

The tax gap as a public management instrument: application to wealth taxes

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Abstract

Purpose – The purpose of this paper is to study the concept of tax gap, that is the difference between the total amount of taxes collected and the total tax revenues that would be collected under full tax compliance.

Design/methodology/approach – The authors also present the methodology to estimate the gap for two taxes levied on wealth: the wealth tax and the inheritance and gift tax; both are administered in Spain by the regional tax authorities.

Findings – The authors point out that its estimation offers useful information about the relative size and nature of non-compliance, as well as its evolution over time. Likewise, the tax gap is a valuable instrument not only to define enforcement strategies of the tax administration but also to enhance its accountability. Nonetheless, the methodology used to estimate the tax gap and, consequently, the interpretation of the results is subject to limitations that are discussed in the paper.

Originality/value – Finally, the paper provides the results of the estimations obtained from using microdata: 44.34 per cent gap in the wealth tax and 41.26 per cent in the inheritance and gift tax.

Keywords Accountability, Tax gap, Fiscal transparency, Tax administration, Tax enforcement

Paper type Research paper

1. Introduction

The tax gap can be defined as the difference between the actual taxes collected and those which would be collected under full compliance. Consequently, by estimating the tax gap, it is possible to obtain relevant information about the degree of non-compliance and its

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JEL classification – H 26, H 83

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components for a specific tax or for the tax system as a whole, including its evolution over time. This information can be essential for tax administrations when deciding how to allocate their resources to improve tax compliance (Shaw *et al.*, 2010). Since 1973, when the Internal Revenue Service (IRS) – the US federal tax agency - pioneered the estimation of the income tax gap, its importance has grown. Currently, 23 tax administrations calculate the gap for some of their respective taxes (OECD, 2017), while the European Union makes a similar effort for the VAT of its member states (Poniatowski *et al.*, 2018).

Tax gaps exist primarily because of evasion, thus its calculation entails making an estimation and finding “evidence of the invisible” (Slemrod and Weber, 2012). Knowing its extent or its magnitude is relevant; however, it is probably more important to know how it evolves over time. Consequently, the estimation strategy should satisfy at least three conditions to guarantee rigour and transparency: first, the results should be presented within confidence intervals; second, the methodology should be relatively stable over time; and, third, the data used for the estimation should be available on a periodic basis. In this manner, estimating the tax gap would make sense as it provides information that would be very useful to the tax administration as a management tool.

Likewise, its periodic estimation may also serve as a way of reinforcing tax administration accountability to citizens as it provides public information on its performance (Heald, 2003). Based on annual surveys of individuals on their perception of tax fraud prepared by the *Centro de Investigaciones Sociológicas*, Durán-Cabré and Esteller-Moré (2018) show there is some evidence that taxpayers tend to overestimate (underestimate) the existence of tax fraud in times of economic crisis (expansion). This overvaluation undermines the incentives for voluntary tax compliance (Hammar *et al.*, 2009), which is especially serious for the public sector during times of crisis when financial restrictions are greater. The publication of the tax gap could contribute to stemming the erosion of the credibility in public finances, enabling taxpayers to moderate their perceptions closer to what happens in reality (Kornhauser, 2005).

Furthermore, greater knowledge about the factors that give rise to the tax gap can also be useful for legislators when assessing regulatory changes. Consequently, estimating the tax gap may provide crucial information for a better understanding of the tax system and the enforcement of the existing tax code (Tomkins *et al.*, 2001).

Nonetheless, as a public management instrument, it also exhibits some weaknesses. For one, being an estimate, some caution should be taken when interpreting its value over time and when making cross-country comparisons. Indeed, the tax gap also depends on elements inherent to the fiscal system itself and on country-specific characteristics. There are enormous differences across countries in terms of the types of taxes and their level of importance, in the composition of tax bases, in the structure of production, and in the level of tax morale[1]. For another, the optimal tax gap is not necessarily zero (Keen and Slemrod, 2017). The existence of costs related to ex ante and to ex post control makes it necessary to maintain an adequate balance between such costs and the ensuing benefits of reducing the tax gap.

In short, the first objective of this paper is to analyse the concept of the tax gap, highlighting not only the advantages, but also the limitations that its estimation implies. Second, we propose a methodology to estimate the gap for the two main personal direct taxes that Spain levies on wealth, managed by the regional tax administrations. Specifically, we estimate the gap for the Wealth Tax (WT) and for the Inheritance and Gift Tax (IGT) by using microdata corresponding to taxpayers in Catalonia for the year 2014[2][3]. Apart from the novelty itself, its estimation is also a useful contribution to the ongoing debate about the future of personal wealth taxes (OECD, 2018).

The estimated tax gap, calculated as a share of the potential tax revenues, is 44.34 per cent (with a range: 37.95-49.6 per cent) in WT, and 41.26 per cent (38.44-44.01 per cent) in IGT. These are high values compared with the results obtained in other countries for taxes such as personal income tax, corporate income tax or VAT, as Table I indicates. The different taxable events considered here undoubtedly affect the value. For example, the WT is levied on the annual net worth of resident natural persons, so every year all the assets that make up the personal wealth must be valued, regardless of their location. Special treatments should also be considered, such as exemptions on shares of closely held companies. Furthermore, there is no withholding taxation.

The structure of the rest of the article is as follows: in Section 2, we define the tax gap, its components and the main methodological aspects related to its estimation. In Section 3, we review some relevant international experiences related to the calculation of the gap; and in Section 4, we describe the methodology and present the main results of its application to wealth taxes. Section 5 concludes.

2. Tax gap: definitions, components and calculation methodologies

2.1 Definitions and components

The IRS defines the tax gap as “the difference between the tax that taxpayers should pay and what they actually pay on a timely basis” [4]. Based on this definition, three components of the tax gap can be identified[5]:

- (1) *Non-filing*: the taxable event is not reported but should be declared in accordance with regulations. For example, an inheritance is received, but the self-assessment of the IGT is not submitted; or the wealth of a person exceeds the tax-free allowance of the WT, but the return is not filled.
- (2) *Under-reporting*: the taxable event is reported, but not in a complete way. For example, the declaration of assets is incomplete, the assessment is incorrect, or a tax credit is improperly applied.
- (3) *Non-payment*: the tax return is filed, but the taxpayer does not pay the tax liability within the voluntary payment period.

This decomposition provides the tax administration better knowledge to determine the appropriate measures to effectively reduce the gap. In turn, each of these factors can be decomposed into subfactors. In our estimations, the most important factor in both the IGT and the WT is under-reporting. Within this, there are various elements such as the non-filing of assets located offshore, the improper use of special treatments for closely held businesses, and the under-valuation of certain assets.

Likewise, it is relevant to differentiate between the gross and the net gap; the former being directly related to the absence of voluntary tax compliance. Following enforcement efforts (e.g. audits) of the tax administration, part of the liability not voluntarily paid on time

	Taxes	Years	Tax gap (%)
Australia	GST, excises, corporation	2014-2016	Net gap: 6.3
European Union	VAT	2016	Gross gap: 12.3
The UK	All, including social contributions	2015-2016	Net gap: 6
The USA	Income, corporation, self-employment, estate and excise	2008-2010	Gross gap: 18.3 Net gap: 16.3

Table I.
Tax gap: Summary of some international experiences

may be recovered, or taxpayers, on their own initiative, may even opt to pay the debt after the deadline. Consequently, the net gap should be lower than the gross figure and this difference can be interpreted as a proxy for the performance of the tax administration. The net gap refers to the share of the gross tax gap that is not collected despite the ex-post enforcement efforts of the administration.

A final issue to point out is whether tax expenditures are included in the estimation. Although uncommon, it is also possible to estimate the so-called policy gap, which includes the potential revenue loss as a result of tax benefits in the tax code. In this case, the tax gap is relativized with respect to all potential revenues – what would be obtained under full compliance and in absence of any special treatment[6]. Its calculation is relevant for two reasons: first, because of the high collection cost of tax expenditures, which is often not considered by policy makers; and, second, because the greater the policy gap, the more complex the tax code and the greater the opportunities for abuse.

2.2 Estimation methodologies

There are basically two types of methodologies, depending on the data used and on the degree of detail that is sought in the calculation (Gemmell and Hasselidne, 2014). The macro approach (or top-down) uses aggregate data, with two alternatives: the tax gap may be estimated by taking data from the underground economy and applying an effective tax rate; or by using macroeconomic indicators, such as national consumption or gross domestic product.

The micro approach (or bottom-up) uses microeconomic data based on the reported returns by the taxpayers and, on the basis of the results from audits implemented by the tax administration, it is possible to infer the amount that should have been declared by each taxpayer. For this, it is necessary to have the results of the enforcement efforts stratified by tax brackets.

The micro approach (based on internal data from the tax administration) is clearly superior. Since it provides information by wealth or by income brackets, we are then able to carry out a redistributive analysis of the tax gap, which is especially relevant when estimating the gap of *ad personam* taxes. As we will see, the estimated gap on WT and on IGT is not homogeneously distributed across wealth. Furthermore, we can identify the factors behind the non-filing. The intensity of the use of microdata is much greater, as well as the requirements to ensure the reliability of the estimates. Ideally, enforcement methods used by the tax administration should be randomised, and the scope of such activity should be large enough. Otherwise, if the audits are not randomised (for example, they are concentrated in groups of taxpayers where the extensive existence of fraud is already known a priori), the estimation of the gap will be biased upwards. On the other hand, if the number of audits is not sufficiently high, we cannot ensure the statistical significance of the estimates.

Occasionally, empirical estimations will require a combination of both approximations; however, it is desirable to start from microdata, especially for *ad personam* taxes. In the case of indirect taxes, such as VAT, the use of macroeconomic data is reasonable and customary (Keen, 2013). This dichotomy between micro and macro data does not exist when dealing with the portion of the tax gap due to non-payment. Here, the tax administration must have accounting information that identifies the accrued and unpaid liabilities.

3. International experiences

The estimation of the tax gap by tax administrations has become popular over time^[7], although it cannot be denied that the difficulties encountered in their estimation result in some reluctance to undertake the exercise. Of the 55 states analysed by the [OECD \(2017\)](#) in its annual report on tax administrations, 23 (about 40 per cent) calculated the gap for some tax, although only 14 published the results of the estimates. The estimation of the gap of all large taxes is published in only 8 countries. In addition, the definitions of the gap and calculation methodologies show important differences in practice, as well as the periodicity of the estimates and the scope of the taxes analysed. Despite all the differences and difficulties, administrations highlight the usefulness of having information about the relative size and nature of non-compliance over time. In [Table I](#), we show some results.

The IRS was a pioneer in estimating the gap on personal income tax in 1973. For this reason, we have taken their definition as a basis. Since then, the calculation of the gap has generally been carried out every three years (although the results are published with a delay of six years) and the number of taxes analysed has been extended. A new feature in the last official estimate is the calculation of the average annual gap for three fiscal years (2008, 2009 and 2010), because it has been considered that the estimates of under-reporting are more reliable ([Internal Revenue Service, 2016](#)). In addition, and for the first time, the net gap together with the gross gap of each tax is calculated, identifying non-filing, under-reporting and non-payment components in most cases. The IRS details the methodology applied to estimate the different components of each tax, which varies according to the information available. Likewise, past estimates are updated and revised when making new ones to improve their reliability, but the impact of the improvements are specified to enable homogeneous comparisons over time.

The experience of HM Revenue and Customs in the United Kingdom is also relevant. Each year, they estimate the net gap for all taxes, including social contributions. The gap is calculated for each tax, according to typologies of “clients” defined by the same administration (e.g. SMEs, large companies) and the behaviour that causes the gap (e.g. due to lack of diligence, by legal interpretation, evasion, fiscal offense). Although the administration itself recognises that these classifications imply a certain degree of discretion on their part, the information is still considered useful ([HM Revenue and Customs, 2017](#)). In each new estimate of the gap, the previous ones are revised following the availability of new data and methodological improvements that are being introduced. These revisions are specified to maintain their usefulness as an indicator of long-term trends.

For their part, the Australian Taxation Office takes special caution when interpreting data, particularly because the tax gap, along with other indicators, provides important information on the performance and integrity of the Australian taxation system ([Australian Taxation Office, 2018](#)). Since 2013, with the aim of improving transparency in the estimates, a panel of independent experts has been put in place to give guidance on their calculation.

It is also interesting to highlight the Danish experience. In 2008, the tax administration (SKAT) agreed to adopt a new strategy on tax compliance, substituting the traditional targets of the number of actions taken and the additional collection generated with indicators on the effectiveness of measures implemented ([SKAT, 2008](#)). To this end, the target set was a maximum tax gap of 3.1 per cent of GDP for personal income taxes levied by the central government. In addition, they also agreed that its calculation would be extended to all taxes. To know the components of the gap, SKAT also set out to conduct a broad survey on the compliance of taxpayers.

More recently, in 2016, the Canadian Tax Administration (CRA) announced the upcoming first estimate of the tax gap, under the framework of intensive public investment

to fight against tax fraud (Canada Revenue Agency, 2016). They explicitly stated that the estimate only makes sense if the additional information obtained serves, on the one hand, for taxpayers to better understand the tasks of the tax administration and how effective they are, and on the other, for the administration itself to improve the degree of tax compliance. To date, the CRA has published two studies on the tax gap in VAT and personal income tax.

In contrast to these positive experiences related to tax gap estimation, we find the case of Sweden, which had performed these estimates periodically (for 2000/01 and 2006/07) and had targeted to reduce the gap by half in 2012. However, in the last update provided in 2012, the tax administration (Skatteverket, 2014) recognised the impossibility of achieving their target. The main reason cited is insufficient information from the traditional audits given that the number of audits had decreased in recent years as a result of a better selection of enforcement measures taken. This lack of information hampers the calculation of a reliable updated tax gap estimate. Other tax administrations that have evaluated the possibility of using the calculation consider that “the costs of measuring tax gaps outweigh the benefits, given data availability, the resource investment required and the levels of uncertainty involved” (Whicker, 2017, p. 185).

Within the European Union, the Commission has also promoted the study of the VAT gap, a harmonised tax at the European level. Initially, for the 2000-2006 period (Reckon, 2009), and from 2013 to the present, the estimations have been published annually with an improved methodology (Poniatowski *et al.*, 2018). The potential VAT revenues are obtained by applying the corresponding tax rates to consumption and investment data from the national accounts. The study also estimates the VAT policy gap.

The Forum on Tax Administration of the OECD has also highlighted the role of the tax gap to better understand the functioning of a country’s tax system and the effectiveness of its tax administration (OECD, 2017). For the first time in Spain, we propose a methodology and present estimates of the gap in wealth taxes[8], which could then be applied to other Spanish regions.

4. Application to the case of taxes on wealth: Catalonia (2014)

Spain is one of the few OECD countries that still has a personal net wealth tax (WT). It is levied on the wealth owned as of the 31st of December of every year, i.e. the value of all taxable goods and rights minus liabilities. Owner-occupied housing and closely held businesses are exempt, subject to the fulfilment of some conditions, and additionally, there is a basic tax-free allowance. Progressive tax rates are applied to the net tax base[9]. The WT is a national tax collected by Spanish regions, which have authority to regulate some of its parameters. In Catalonia, for instance, the 2014 tax-free allowance was 500,000 euros and the tax rates were set between 0.21 per cent and 2.75 per cent.

The Inheritance and gift tax (IGT) is levied on inheritors and donees. It is also a national tax collected by regions, again with legal capacity to regulate some important parameters, such as deductions, tax credits and tax rates. The liability depends on the value of the transferred goods and the type of goods, but also largely on the kinship with the transferor. For spouses and descendants, tax rates range from 7 per cent to 32 per cent.

The WT and the IGT represent approximately 35 per cent of the taxes managed by the Catalan Tax Agency (ATC) in 2014, the year used for our estimates. Next, we outline the proposed methodology for estimating the gross gap of each tax and, in particular, its components (non-filing and under-reporting). Regarding non-payment, the information has been provided directly by the ATC.

4.1 Wealth tax

4.1.1 Methodology

4.1.1.1 Under-Reporting. The objective is to correct the tax base for non or partially declared assets. Audit information shows that the main sources of under-reporting are:

- non-filing of unproductive assets such as jewellery or antiques, among others;
- incorrect use of the closely-held business exemption;
- existence of undeclared assets located abroad; and
- incorrect or non-reporting of loans.

For its estimation, in general, we proceed as follows: first, we compute the corresponding under-reported amount for each source of gap, which is subsequently added to the base initially declared. These imputations are done for each individual taxpayer. Once the tax base is adjusted, we compute the new tax liability[10] and deduct the tax liability initially reported. Finally, we add the tax liabilities resulting from tax audits that have not been previously considered in the calculations.

The main information used to calculate this component of the tax gap comes from anonymized 2014 WT returns of Catalan taxpayers. In addition, for each source of under-reporting, different methods are used based on the available information.

The computations associated with unproductive assets are made in accordance with the information provided in the 2014 Survey of Household Finances (*Encuesta Financiera de las Familias*, EFF), conducted by the Bank of Spain. The [Bank of Spain \(2017\)](#) details the asset composition of households for different percentiles of wealth. Taking this information for the highest percentile group (90-100)[11], we calculate the proportion that jewels, antiques, etc., represent over total assets. With this percentage, we can estimate the amount that should have been declared in the WT. Additionally, from the EFF we also obtain the median value of automobiles and other vehicles owned by households. The imputation derived from this source of under-reporting corresponds to the difference between the value that emerges from the EFF and the value actually declared by each taxpayer, if the latter is lower.

Regarding the incorrect use of closely held business exemption, computations are based on tax audit results. Different imputation criteria are considered:

- (1) a constant share of the reported exemption;
- (2) a share of the reported exemption which varies depending on the value of this exemption; and
- (3) an average derived from criteria (1) and (2). The basic results presented in this article are computed using criterion (3)[12].

Regarding the imputation of undeclared assets located abroad, different alternatives have also been considered. Following the methodology proposed by [Roine and Waldenström \(2009\)](#), taking from the net errors and omissions[13] of the Spanish Balance of Payments, we calculate all unreported assets located abroad owned by Spanish residents: €75,062m in 2014. Alternatively, we also consider [Zucman \(2013, 2014\)](#) calculation of undeclared offshore wealth for Spain amounting to €144,000m. To compute the share of this unreported wealth corresponding to Catalan residents, we use the proportion of reported wealth in Catalonia over the total wealth in Spain in 2007, the last year for which the WT data may be representative for all the Autonomous Regions.

When allocating the overall undeclared wealth at micro level, our assumption is that the richest taxpayers, identified from initial reported wealth, hold most of the assets located

abroad[14]. The individual allocation of this undeclared wealth is proportional to the total assets initially declared by each taxpayer, until the accumulated individual amount matches with the global value previously calculated. At the end of this process, we obtain three different computations for this tax gap concept:

- (1) from own calculations based on the net errors and omissions of the Spanish Balance of Payments;
- (2) from Zucman's (2013, 2014) calculations; and
- (3) an average of (1) and (2). As before, the results presented in this article use criterion (3)[15].

As for the incorrect reporting of loans, we did not have the appropriate disaggregated information to complete the computations. Consequently, we could only include the tax liabilities resulting from tax audits related to loans.

4.1.1.2 Non-filing

Here, the objective is to detect those WT taxpayers who, despite being legally bound to declare the tax, do not do so. For this purpose, we use information from anonymized inheritance tax returns provided by the ATC.

Specifically, the first step consists of adjusting the estate of Catalans deceased in 2014 using the WT valuation rules so that it is comparable to the WT tax base. This mainly affects real estate, household items, expenses and deductible debts in the IGT but not in the WT, and exempt goods in the WT but not in the IGT (main-dwelling residence, closely held businesses)[16].

Once the potential WT tax base has been constructed from the estate, we need to identify those deceased whose computed WT base is above the tax-free allowance and, subsequently, raise this sample to the population level by applying mortality rates. This methodology, based on inferring the wealth distribution of a population from the bequests left at a given period of time, was introduced by Atkinson (1975)[17]. The sample used will be representative of the population – once mortality rates have been taken into account – if we assume that there are no IGT non-filers in the upper part of the estate distribution[18].

Next step consists in distributing the estimated population to different net tax base brackets[19]. Once such brackets have been defined, the 2014 Catalan WT taxpayers must be distributed in the same way. By comparing both distributions, we can identify the number of WT non-filers existing in each bracket[20]. To illustrate, the histogram of the estimated population shows that there are 12,000 individuals allocated to the first tax base bracket, while in the histogram associated to WT taxpayers there are only 9,000 individuals in the first bracket, then the resulting difference indicates that there are 3,000 WT non-filers in this bracket.

The last steps for calculating the WT non-filing tax gap include adjusting the average net tax base of each bracket for undeclared assets both in WT and in IGT. These assets are mainly jewellery, antiques, etc. This is computed using the information obtained from the 2014 EFF detailed above. From the 2014, WT returns we also calculate the average tax rate associated to each bracket. Finally, putting these last calculations together, we apply the average tax rate on the adjusted average net tax base of each bracket, and then, multiply the average tax liability obtained by the number of non-filers. The sum of the results computed for each bracket corresponds to the WT non-filing tax gap.

4.1.2 Results[21]. Table II provides the main results of the WT tax gap calculations and its components. The gap, expressed as a proportion of potential revenues, is 44.34 per cent. The component that explains most of the tax gap is under-reporting (97.28 per cent). Figure 1 details

all tax gap sources. The most relevant is undoubtedly the existence of undeclared assets located abroad (explaining 56.40 per cent of the total WT tax gap), followed by the incorrect application of the closely held business exemption (36.08 per cent of the total).

Figure 2 shows tax gap calculations by wealth deciles. As expected, it is mostly concentrated among the richest taxpayers. The gap of the first decile is 100 per cent because it includes only non-filers. Figure 3 shows the gap by net tax base brackets. In contrast to Figure 2, we can now see the gap decreases as the base increases. This apparent contradiction may be attributed to two main factors: first, very rich taxpayers can be classified in the initial brackets of the tax base since exempt assets, particularly those related to closely-held businesses, can be very large for them[22], thus the gap is high due to the incorrect application of exemptions and non-reporting of assets located abroad; and second, all WT non-filers are assigned to the first three brackets and for them the gap is 100 per cent.

WT tax gap	Under-reporting	Non-filing	Non-payment	Total
Value in 2014 euros	331,629,153	3,304,866	5,961,432	340,895,451
% potential revenues	43.14	0.43	0.78	44.34
% tax gap	97.28	0.97	1.75	100

Table II.
WT Tax gap.
Main results

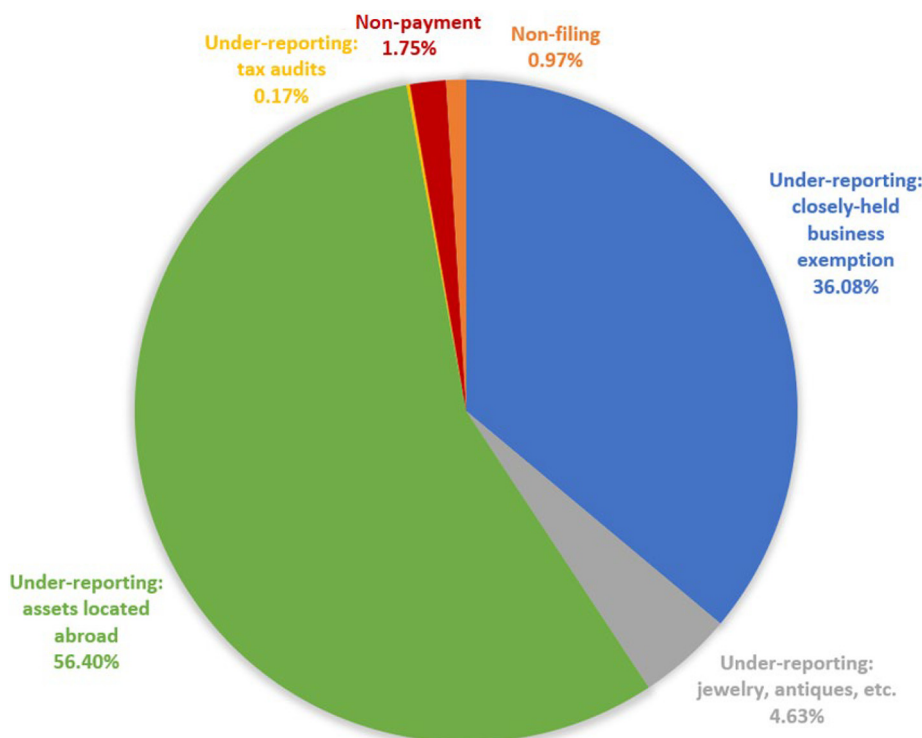


Figure 1.
Tax gap sources in the Wealth Tax

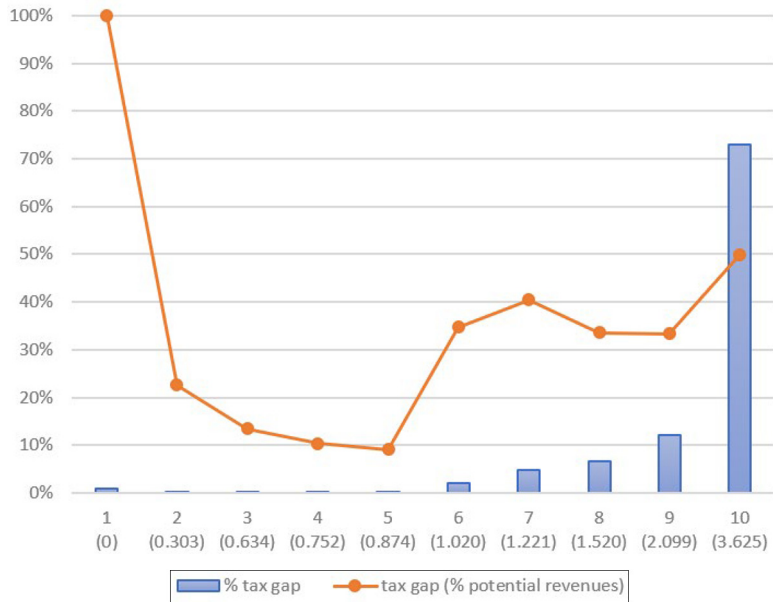


Figure 2.
WT tax gap by
wealth deciles

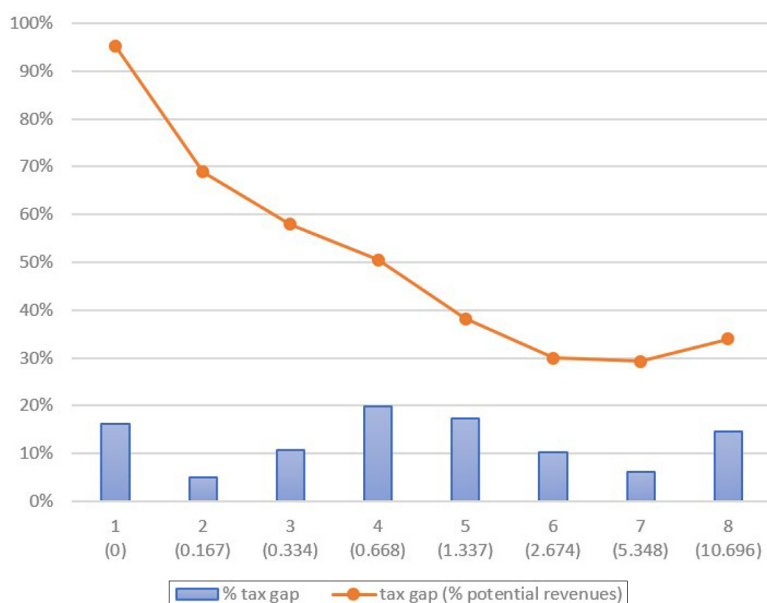
Notes: Wealth deciles have been defined according to total wealth (taxable wealth + exemptions) initially reported by taxpayers. Numbers in parentheses indicate the lower bound of each decile, in million euros. The first decile tax gap is 100% given that it only includes non-filers

4.2. Inheritance and gift tax

4.2.1 Methodology. In relation to the IGT, we estimate the components of the tax gap derived from under-reporting and non-payment in the voluntary period, but not the non-filing component. This is due to our assumption, in agreement with the ATC personnel, that the impact on the tax liability of non-filing inheritors is highly insignificant given that tax deductions were quite high in Catalonia in 2014 and there was a tax credit starting at 99 per cent of the tax liability and decreasing with the tax base. Therefore, only very large bequests were levied by the inheritance tax. As mentioned in the previous section, we consider there are no non-filing inheritors in the upper part of the distribution. However, non-reporting of certain types of gifts, such as cash or luxury goods, may be more common. Given the difficulty to detect such gifts, we assume that at some point, these objects are going to be transmitted via bequests and, therefore, we allocate them to the inheritance gap calculations instead of the gift gap.

4.2.1.1 Under-reporting. The methodology followed is very similar to that implemented for the WT. The objective is to correct the IGT tax base for the non or partially declared assets that are sources of the tax gap. According to audit information, the main sources of inheritance under-reporting are:

- non-reporting of unproductive assets such as jewellery, antiques, etc.;
- incorrect assets' valuation;
- existence of undeclared assets located abroad; and
- incorrect use of the closely-held business deduction.



Notes: Brackets have been defined according to the net tax base initially reported by taxpayers. Numbers in parentheses indicates the lower bound of each bracket, in million euros. Non-filers are distributed in the first three brackets

Figure 3.
WT tax gap by net tax base brackets

Alternatively, the main sources of under-reporting gifts are:

- incorrect assets' valuation; and
- incorrect use of the closely held business deduction.

The general methodology proceeds as follows: first, for each source of under-reporting, we compute the corresponding under-reported amount, which is then added to the estate initially declared. These imputations are done for each deceased, and later distributed among all heirs according to their initial portion on the estate[23]. Next, we adjust deductions that might be a tax gap source (that is, the closely held business deduction). Once the net tax base is adjusted with under-reported assets, we compute the resulting new liability and deduct the liability initially reported. Finally, we add the tax liabilities resulting from tax audits that have not yet been considered in the under-reporting tax gap calculations.

The main source of information used to calculate this tax gap comes from anonymized 2014 IGT returns of Catalan taxpayers. In addition, for each source of under-reporting, different methods have been used based on the information available. In this regard, the computations associated with unproductive goods have been made using the same criteria and sources of information followed in the WT calculations. The difference arises only when estimating the proportion of jewellery, antiques, etc., over total assets, since here we consider all wealth percentiles, instead of only the highest group, as we did in the case of the WT.

To obtain the value of undeclared assets located abroad, we calculate the total amount to be included in the 2014 estates by multiplying the imputation made to each WT taxpayer with the corresponding mortality rate. Once the overall amount has been calculated, it is allocated among the wealthiest deceased proportional to their initial reported estate. Next, such imputation is distributed among the heirs according to their initial estate portion. This procedure is parallel to the two calculations of undeclared assets located abroad used in the WT. The results presented have been computed using an average of the two values.

With respect to the incorrect valuation of assets, we do not have detailed information to compute the corresponding adjustments. Therefore, we can only include the liabilities resulting from tax audits related to assessments in the tax gap calculations. While for the incorrect use of the closely held business tax deduction, we follow the same criteria used to calculate the WT gap.

As far as gifts are concerned, data limitations compel us to follow an alternative procedure to calculate the under-reporting tax gap using tax audit information to directly adjust the tax liabilities[24].

4.2.2 Results. Table III provides the main results of IGT tax gap calculations. The computed gap is 41.26 per cent of potential revenues. As in the case of the WT, the component that explains most of the tax gap is under-reporting (85.64 per cent). Figure 4 shows all tax gap sources[25]. Similar to WT results, the most relevant source is the existence of undeclared assets located abroad (in particular, it explains 37.35 per cent of the total), followed by the incorrect use of the closely held business tax deduction (29.11 per cent of the total, taking into account both inheritances and gifts).

Figure 5 shows tax gap calculations by net tax base brackets. A large proportion of the gap is concentrated in the last bracket. In the case of inheritances, this can be explained by the existence of large deductions and tax credits for closely related inheritors (descendants, spouses and parents), while the case of gifts can be explained by the existence of reduced rates for closely related recipients. Consequently, the adjustments made have little impact on the tax liability of taxpayers located in the first brackets.

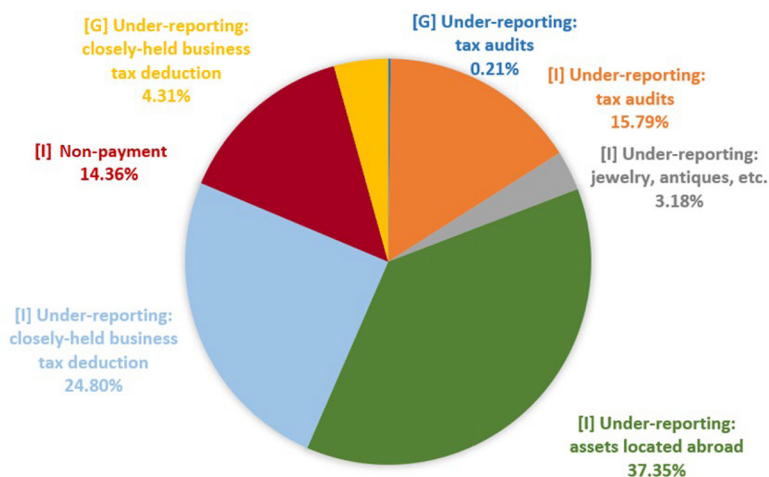
Figure 6 shows the tax gap calculations by kinship groups[26]. One can observe that, especially in the case of inheritances, the tax gap is higher for group II (which includes descendants older than 21, spouses and parents). Group II also accounts for most of the tax gap share, which is an expected result considering that this group represents almost 90 per cent of the tax returns and the tax bases declared in 2014[27].

5. Conclusions

The analysis of the tax gap allows us to highlight its usefulness as a management tool available to the tax administration, and as an indicator to improve accountability to its citizens. However, there are certain limitations that we also want to point out. For one, it is an estimate that depends on the methodology applied and the assumptions adopted, often conditioned by the availability of data. For another, its evolution over time, either upwards or downwards, not only depends on the efforts made by the tax administration, but also on external factors that may affect tax compliance.

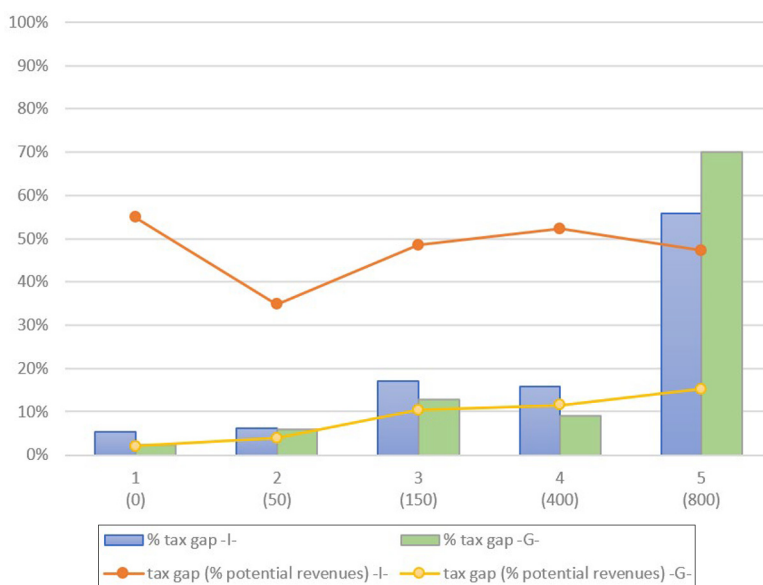
Table III.
IGT Tax gap. Main results

IGT tax gap	Under-reporting	Non-payment	Total
Value in 2014 euros	238,013,631	39,902,512	277,916,143
% potential revenues	35.34	5.92	41.26
% tax gap	85.64	14.36	100



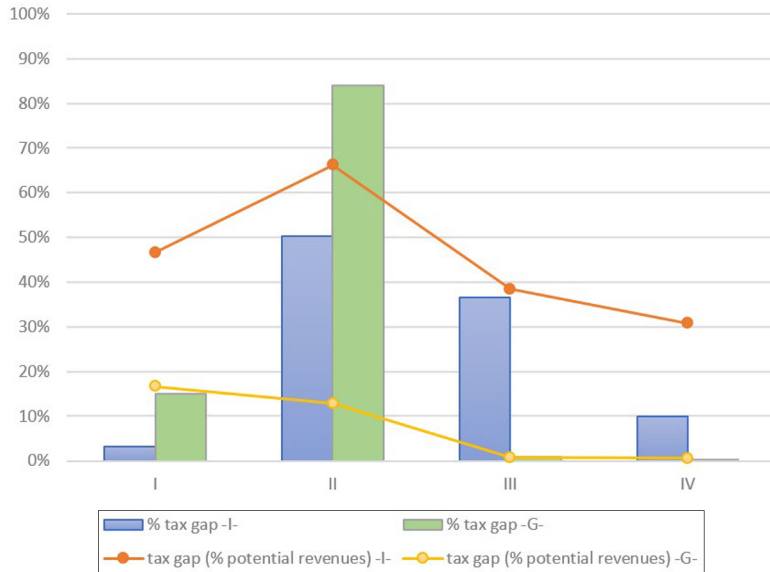
Note: Tax gap composition has been distinguished between Inheritances [I] and Gifts [G]

Figure 4. Tax gap sources in the Inheritance and Gift Tax



Notes: Tax gap calculations have been distinguished between Inheritances [I] and Gifts [G]. Brackets have been defined according to the net tax base initially reported by taxpayers. Numbers in parentheses indicate the lower bound of each bracket, in thousand euros

Figure 5. IGT tax gap by net tax base brackets



Notes: Tax gap calculations have been distinguished between inheritance [I] and Gifts [G]. Group I refers to descendants younger than 21. Group II refers to descendants older than 21, spouses and parents. Group III refers to siblings, uncles, cousins and more distant relatives up to 3rd degree of relatedness. Group IV refers to relatives with 4th degree of relatedness or higher, or taxpayers with no family relationship with the deceased/donor

Figure 6.
IGT tax gap by
kinship groups

Another contribution of this article is the proposed methodology for estimating the gross tax gap of *ad personam* taxes based on wealth, the WT and IGT. In Catalonia, the gaps estimated for these taxes are above 40 per cent, high values compared with the results obtained in other places and for taxes such as personal income tax, corporate tax or VAT. As long as the tax administration calculates the tax gap periodically, the estimates can then be revised in the future if more information becomes available, or if the estimation techniques are improved. In this sense, we believe it is important to highlight that the usefulness of estimating the tax gap increases if its estimation is carried out regularly to see how it evolves over time.

Pertaining to the results obtained, we emphasise that a very important part of the tax gap in WT and in IGT is due to the existence of undeclared financial assets located abroad. If we discount this component, the tax gap is reduced from 44.34 per cent to 26.38 per cent and from 41.26 per cent to 29.67 per cent for the WT and for the IGT, respectively. This result serves to highlight the crucial importance of collaboration between tax administrations of different countries.

Finally, the estimation of the tax gap in two *ad personam* taxes, wealth and inheritance, which are justified by their redistributive functions, confirms that the gap not only erodes public coffers, but also the redistributive capacity of the two taxes given the current regulation. Thus, the reduction of the tax gap would also contribute to improving the equity of our tax system.

Notes

1. See the interesting review by [Luttmer and Singhal \(2014\)](#) on tax morale as a determinant of voluntary tax compliance.
2. This is the first time the gap of these taxes are estimated and published.
3. The estimation of the tax gap usually takes place within a country, although there are also regional studies such as for the State of Georgia in the USA ([Alm and Borders, 2014](#)).
4. [Toder \(2007\)](#), or the IRS Website <https://www.irs.gov/newsroom/the-tax-gap>
5. [Gemmell and Hasselidne \(2014\)](#) point to a fourth factor: the behavioral responses caused by the tax burden. To the extent that taxpayers respond, either by reducing labor supply or savings, the potential revenue considered in this section is below its maximum. Undoubtedly, this is an interesting approach, but difficult to quantify. Moreover, it can be argued that the objective of the tax administration is potential revenue, having already discounted those effects derived from behavioral changes due to the tax burden.
6. E.g. Regarding VAT, this would mean taking the total amount of revenues that would be obtained under full compliance if all the final consumption of a territory were taxed at the general rate.
7. [Couzin \(2017\)](#) points out that even during the times of the Roman Empire there was some gap of the tax that fell on the Jews as punishment for their revolt in Judea, in 66 BC. Although it was a lump sum tax, which is generally considered to be easier to enforce, Couzin estimates a tax gap of around 40 per cent, but with considerable variations over time and across the territories of the Empire.
8. This methodology and the estimation were fully developed by the authors of this article, while the Catalan Tax Agency was fully collaborative granting access to anonymous microdata. Also, when necessary, they shared very basic characteristics of their enforcement policy to provide consistency with our estimation methodology.
9. The net tax base is the tax base minus the tax-free allowance.
10. This is done by means of programming with Stata.
11. The EFF provides only national data. Given the information available, the 90-100 percentile group is the most comparable to the WT Catalan taxpayers.
12. See [Appendix 1](#) for more detailed information.
13. The methodology proposed by [Roine and Waldenström \(2009\)](#) is based on using the net errors and omissions of the Balance of Payments. The authors argue that this item includes capital movements not accounted for in official statistics. The calculation of the non-reported equity located abroad consists of accumulating the yearly values of this Balance of Payments item, applying a certain return on the stock accumulated until then.
14. This assumption is consistent with the type of taxpayers that took part in the tax amnesty carried out by the Spanish government in 2012. [Alstadsæter et al. \(2018\)](#) also show that the wealthiest are those hold a large portion their wealth undeclared offshore.
15. See also [Appendix 1](#) for more detailed information.
16. Taking into account the information declared in the inheritance tax returns, certain assumptions need to be made in relation to the main-dwelling residence and closely held businesses.
17. There is also evidence of its use in the USA by the IRS ([Johnson, 1998](#)).
18. This assumption was considered reasonable by the ATC personnel.
19. The brackets of the net tax base are defined every 100,000 euros.

20. In our estimations, we only look at the first three net tax base brackets, given that the differences between both distributions in these brackets were more prominent than in the succeeding brackets.
21. To facilitate the reading of this Section, we will not show the interval results but only the main estimations. The results expressed in ranges are mentioned in the Introduction and, in [Appendix 2](#), we offer the range for the different sources of tax gap and the corresponding methodology.
22. [Mas-Montserrat \(2017\)](#) shows that closely-held business exemption represents almost 60 per cent of total assets for the richest 1 per cent of 2015 Catalan WT taxpayers. Logically, this affects the possible redistribution intended to be achieved with the tax.
23. This was also done by means of programming with Stata.
24. Specifically, we computed the average ratio of tax liabilities derived from tax audits over the initial tax liabilities. This proportion has been applied to the tax liabilities of non-audited taxpayers who meet certain requirements with respect to the magnitude of the tax base and the application of closely held business tax deduction. The application of this tax deduction complies with most of the audit reports. This is the reason why in the results ([Figure 4](#)) a distinction is made between this tax gap source and the rest of the tax audits which have not been used to make imputations for the other taxpayers.
25. In [Appendix 2](#), we also offer the range of the results for the different sources of tax gap and the corresponding methodology.
26. Group I refers to descendants younger than 21. Group II refers to descendants older than 21, spouses and parents. Group III refers to siblings, uncles, cousins and more distant relatives up to 3rd degree of relatedness. Group IV refers to relatives with 4th degree of relatedness or higher, or taxpayers with no family relationship with the deceased/donor.
27. http://economia.gencat.cat/web/.content/70_tributs/arxiu/2017/Memoria_IS_meritacio_2013-2014.pdf

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Under-reporting*Exemption of closely held business*

We know the share of reported closely held business exemption improperly applied. This value is imputed to taxpayers according to three different criteria: a) a constant share of the reported exemption (39.58 per cent based on audits); b) the share varies depending on the value of this exemption: 59 per cent if the reported exemptions are smaller than €7m, or 27 per cent if they are bigger (both percentages also come from audits); and c) an average from criteria a) and b). According to the first criterion, under-reporting of closely held business accounts for 36.31 per cent of the tax gap; 35.85 per cent with the second one; and 36.08 per cent with the third.

Assets located abroad

We have considered two different ways to calculate the value of non-reported assets located abroad:

- (1) apply the methodology used by [Roine and Waldenström \(2009\)](#), based on the net errors and omissions of the Balance of Payments. The resulting assessed value for Spain is €75,062m; and
- (2) use directly the assessed amount by [Zucman \(2013, 2014\)](#) for Spain: €144,000m.

As the difference is considerable, we also use the mean value based on prudential grounds and our main results are based on this criterion. Once we know these global values, we assign the share corresponding to residents in Catalonia according to the weight of reported wealth by Catalans over all Spanish wealth taxpayers in 2007, which is 25.86 per cent. We use 2007 data to also consider Madrid's taxpayers, who are exempt from the tax since its reintroduction in 2011.

To impute the aggregate wealth to individual taxpayers, we use information from the 2012 tax amnesty. In particular, we look at the share of assets located abroad and reported during the amnesty over the total wealth initially reported. This share, 34.32 per cent, is then assigned individually to top decile taxpayers (those most affected by the amnesty), until the sum of the imputed amounts matches the global value of wealth located abroad from Catalan taxpayers. It is important to note that those taxpayers that data suggests they could have participated in the amnesty are excluded from these imputations. In absolute terms, the tax gap would vary from €115.77m (first methodology) to 268.75 (second). Therefore, based on prudential grounds we use the average value, €192.26m.

Appendix 2

Tax gap as a
public
management
instrument

225

Wealth tax	Methodology	Range (%)
<i>Under-reporting</i>		
Unproductive assets	External information: Survey of Household Finances	4.63
Business exemption	Tax audit information: a) Constant share b) The share depends on the value of exemption c) Average a + b	35.85-36.31
Abroad-located assets	External information: a) Roine and Waldenström (2009) b) Zucman (2013, 2014) c) Average a + b	43.79-64.39
Non-reported loans	Tax audit information	0.17
<i>Non-filing</i>		
Missing taxpayers	Atkinson (1975) comparison of the WT taxpayers' distribution with a representative distribution created from Inheritance tax returns	0.97
<i>Non-payment</i>		
	Tax collection information	1.75
Inheritance and gift tax	Methodology	Range (%)
<i>Under-reporting</i>		
Inheritances		
Unproductive assets	External information: Survey of Household Finances	3.18
Assets' valuation	Tax audit information:	15.79
Abroad located assets	WT gap information and mortality rates	31.53-42.26
Business deduction	WT gap information	23.28-26.26
Gifts		
Assets' valuation	Tax audit information	0.21
Business deduction	Tax audit information:	4.31
Non-payment	Tax collection information	14.36

Table AI.
Summary: tax
gap sources,
methodologies
and range

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