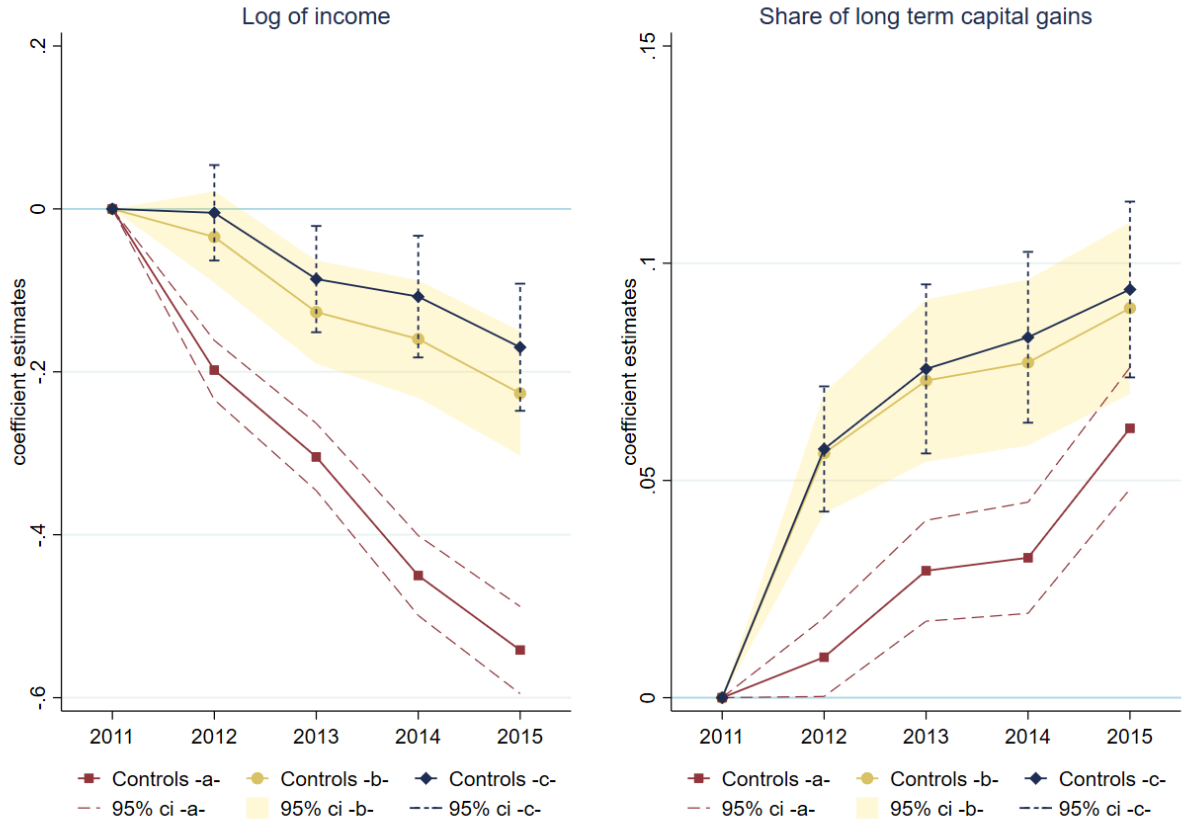N: 89,265 obs

Figure A7: Effect on potential tax avoidance strategies

Notes: Both figures provide coefficient estimates and 95% confidence intervals from specification (1) with *estimated* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable in the left-hand panel is a dummy which equals 1 if a taxpayer faces the limit on the tax liability in year t, and 0 otherwise. The dependent variable in the right-hand panel is the share of exempt assets over total reported assets.
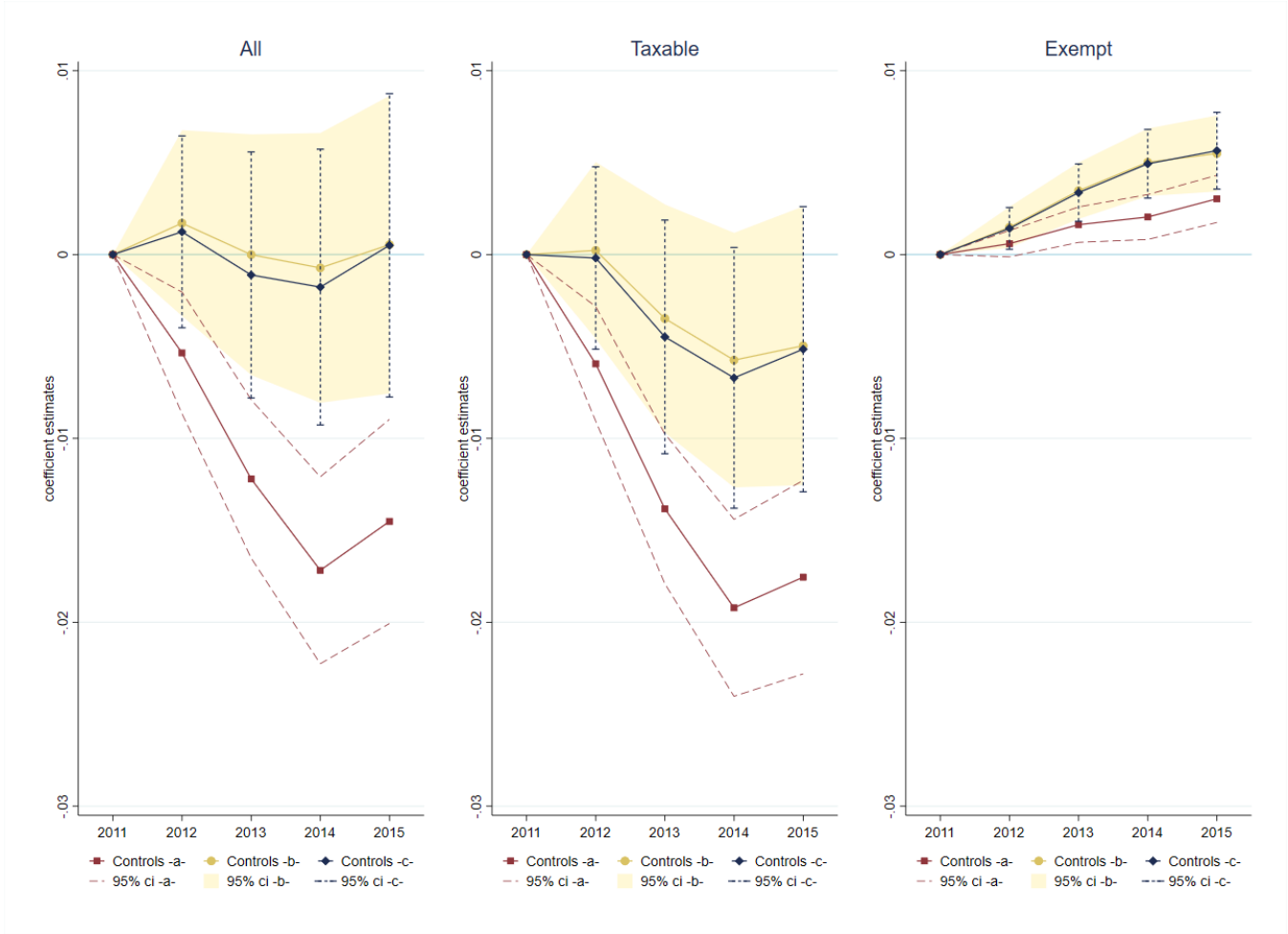
N: 89,265 obs

Figure A8: Effect on income and long-term capital gains

Notes: Both figures provide coefficient estimates and 95% confidence intervals from specification (1) with *estimated* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable in the left-hand panel is the log of taxable income. The dependent variable in the right-hand panel is the share of long term capital gains over taxable income.
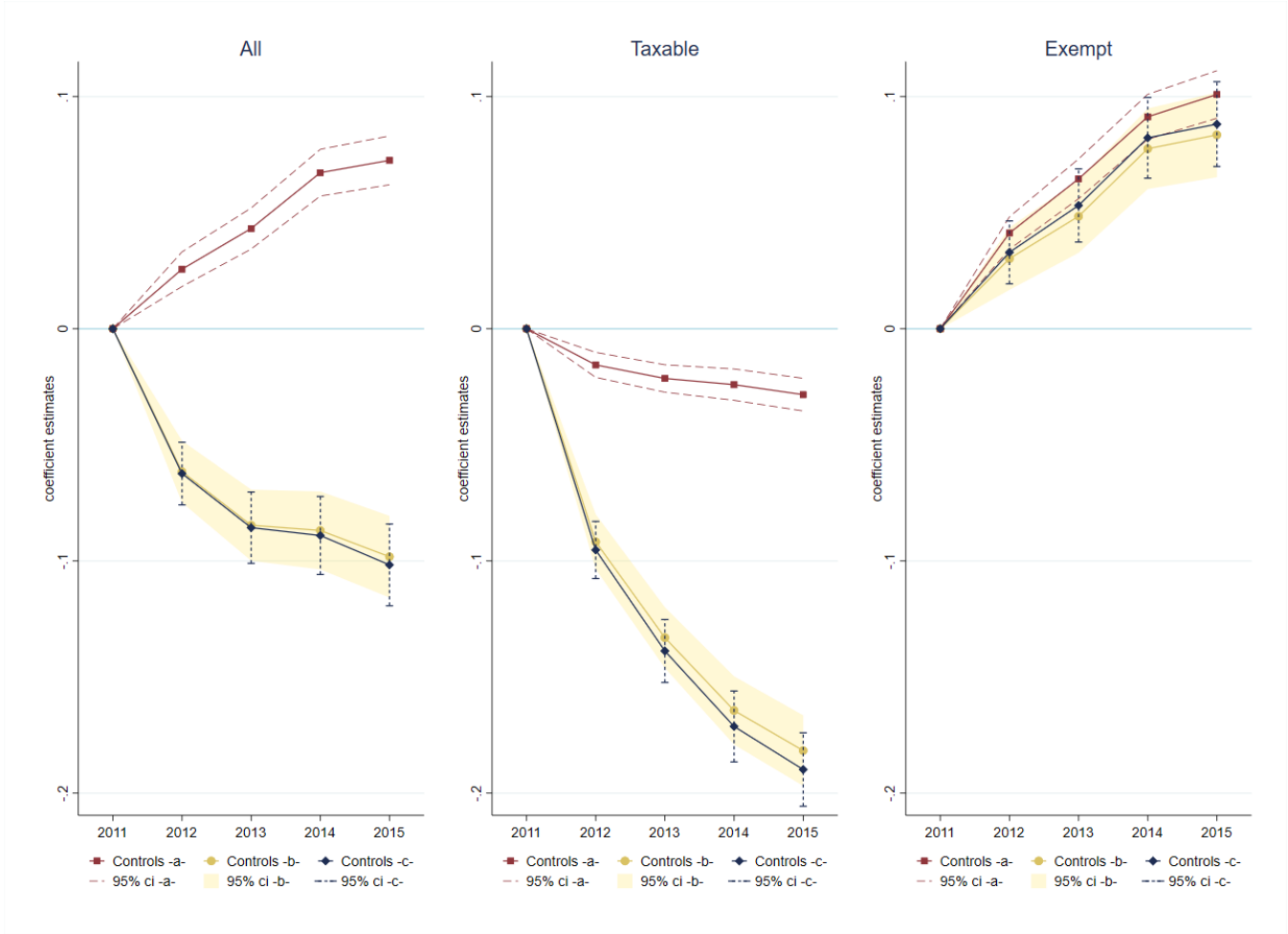N: 69,405 obs

Figure A9: Effect on real estate

Notes: All figures provide coefficient estimates and 95% confidence intervals from specification (1) with *estimated atr$_i^{11}$* as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable for the panels (from left to right) is the share of (all/taxable/exempt) real estate over total reported assets.
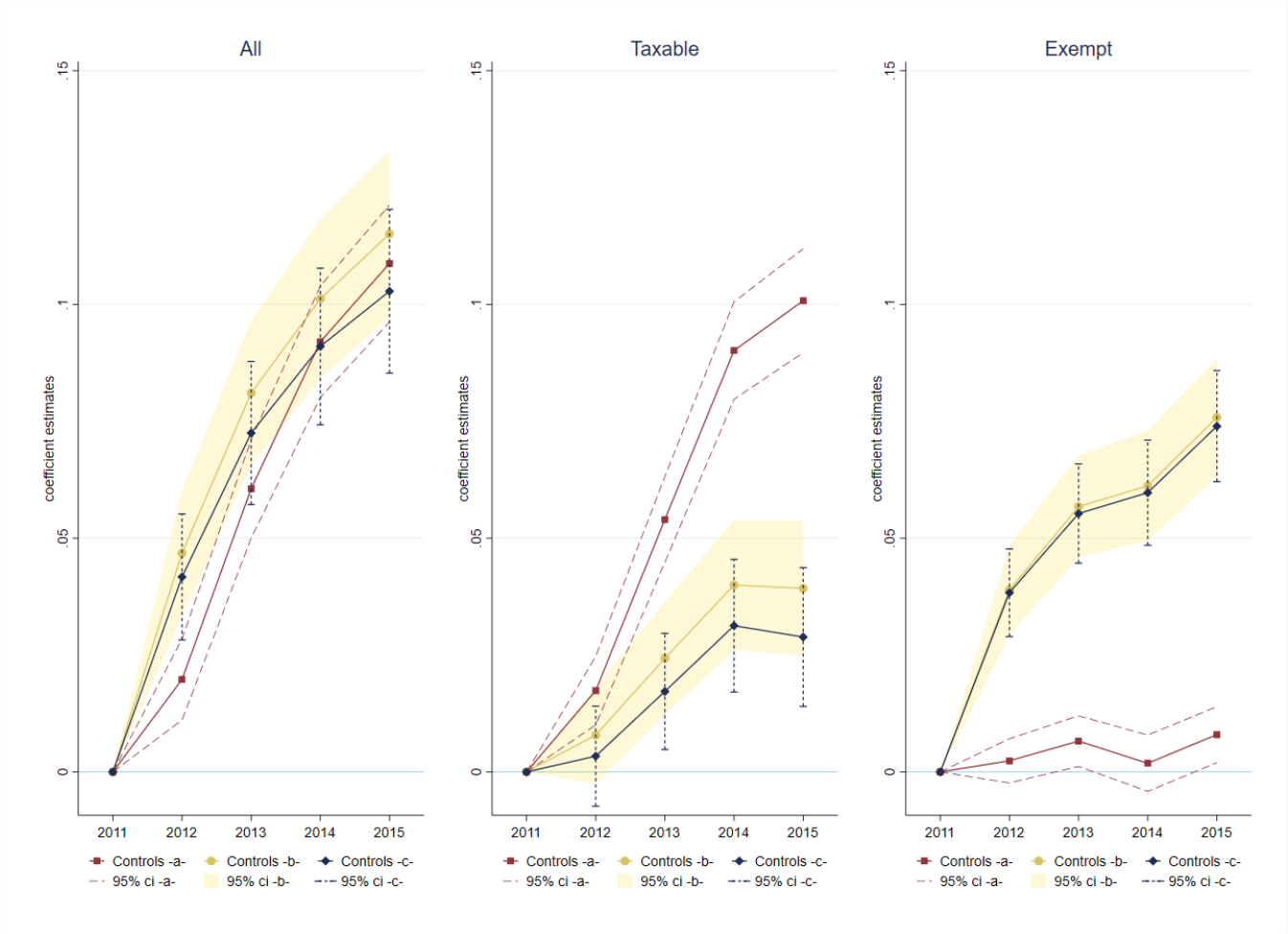N: 89,265 obs

Figure A10: Effect on unlisted companies and business assets

Notes: All figures provide coefficient estimates and 95% confidence intervals from specification (1) with *estimated* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable for the panels (from left to right) is the share of (all/taxable/exempt) unlisted companies and business assets over total reported assets.
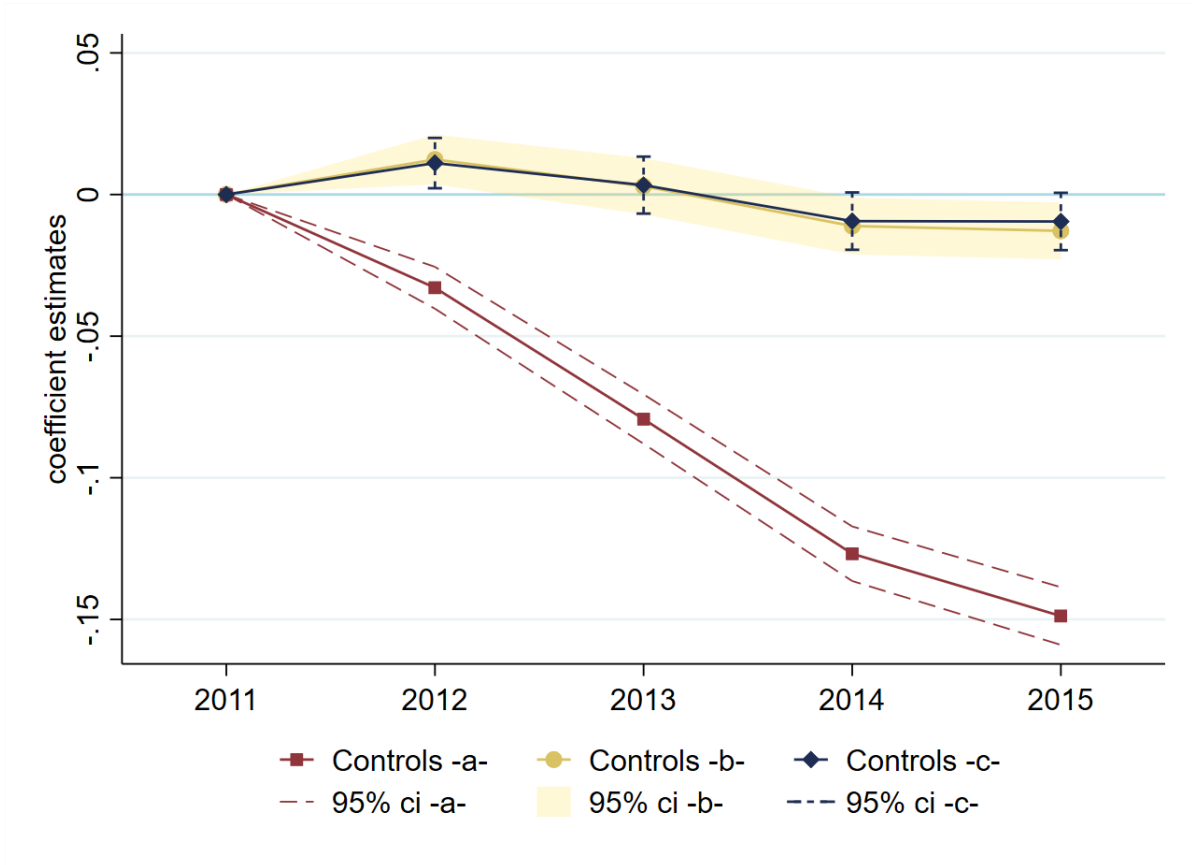
N: 89,265 obs

Figure A11: Effect on listed equity and investment funds

Notes: All figures provide coefficient estimates and 95% confidence intervals from specification (1) with *estimated* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable for the panels (from left to right) is the share of (all/taxable/exempt) listed equity and investment funds over total reported assets. N: 89,265 obs

Figure A12: Effect on bank accounts and bonds

Notes: The figure provides coefficient estimates and 95% confidence intervals from specification (1) with *estimated* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable is the share of bank accounts and bonds over total reported assets.
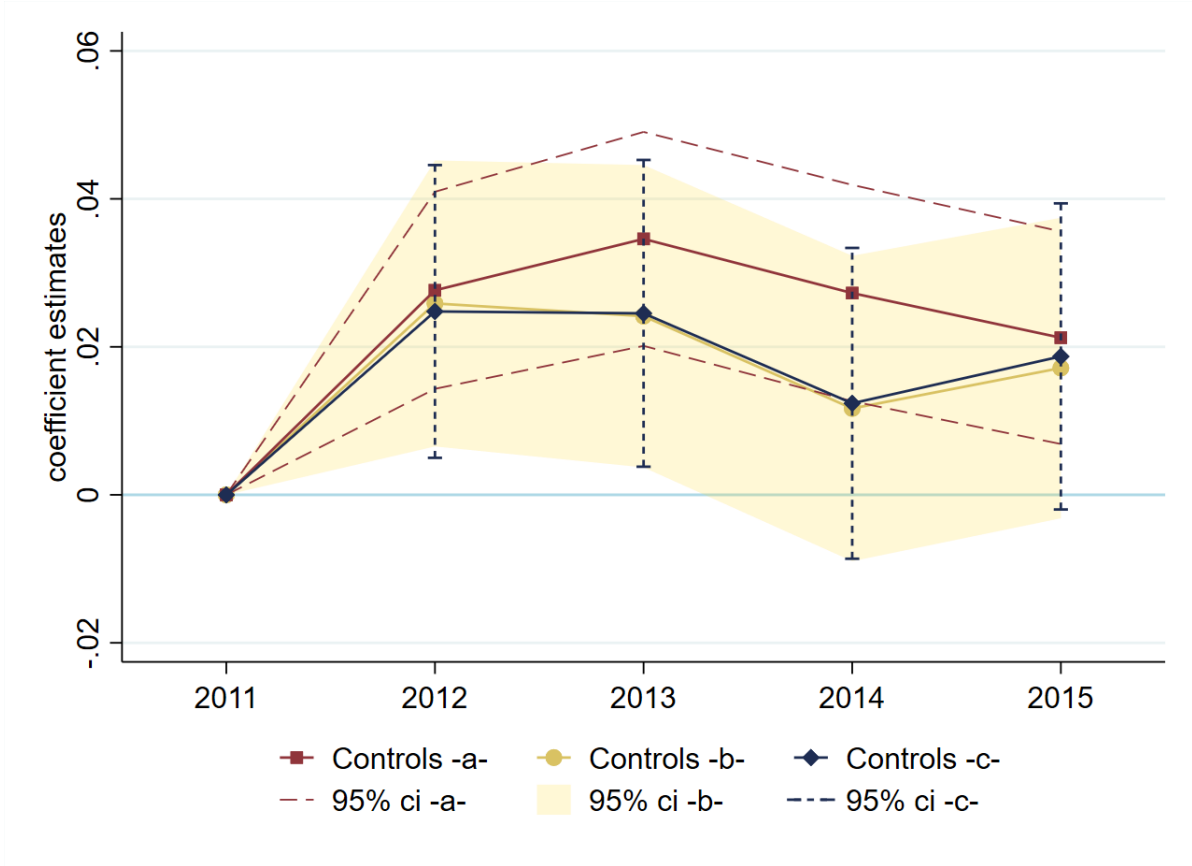N: 89,265 obs

Figure A13: Effect on gifts

Notes: The figure provides coefficient estimates and 95% confidence intervals from specification (1) with *estimated* atr_i^{11} as the explanatory variable. The three sets of estimates result from using alternative control variables. Controls -a- only include individual and time fixed effects. Controls -b- and -c- include, additionally, the set of "decile" and "narrow" controls, respectively, interacted with time dummies. For a detailed definition of these variables see Section 4.2. The estimation sample is a balanced panel of the 50% richest taxpayers, according to the stock of wealth reported in 2011, who filed wealth tax returns every year between 2011-15. Standard errors are clustered by marriages and top 0.5% of income and wealth distributions are excluded from the estimations to avoid outliers. The dependent variable is a dummy which equals 1 if a taxpayer makes a gift - declared to the Catalan Tax Agency - in year t, and 0 otherwise.
N: 89,265 obs

2013

2013/1, Sánchez-Vidal, M.; González-Val, R.; Viladecans-Marsal, E.: "Sequential city growth in the US: does age matter?"

2013/2, Hortas Rico, M.: "Sprawl, blight and the role of urban containment policies. Evidence from US cities"

2013/3, Lampón, J.F.; Cabanelas-Lorenzo, P-; Lago-Peñas, S.: "Why firms relocate their production overseas? The answer lies inside: corporate, logistic and technological determinants"

2013/4, Montolio, D.; Planells, S.: "Does tourism boost criminal activity? Evidence from a top touristic country"

2013/5, Garcia-López, M.A.; Holl, A.; Viladecans-Marsal, E.: "Suburbanization and highways: when the Romans, the Bourbons and the first cars still shape Spanish cities"

2013/6, Bosch, N.; Espasa, M.; Montolio, D.: "Should large Spanish municipalities be financially compensated? Costs and benefits of being a capital/central municipality"

2013/7, Escardíbul, J.O.; Mora, T.: "Teacher gender and student performance in mathematics. Evidence from Catalonia"

2013/8, Arqué-Castells, P.; Viladecans-Marsal, E.: "Banking towards development: evidence from the Spanish banking expansion plan"

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2013/13, González-Val, R.; Tirado-Fabregat, D.A.; Viladecans-Marsal, E.: "Market potential and city growth: Spain 1860-1960"

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2013/16, Lampón, J.F.; Lago-Peñas, S.: "Factors behind international relocation and changes in production geography in the European automobile components industry"

2013/17, Guío, J.M.; Choi, A.: "Evolution of the school failure risk during the 2000 decade in Spain: analysis of Pisa results with a two-level logistic mode"

2013/18, Dahlby, B.; Rodden, J.: "A political economy model of the vertical fiscal gap and vertical fiscal imbalances in a federation"

2013/19, Acacia, F.; Cubel, M.: "Strategic voting and happiness"

2013/20, Hellerstein, J.K.; Kutzbach, M.J.; Neumark, D.: "Do labor market networks have an important spatial dimension?"

2013/21, Pellegrino, G.; Savona, M.: "Is money all? Financing versus knowledge and demand constraints to innovation"

2013/22, Lin, J.: "Regional resilience"

2013/23, Costa-Campi, M.T.; Duch-Brown, N.; García-Quevedo, J.: "R&D drivers and obstacles to innovation in the energy industry"

2013/24, Huisman, R.; Stradnic, V.; Westgaard, S.: "Renewable energy and electricity prices: indirect empirical evidence from hydro power"

2013/25, Dargaud, E.; Mantovani, A.; Reggiani, C.: "The fight against cartels: a transatlantic perspective"

2013/26, Lambertini, L.; Mantovani, A.: "Feedback equilibria in a dynamic renewable resource oligopoly: pre-emption, voracity and exhaustion"

2013/27, Feld, L.P.; Kalb, A.; Moessinger, M.D.; Osterloh, S.: "Sovereign bond market reactions to fiscal rules and no-bailout clauses – the Swiss experience"

2013/28, Hilber, C.A.L.; Vermeulen, W.: "The impact of supply constraints on house prices in England"

2013/29, Revelli, F.: "Tax limits and local democracy"

2013/30, Wang, R.; Wang, W.: "Dress-up contest: a dark side of fiscal decentralization"

2013/31, Dargaud, E.; Mantovani, A.; Reggiani, C.: "The fight against cartels: a transatlantic perspective"

2013/32, Saarimaa, T.; Tukiainen, J.: "Local representation and strategic voting: evidence from electoral boundary reforms"

2013/33, Agasisti, T.; Murtinu, S.: "Are we wasting public money? No! The effects of grants on Italian university students' performances"

2013/34, Flacher, D.; Harari-Kermadec, H.; Moulin, L.: "Financing higher education: a contributory scheme"

2013/35, Carozzi, F.; Repetto, L.: "Sending the pork home: birth town bias in transfers to Italian municipalities"

2013/36, Coad, A.; Frankish, J.S.; Roberts, R.G.; Storey, D.J.: "New venture survival and growth: Does the fog lift?"

2013/37, Giulietti, M.; Grossi, L.; Waterson, M.: "Revenues from storage in a competitive electricity market: Empirical evidence from Great Britain"

2014

2014/1, Montolio, D.; Planells-Struse, S.: "When police patrols matter. The effect of police proximity on citizens' crime risk perception"

2014/2, Garcia-López, M.A.; Solé-Ollé, A.; Viladecans-Marsal, E.: "Do land use policies follow road construction?"

2014/3, Piolatto, A.; Rablen, M.D.: "Prospect theory and tax evasion: a reconsideration of the Yitzhaki puzzle"

2014/4, Cuberes, D.; González-Val, R.: "The effect of the Spanish Reconquest on Iberian Cities"

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