Evasion and progressivity in the Spanish income tax (1970-2001)*

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Abstract

Tax evasion is a renowned enemy of tax administrations and compliant taxpayers along the world. Several attempts have been made at identifying its quantitative impact in different countries, related to studies about the black economy. However, analyses of its distribution and impact on the progressivity of taxation are rare.

This paper intends to fill part of this gap. I estimate under-assessment of incomes in the Personal Income Tax during the years following its introduction in Spain. A discrepancy analysis shows that around 45% of the tax base went unreported in 1982, and still 30% eight years later. Concealing of income differed substantially across sources and levels, and was affected by several factors: the existence of non-filers, legal under-valuation and under-reporting by taxpayers. Regarding the last two, an econometric exercise based on the relation of reported charitable donations with the composition of income in tax micro-data allows to estimate for 1982 an approximate 59-56% under-reporting of capital incomes and 54% for self-employment incomes; in 2001, these had gone up for movable capital (62%), but down to around 44% and 28% for fixed capital and business incomes respectively.

Fraud made the tax less progressive than it was on paper. The results suggest improvement over time, but levels still far from those attained in developed countries. The introduction of the personal income tax was deeply flawed because of lack of administrative capacity or political will to enforce compliance.

Keywords: tax evasion, progressivity, personal income tax.
JEL Codes: H23, H26

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1 Introduction

In 1978, Gunnar Myrdal made a tough critique of the Swedish income tax. He argued that high marginal tax rates created incentives to avoid and evade taxes, and hence equity –specially horizontal equity– was not at place. According to Björklund et al. (1995), this opinion influenced his country's societal views and drove towards reform in 1991.

A corollary to Myrdal's argument was that formal progressivity did not translate itself into redistribution from rich to poor. The Spanish economist Fuentes Quintana thought likewise in the 1980s. He had been a strong advocate of tax reform in the preceding decades, pushing for a central place of a progressive income tax in the system; however, after the reform of 1977-78 which introduced it in Spain he was very critical of the result, specially in relation to persistent evasion, and became a proponent of the flat tax.

One may or may not share this proposal as a solution for evasion. But the concern about fraud was and is crucial, since it carries negative consequences on the tax system and society in many dimensions. On the one hand, it reduces tax revenue, imposing heavier spending constraints on the government. It is also likely that the resulting horizontal inequity erodes the perceived legitimacy of the tax system. Finally, fraud can also affect vertical equity, if the ability to evade (and maybe the propensity) changes along the income scale. In this paper, I focus on the last issue.

What do we know about how tax evasion is actually distributed? Not very much. Economic theory has attempted to model the decision on whether or not to evade as a choice of the taxpayer in face of risk. In the classical "deterrence model" of Allingham and Sandmo (1972), the individual under-reports her income to a certain extent, in order to maximize expected utility minimizing the tax bill, taking into account the possibility of being caught and the heaviness of the sanction. Related literature has abounded on the relation between marginal tax rates, the income level and evasion. The conclusions are dependent on the specific assumptions about the nature of risk aversion, but tend to point towards higher incentives to evade at higher levels of income and maybe also in front of higher tax rates; since these tend to grow with income, which of the two forces prevails is an empirical question.[1]

These models were shown to predict much higher levels of non-compliance than found in reality. In response to that, further work paid attention to other possible determinants of the reporting behaviour, such as tax morale (Pommerehne and Frey, 1992; Andreoni et al., 1998; Luttmer and Singhal, 2014). The importance of withholding at source and third party information reporting has been recently underlined as a key factor by Kleven et al. (2011). What about the relation of those with income levels? We do not know much about how tax morale can differ across the

[1] In Allingham and Sandmo (1972)'s paper, the income level would increase evasion (i.e., the percentage of income non-reported) if relative risk aversion is decreasing with income. The impact of the tax rate was found to be ambiguous in the case of decreasing absolute risk aversion (DARA, the most accepted possibility). Yitzhaki (1974) contemplated the case where the sanction depends of the evaded tax – as opposed to the under-reported income in Allingham and Sandmo (1972)'s model–; this is in fact more common in national legislations (e.g. the US and Spain). His specification does not change the expected effect of income, while it does alter the impact of the tax rate, that would now *decrease* evasion, in presence of DARA. (Allingham and Sandmo's results also stated that with DARA the absolute level of reported income will only increase when the sanction is a factor at least equal to 1).

income schedule, but, by contrast, it is well known that some kinds of revenue are subject to much stricter control than others, and having distinct distributions: of course, we are speaking of income from labour versus income from capital.

The empirical literature has provided us with several analyses pointing towards a possible positive impact of income on under-reporting, but with considerable uncertainty because of econometric issues. The seminal work of Clotfelter (1983) for the US and those of Valdés (1982) and Raymond-Barà (1987) for Spain found high-income taxpayers to under-report more, but the effect of income was difficult to disentangle from the effect of marginal tax rates because of the intense correlation between both.[2] Indeed, Feinstein (1991) contradicted Clotfelter in not finding a significant effect of income on the reporting behaviour.[3]

Work addressed to study directly the distribution of fraud has also suggested a rate of under-reporting increasing with income. For the US, the data have been available thanks to the Tax Compliance Measurement Program (later on, the National Research Program), providing samples of randomly audited tax returns. Using them, Johns and Slemrod (2010) found evasion to reach maximums in the top percentiles. This was partially a result of the composition of incomes, but not exclusively.[4] Similar conclusions were obtained by Feldman and Slemrod (2007), who estimated under-reporting with un-audited data:[5] it was increasing with income levels for self-employment non-farm income and for capital income. To my knowledge, an analysis of the distribution of evasion across the income scale has not yet been undertaken in Spain, although we have some intuitions from studies that will be reviewed in the following section.

My preliminary hypothesis is that tax evasion (in terms of rates of income under-reporting) is higher at the top of the income scale, and that, therefore, the tax is less progressive de facto than it would be de jure. This would stem from the easier avoidance and non-reporting of capital incomes, while wages and salaries are most likely withheld at source. If the theoretical models are right, the higher incentive to evade at higher income levels or tax rates would push in the same direction.

The paper also proposes a methodological innovation, slightly modifying Feldman and Slemrod (2007)'s model to estimate evasion across filers by income source. Because the estimation is based on the relationship between reported incomes and deducted donations, the regression is performed using a restricted sample (those who itemized donations in a given year). It is therefore argued that the results of a baseline estimation may be biased, and that a two-step procedure à la Heckman (1979) might provide better results. This would be the first time such an approach is taken in the tax evasion literature.

The rest of the paper is organized as follows. In section 2 I review previous work about tax

[2] In spite of which, Raymond-Barà blamed the tax rates and thus made strong policy recommendations.

[3] This kind of empirical analyses have also found influence of other factors, such as age, education level, marital status... The discussion of those is out of the scope of this paper.

[4] Bishop et al. (2000) used the same kind of data for the 1980s, estimating the changes in the indices of inequality caused by including evaded income. They found that vertical equity was affected, but especially horizontal equity.

[5] Their methodology will be reviewed and closely replicated in section 4.2 of this paper.

evasion in Spain, while some aggregate data about compliance and inspection is presented in section 3. I next turn to explaining the methodology applied to estimate tax evasion in the personal income tax between 1971 and 2001 (section 4) and show the results obtained and the impact of evasion on progressivity (section 5). Finally, some general conclusions are presented in section 6.

2 Previous estimates of income tax evasion

Tax evasion is closely associated with the underground economy, although both concepts should not be confused (see Schneider and Enste, 2000). Spain usually scores high among European countries in studies about hidden activity: Schneider (2009)'s estimates ranging from 16% to 23% of GDP would make the country rank third in his sample in 2009, only after Greece and Italy. Studies with a national focus are reviewed in Pickhardt and Sardà (2011), who reveal a general agreement in the increasing magnitude of the shadow economy during the eighties, with a peak around 1993-95, and its inability to fall below the 15% of GDP level thereafter.

Tax fraud is directly related to this phenomenon, as one of its *raisons d'être* (along with overlooking sectoral regulations or pursuing illegal activities). Some attempts have been made to estimate evasion in several taxes, such as the Corporation tax (Truyols, 1993; Almunia and Lopez-Rodriguez, 2012) or the Value added tax (Díaz and Romero, 1994; Gómez de Enterría et al., 1998), which are also central in the current system.

In this paper, however, the focus is on personal income taxation (PIT, in the following). Evasion in this tax and its precedents has been known to be widespread throughout its entire history. Gota Losada (1970) underlined this issue in a classic study about the first such tax (the *Contribución General sobre la Renta* introduced in 1932), with data on the fraud discovered by the tax inspection between the forties and the sixties. The problem was addressed in further reports by the Spanish Institute for Fiscal Studies (Instituto de Estudios Fiscales, 1973), but has remained one of the main unresolved issues in the system resulting from the transition's tax reform, as was pointed by several scholars (Fuentes Quintana, 1990; Comín Comín, 1994).

There are some estimations of its magnitude available. Albi (1975) studied the year 1971 (which corresponds to the tax denominated *Impuesto General sobre la Renta de las Personas Físicas*, introduced in 1964). He calculated that total under-reporting of income tax bases amounted to 916,300 million pesetas (this includes the effect of defective valuation methods by the tax administration, but is an under-assessment in the sense that it does not consider capital gains). That amount corresponds to 78% of the tax base declared that year, and 33% of Spain's GDP. [6]

The so-called personal income tax in Spain was, until 1978, a super-tax: it only affected those whose income exceeded the thresholds dealt with by factor taxes (*"impuestos de producto"*, which targeted different kinds of revenue separately). Albi's calculation uses the whole group as a reference, by adding up their tax bases, so it is not comparable to the specific collection of the income tax per se: this was a negligible part of the total, as we shall see. The most important of those factor taxes during the seventies was the Labour tax (*Impuesto sobre los rendimientos del trabajo per-*

[6] All calculations involving GDP levels are made with data from Prados de la Escosura (2003).

sonal), which can be fairly considered the main real precedent to the current PIT. Fraud in this labour tax was estimated by Santos Peñas (1975) to be around 56.7% for the years 1964-72 (also in terms of base under-reporting).[7]

In the process of introduction of the modern personal income tax, Alcaide (1980; 1981) performed some analysis on compliance. With his data we can estimate that around 20% of the obliged households filed a return in 1977, going up to around 59% two years later. In both cases, however, ratios were decreasing with the income level, which points towards significant under-reporting: he found that declared incomes were around 21% of real estimated household revenues in 1977, and 61% in 1979.[8]

Later on, under the modern *Impuesto sobre la Renta de las Personas Físicas*, concern for this issue has not diminished. Fuentes Quintana (1990) shows how 27.5% of a random sample of returns from 1979 were found fraudulent by inspectors, with the percentage of tax evaders increasing with the income level, which supports the initial hypothesis in this paper. During the 1980s, a Commission was appointed by the government to estimate evasion in several taxes, with special attention to PIT. This study group yielded results for the years 1979-86, after which its existence was put to an end. Their estimations are shown in table 1: levels of compliance generally beneath 70% in all concepts, but increasing over the period. The filing obligation was fulfilled by 52 to 64% of those legally obliged, and 43 to 55% of the total taxable income in the country was reported.[9]

Unsurprisingly, concealing of revenue was significantly more intense in non-labour yields. Díaz and Melis (1993) analysed entrepreneurial incomes with data from 1989 and found that evasion could be very roughly estimated to be around half the real tax base.[10]

The last three columns in table 1 reveal another aspect of differential tax evasion. The mean of wage income among the total obliged population was lower than that of the filers, while the

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[7]This general estimate conceals acute differences among categories of workers: evasion from civil servants was calculated as 5.6%, in industry workers 28.5%, in service workers 43.1% and finally professionals were found to evade the most, at a rate of 71.0%.

[8]For the income category of more than 6 million ptas, the ratio returns/households was under 8% and 19% in 1977 and 1979 respectively. It is important to understand that this does not necessarily mean that the wealthiest families did not file a return, but that they probably did not report a significant share of their true income. It should also be noted that such a big improvement in compliance in just two years seems unlikely: the estimations are surely not very precise, since they rely on faulty data on household incomes and their distribution. Many low-income households may have paid their share in the factor taxes and simply not filed a return for PIT, which might not have increased their tax due anyway. The fundamental changes in the system of personal taxation make comparison difficult across regimes.

[9]Because of their distinct systems of tax administration, the Commission could not include Navarra and the Basque country in their study. Unfortunately, this data problem is quite common in the area. We do however have an estimation for the Basque provinces in 1983-89 using the same methodology: Sasigain (1993) found a slightly inferior level of evasion (40 to 36% in the period) and the same strong contrast between concealing in wage incomes (30 to 16%) and that of revenues from capital or self-employment (69-67% with no clear trend).

[10]If the taxpayers with this kind of revenue were imputed the average wage reported in tax, and their relatives working with them were imputed the minimum wage, business incomes would be estimated at more than double than the reported magnitudes. The authors state: *"This approximation to personal businesses' under-reporting in PIT, whatever crude, yields an index of concealment equal to the average index of concealment obtained by the Tax Inspection in the sample investigation that served as a base for the establishment of assessments for the reform of presumptive taxation"* (p. 189).

Table 1: Compliance in the Spanish income tax according to the Comisión para el Estudio del Fraude en el IRPF

	Filing	Tax base reporting			Reported mean / Real (estimated) mean		
		General	Labour	Other yields	Total yields	Labour	Other yields
1979	52%	43%	54%	22%	82%	103%	43%
1980	57%	48%	62%	24%	84%	109%	43%
1981	56%	49%	63%	25%	87%	113%	44%
1982	56%	50%	65%	25%	88%	115%	45%
1983	59%	51%	67%	23%	86%	112%	39%
1984	59%	51%	67%	25%	86%	114%	42%
1985	61%	52%	69%	26%	85%	113%	43%
1986	64%	55%	71%	30%	86%	111%	47%

Source: Comisión para el Estudio del Fraude en el IRPF (1988).

Note: only regions under the common fiscal rule (i.e., excluding the Basque Country – only Álava in 1979-80 – and Navarra).

contrary was true for other yields (self-employment and capital income). While this calculation may confound the effects of non-filing and under-reporting, according to the authors it suggests that salaried non-filers would generally be those with lower incomes, and on the contrary, in the case of other revenue sources, the more affluent were the ones failing to fulfil their tax obligations.

Has this situation improved in more recent years? Díaz and Fernández (1993) estimated 6.2% of under-reporting in wages in 1990, down from 11.6% in 1987. Their figures are shockingly different from those obtained by the Commission, because they are based on a different source and method: these authors use withholding data from firms (*Estadística Anual de Retenedores*), which allows disentangling salaries from pensions, and limiting the scope to wages of those actually obligated to file a return. Díaz and Fernández attribute the difference in the results precisely to the incidence of the income threshold, which they seem to think that the Commission did not correctly estimate. Other possible sources of discrepancy are the 85% coverage in their source, or the fact that this estimation corresponds solely to under-reporting among filers (while the Commission data subsumes the effect of non-filing).

In terms of total tax base, Esteller (2011) also obtained a more positive result for the period 1993-2000, since he estimated mean compliance as 80% (with considerable variability across provinces). Using the micro-data of the year 2008, Domínguez et al. (2013) have recently calculated under-reporting of non-wage incomes at 40-55%, which is also a favourable evolution from 70% in 1986. In their method (largely replicated in section 4.2 of this paper), they assume salary incomes to be completely reported, since having a reliable reference category is a requisite of the estimatio method. If this reference income is limited to pensions, wages are found to have a compliance ratio around 81%.

To sum up, previous studies point to a decrease in tax evasion, but at the same time to persistent differences in the subjection to tax of incomes depending on their source. The issue deserves further attention, since it violates basic principles of fiscal equity as well as tax capacity.

3 The struggle for compliance in Spain

One of the main principles of modern taxation is universality (Neumark, 1974): all citizens should contribute and be subject to the same rules. This is true specially of personal income taxes. They normally include an income threshold under which economic capacity is considered to be too low to impose any direct taxes on, but those excluded for this reason should become less and less along the process of economic development.

The path towards such universality in Spain was slow and painful. Personal income taxation was not general until quite recently because of two reasons: the very high threshold established initially,[11] and persistent lack of compliance. Table 2 displays some indicators of this evolution. It shows the number of returns and of those with positive tax due, and puts them in relation to the number of inhabitants and households in the country.[12] Columns (8) and (9) are more illustrative of generality than (5) and (6), because these taxes were during almost the whole period conceived as family taxation, and implied until 1989 joint compulsory filing for married couples.

Table 2: Generality of personal income taxation in Spain

Period	Returns (1)	Positive tax due (2)	Pos/ returns (3=1/2)	Adults (4)	Ret/ adults (5=1/4)	Pos/ adults (6=2/4)	House-holds (7)	Ret/ (Hh.) (8=1/7)	Pos/ (Hh.) (9=2/7)
1933-54	19	6.7	54.6%	16,794	0.1%	0.0%	6,124	0.3%	0.1%
1955-67	211	64.5	31.4%	19,383	0.7%	0.2%	7,779	2.7%	0.8%
1968-79	956	76.6	6.9%	22,129	1.4%	0.1%	9,508	9.6%	0.8%
1980-90	7,641	6,019.7	75.3%	24,530	31.9%	17.7%	11,140	68.2%	53.2%
1991-00	13,776	11,285.8	81.4%	27,981	49.2%	40.2%	12,310	111.8%	91.4%

All data are expressed in thousands and averaged over the periods given by the first column.

Note: since 1983, the number of returns corresponds only to the regions under the common fiscal rule (i.e., excluding the Basque Country and Navarre).

Source: author's calculations with data about number of returns from Gota Losada (1970); Valdés (1982); Ministerio de Hacienda (1980), IEF-BADESPE and PIT microdata. For households, INE (series históricas) and Household Budget Surveys, interpolated. For adults, Alvaredo and Saez (2009), tables in Appendix (population over 20, excluding regions with special regimes).

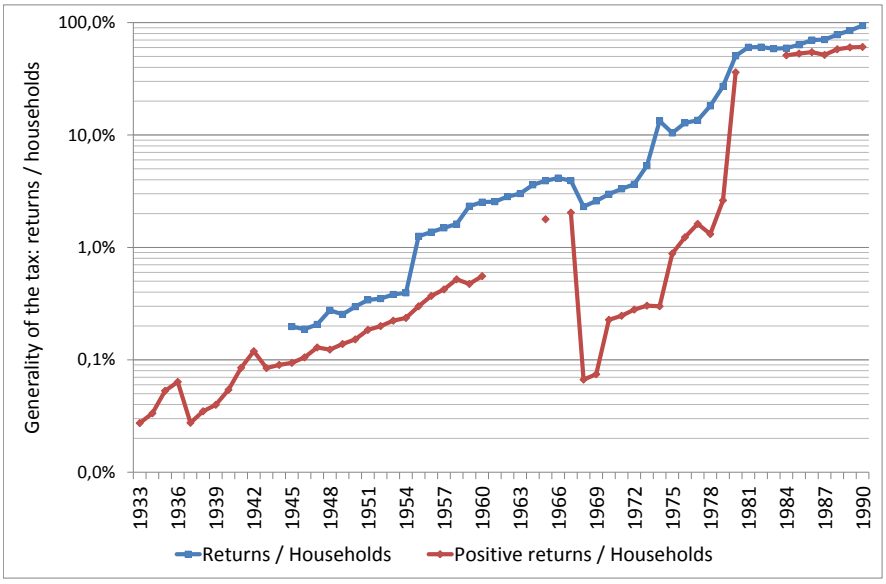
In figure 1 I plot the series of tax filers and taxpayers over the total number of households, for the period 1933-1990 (again, the number of tax filers is that of tax returns, while 'taxpayers' refers only to those who had positive tax due as a result of filing). The figure shows that filing gradually

[11] Under this threshold, individuals were subjected to factor taxation, which lacked progressivity for the most, as is consistent with the conservatism of the political regime.

[12] Under the old tax regime, returns with no positive tax due correspond to individuals who did not pay any personal income tax in addition to factor taxation (although they were required to file); column (2) therefore represents more closely the concept of 'taxpayer' than column (1). For the modern tax (after 1979), it is important not to mistake "positive tax due" with "positive differential tax due": column (2) still represents the number of effective taxpayers, not only those who had to pay an additional quantity during the filing season, normally as a result of insufficient withholding at source during the year.

became more and more widespread until the late 1980s, when the process was quite complete. There were several turning points which correspond to major reforms in the tax: 1954, 1967 and 1978. The line of effective taxpayers (in red) runs parallel to that of filers in the first decades, but then drops very significantly in 1967. During the period of the IGRPF, indeed (that is, until 1978), this tax was filed by increasingly many, but only under 10% of those who filed actually paid some tax: all others had already fulfilled their obligations with the factor taxes. This meant, among other things, that revenue collection through this tax was insignificant, and its progressive rates did not generally apply. The reform in personal taxation during the sixties therefore does not point towards a redistributive aim, as it was presented at the time – it might actually have had just the opposite effect.

Figure 1: Generality in Spanish personal income taxation



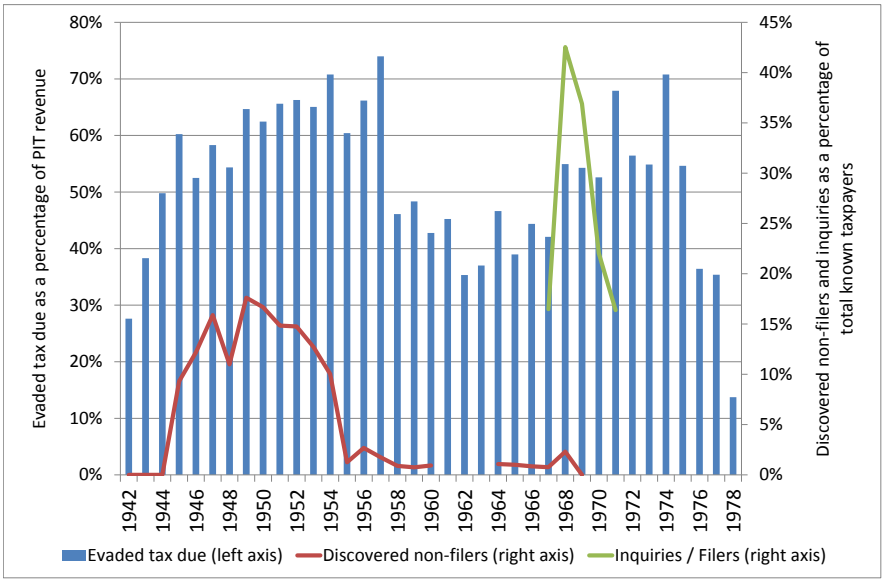
Sources: same as table 2. The blue line (Returns/Households) represents the extension of filing, while the red one (Positive returns/Household), that of effective payment of the personal income tax.

The situation was changed under the modern PIT: in the last decade shown in table 2, 80-90% of tax filers had positive tax due, which was translated to 50-60% of households (since 55-85% filed a tax return). During the nineties, the tax had attained generality, with returns outnumbering households (separate taxation of married couples was introduced as an option in 1989-91). In the first decade of its existence, nonetheless, there was a considerable remaining distance to 100%. As we shall see, it does not only correspond to the legal limits of the filing obligation, but also to failure to comply with the system.

The results of the tax inspection activity can shed further light on the issue. It should be kept in mind, however, that these data show in all cases a lower bound, and their trends do not necessarily coincide with those of actual evasion (since resources and efficiency in tax inspection also play a role in the outcome). In figure 2 I depict the relative importance of uncovered tax fraud in the precedents of PIT. Evaded tax due is shown as a percentage of total tax liquidated in the

corresponding year (this does not mean that all tax uncovered was eventually paid): it stands near 50% of revenue, showing that it should have been indeed a big concern. The relative decrease in the sixties is associated, according to Gota Losada (1970), with the use of presumptive assessment in several of the components of income, which means that they were no longer subject to the tax inspectors. It is therefore not a clear indicator of improvement.

Figure 2: Results of inspection in the personal income tax



Sources: Gota Losada (1970); Hacienda Pública Española (1974); Ministerio de Hacienda (1980), Castillo (1994) and Torregrosa (nd). 'Evaded tax due' is that discovered by auditors, and shown as percentage of each years' liquidated collection. 'Discovered non-filers' are individuals not presenting a tax return and being caught by inspection; they are displayed as a percentage of the number of filers after including them. 'Inquiries' represents more widely investigation processes (*"actas"*).

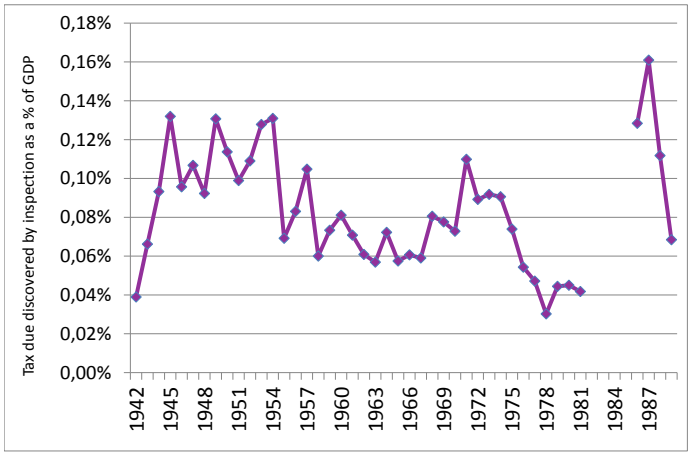
The same evolution is mirrored in the series of discovered non-filers (as a percentage of filers plus discovered non-filers): in the forties, near 15% of the total number of filers eventually known by the tax administration had failed to make their tax return. The norm was widely overlooked. After 1955, however, this number drops down to under 3%.[13] Was tax fraud overcome? The number of investigations undertaken yearly by the tax administration says the contrary, since they represented around 25-30% of the number of filers at the end of the 1960s. We would be witnessing a change in the nature of the prevailing evasion, from not filing a return at all to making an incomplete income statement.

This data series is unfortunately not complete, but the ratio significantly decreases after 1978 (not shown in the graph), when the denominator experienced very significant growth due to the introduction of the modern tax. It should not be concluded, however, that this points to a

[13]This could be related to the re-introduction of the use of *"signos externos"*, objective criteria for subjection to the tax, like dwellings or vehicles owned, or number of servants. This instrument had been relegated following the Civil War.

vanishing of the problem. If we look at the importance of the discovered part of the evaded tax in terms of GDP, a different picture emerges (figure 3): the relative magnitude is around 0.10% of GDP, with no clear difference between the period of the old income taxes (pre-1978) and that of modern PIT. Non-compliance might have become less widespread in terms of discovered non-filers or relative number of inquiries, but it remained in similar economic levels since the tax base was now much wider. The fact that the discovered tax bill did not significantly increase after the huge increase in the tax base that took place since 1978 calls into question the ability of the inspection body to adapt to the new tax, which undoubtedly required higher control resources if it were to be effective.

Figure 3: Tax due discovered by inspection, as percentage of GDP



Sources: Same as in fig. 2, with GDP from Prados de la Escosura (2003).

The lack of capacity in the tax administration would therefore be one of the explanatory factors for the historically high levels of fraud in Spanish personal income taxation, together with other possible aspects such as tax morale or the economic structure. Indeed, evasion was for a long time a profitable strategy for taxpayers, given the probabilities of being investigated and the sanction structure. Lagares (1974) made some calculations on expected income and fines, based on the Allingham and Sandmo (1972) model, and obtained that the rational choice for a risk-neutral individual would be not to declare her income. This was the combined effect of low and un-progressive sanctions (generally 25 to 100% of evaded tax due), meagre probabilities of detection (the author follows an optimistic assumption of 65% in five years, after which prescription would be in place), in combination with quite high interest rates in the economy (he uses 10%).[14] Confronted by a very inefficient tax administration, Spanish taxpayers could actually find it profitable to finance themselves at the public expense, even if they were caught (asking for a loan would be more expensive than delaying the payment of tax and including the corresponding expected fine). Still in 1986, according to Castillo (1994), this was the optimal strategy for a "rational" citizen.

[14]The use of a model of risk neutrality (that is, direct maximization of expected income) leads to corner solutions. If we considered a more complex model with risk aversion, the optimal strategy would be less extreme.

This observation is at odds with the reality, where some tax was paid (the "evasion puzzle" in the literature). In fact, many taxpayers were constrained to comply due to withholding at source of their (labour) income, while others had the option not to do it (notably in the case of self-employment and capital incomes). The lack of knowledge of the tax administration about the real incomes of citizens and firms was so notorious that collective assessment was established as an alternative to the direct estimation of tax bases (derived from individual accountancy) as late as 1957-64 in several taxes. This figure still partially survives in the form of presumptive taxation schemes for self-employment activities (*Estimación Objetiva*).

Already in 1940, a Registry of Income and Wealth of individuals was created by the dictatorial government (*Registro de Rentas y Patrimonios*), to which banks, stock exchange agents and other establishments were supposed to inform about their clients' assets. But this does not mean that third-party information reporting was a reality. In fact, it took several decades to painfully introduce it as an automatic part of economic life. Banking secrecy was abolished by law in 1977, at the same time as tax crime was introduced;[15] however, the first was appealed to the supreme Constitutional Court, paralysing its application for years, while the second also had very limited practical results up to at least 1990 (Castillo, 1994).

Some improvements came about during the eighties. The introduction of VAT in 1986 was expected to foster compliance, given the incentives of the different parties involved to report economic activity in order to request refunds (according to the results in Comisión para el Estudio del Fraude en el IRPF (1988), this was indeed at least partly effective). At the same time, in 1985 a new law intended to make effective the withholding and reporting of financial assets in PIT. The legislators acknowledged the disproportionate weight of labour income in the aggregate tax base, which was a result of unequal compliance. The immediate effects of this reform, however, were not outstanding. The financial sector found ways to avoid fiscal transparency, with the creation of several opaque instruments that had considerable success during the second half of the decade (notably, the *"primas únicas"* and *"cesiones de crédito"*).[16] It is remarkable that the State issued one also opaque public debt asset, the *Pagarés del Tesoro*, which it swapped in 1991 for another kind of anonymous debt (*Deuda Pública Especial*) granting complete impunity.[17] In this way, the government granted amnesty to black money, in exchange of getting financed under market price.

At the same time, a reinforcement of the tax administration was taking place, with the proliferation of new offices around the territory, a reform of the structure of tax inspection in 1986 (Pan-Montojo, 2007; Castillo, 1994), and a general process of computerization. Finally, it was given higher autonomy in 1991 with the creation of the AEAT (*Agencia Estatal de la Administración Tributaria*), which was expected to bring higher efficiency with a more flexible operation than that of the public sector in general.[18] In spite of that, Onrubia (2007; 2012) shows how insufficiencies

[15] Law of Urgent Tax Reform Measures, which also created the Wealth tax and paved the way for the modern PIT.

[16] Descriptions and some data on these assets can be found in Esteve (1990) and Castillo (1994).

[17] The identity of the holders would only be known to the government at the time of expiration, in 1997, when the tax crime could no longer be prosecuted. On these events, see López-Laborda and Sauco (2003).

[18] Notably, the ability of granting higher salaries to inspectors, to fight the draining of qualified personnel towards the

in terms of personnel and organisation prevailed during the last decades of the 20th Century and are significant even today, compared with the situation in other Western European countries.

There was no withholding at all in rental incomes until very recently. A law in 1998 established the obligation of tenants to withhold part of their payments, as a response to widespread non-reporting of these incomes. But the mechanism is not general, since the obligation only concerns legal entities and not natural persons (due to the associated compliance costs to the withholder). Rents of housing between individuals are therefore still lacking automatic control. Indeed, shifting of income from financial to fixed assets in the aftermath of the reforms of the middle 1980s was suggested by Castillo (1994) as one of the elements contributing to the first housing bubble of 1986-89.

4 An estimation of the incidence of tax evasion

I estimate under-reporting of income tax bases in the country for selected years between 1971 and 2001, following two different methodologies. While both of them have their shortcomings, a joint examination of the results might reinforce their plausibility. After presenting my results, in the following section I compare them with those of previous work on earlier and later years. I also attempt to go one step further and approximate the impact of fraud on the progressivity of the tax.

Under-assessment of incomes for tax purposes arises in at least three distinct ways, and the three will be considered in this paper. The first one is the existence of non-filers (called 'ghosts' in related literature; see e.g. Erard and Ho, 2001): individuals who were legally obliged to pay taxes and file the corresponding tax return, but failed to do so. As we have seen in section 3, this was a problem of considerable magnitude in Spain during most of the 20th Century.

The other ways for income to escape taxation are legal under-valuation and under-reporting by taxpayers. Both are jointly studied here, since they are difficult to disentangle from the available data. Only under-reporting would be considered fraud from a legal point of view, while the first is not punishable behaviour. It does, however, limit the capacity of the income tax to be what it was supposed to be: a general contribution falling on all kinds of income equally. This issue arises notably for imputed incomes of owner-occupied housing (included in the tax base as a percentage of the cadastral value of the dwellings) and for self-employment activities under certain threshold, which have the option to be assessed 'objectively' (presumptive taxation under standard assessment). Both procedures are known to have greatly under-assessed market values.[19] The under-valuation of certain revenues affects equity among taxpayers because they all

private sector which was an acute phenomenon in the 1980s.

[19]Regarding dwellings, the percentage was first set at 3% and downgraded to 2% in 1988; currently 1.1% is applied if the cadastral value was assessed after 1994. Naredo (1993) found that undervaluation with respect to market values increased during the eighties (in a context of growing housing prices), and applied correction factors ranging from 2.48 in 1982 to 3.42 for urban properties and 6.7-8.4 for rural ones. Durán-Cabré and Esteller-Moré (2010) calculated that cadastral values were at 20-30% of market values in the period 1987-2001. See García-Vaquero and Martínez (2005) for an overview on the fiscal treatment of housing.

have different weights in each citizen's total income.

4.1 The discrepancy approach

International literature offers some examples of measurement of income under-reporting based on the comparison between tax returns and household surveys or national accounting. This approach has been widely applied in Italy, where tax evasion issues are also acute (Bernardi and Bernasconi, 1997; Fiorio and D'Amuri, 2005; Marino and Zizza, 2012). The intuition behind it is that the incentive to conceal income in a tax return is not present at an anonymous interview, so the answers to the latter would be more honest (which does not preclude possible errors). In this sense, the difference between both sources would indicate lack of generality in taxation of income. It is important to keep in mind, as has been said, that this difference is not only illegal fraud, but also avoidance and other escapes from taxation in a broad sense – including incomprehensive legal definitions of the tax base, which can be difficult or impossible to discern.

The data used comes from two sources. One is the PIT returns micro-data provided by the Spanish Institute for Fiscal Studies (IEF), which offers a 2% randomised sample of all taxpayers in each year since 1982.[20] The other arises from the Household Budget Surveys (HBSs in the following) undertaken by the Spanish Statistical Institute (INE). The comparison of both databases poses several challenges. Firstly, income data in HBSs are known to be also widely under-assessed; therefore, a previous adjustment to the magnitudes in the National Accounts is required (see Torregrosa, 2014).[21] On the other hand, incomes in the HBSs are always given in net terms, so gross revenues can only be obtained after imputation of the tax paid; something which was also tackled in previous work (Torregrosa, nd).

The population in both databases is not completely coincident. My unit of analysis is the taxpayer (individual or couple), obligated both to pay tax and to file a return. I have thus modified in this sense the structure of the data in the HBSs, where the focus is on the household, and excluded both individuals who filed only to obtain refunds of excessive withholding (and paid no net tax) and those with incomes under the threshold that legally required filing (who have very small participation in total tax paid).[22] These were found to be the best criteria to align both sources of information.

The categories of income to be analysed need to be identifiable in both databases. This restricts the analysis to four boxes: labour income, capital income, self-employment income and the

[20] The design has changed in the later years, being more complex and accurate since 1999.

[21] A scaling-up procedure was implemented, using different factors by income source. This prior adjustment will affect the levels of the ratios obtained (which would be higher relative to the raw HBS data), but their variation across income levels only indirectly, by affecting the relative ranking of households. It should be taken into account, however, that were non-reporting is an issue in the HBS, factorization is not a completely correct adjusment methodology (imputation should go along). Since this was the only strategy applied here, the compliance ratios will be downward biased in the presence of significant non-reporting in the HBSs. This could be the case for capital incomes.

[22] The limit of this obligation was 300,000 ptas in 1982 and 900,000 ptas in 1990. It is noteworthy that these thresholds do not coincide with the non-taxable minimum, which did not exist as such until 1988, and was 648,000 ptas in 1990.

total sum.[23] The fiscal database would allow us to further distinguish among self-employment regarding the type of tax base estimation procedure (namely accountancy-based or presumptive), but this is not possible in the HBSs; as well as the separation of movable and fixed capital incomes before 1990. Several non-monetary items are contemplated in the taxable base: imputed income from owner-occupied housing (capital income), in-kind compensation (labour income) and self-supply (self-employment income).

The aggregate composition of incomes of taxpayers in both sources serves as an indication of total evasion (including avoidance and faulty tax base definitions). Figure 4 reflects the compliance ratio obtained dividing the reported magnitudes by the real estimated flows of household incomes of each kind. It can be seen that labour incomes were the most correctly reported, already in 1971, but specially since the eighties.[24] On the other hand, capital incomes show the most deceiving behaviour, while self-employment starts as the kind evading the most but experiences a very significant improvement. The total tax base goes from a low 11% in 1971 (recall this is the old tax and therefore does not necessarily mean escaping also the factor taxes) to 57-70% in the later years. The increase between 1982 and 1990 is significant, but lack of compliance was still calling for concern in the last decade of the 20th Century.

We can only distinguish different kinds of capital incomes for the last year analysed here. Movable capital presents higher levels of compliance than fixed capital, a counterintuitive result given the nature of assets. A part of the explanation derives from the legal under-valuation of imputed rents. In that sense, we can infer that the decrease of compliance in capital incomes during the eighties could be partly due to a composition effect (an increase in the weight of fixed capital incomes, in the context of rising housing prices after liberalization in 1985).

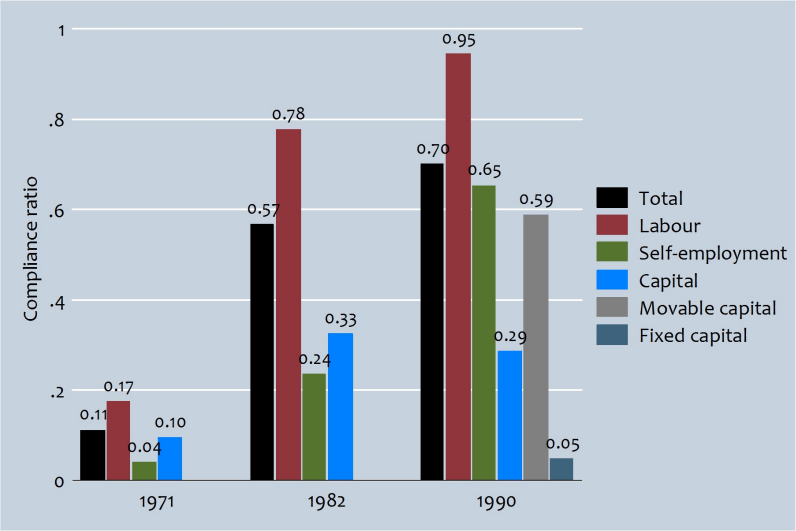
These ratios subsume the impact of non-filers and of under-reporting by filers. In the rest of the paper, I will try to approach only the latter. To do so, I re-weight the sample from the HBSs to reflect the population of effective tax filers, by main source of income, marital status, labour market status (active versus pensioner) and region.[25] This procedure, of course, is only an

[23] Labour income includes pensions in 1990, but they are not available in the HBSs in previous years. Therefore, using only the HBS our labour and total ratios would be over-estimated for 1982 (compliance estimated at 93% and 63% respectively). That is why I take the total of pensions (not all public benefits) from an additional data source, Ministerio de Trabajo (1991), subtracting from it the part corresponding to households under the income threshold (approximated at 22% from the results in Bandrés, 1993). An alternative upper bound assuming total compliance in pensions (i.e., using only the data on reported amounts from the tax returns) gives 91% for labour and 62% for the total tax base.

[24] The 17% compliance estimated in 1971 might indicate that most wages accrued to taxpayers who failed to make a return, but this does not imply that they weren't paying the corresponding labour tax, which was supposedly withheld at source. Recall that the declared tax base data here is only for the "general" tax, not a comprehensive one for all the range of factor taxes.

[25] I use as regional units the autonomous communities, of which there are 17 in Spain and 14 in the sample, after excluding the Basque Country, Navarre and the Canary Islands (the autonomous north-African cities Ceuta and Melilla are also not included). The Basque country and Navarre are not present in the Finance Ministry tax return data because of their special tax administration system. The Canary Islands, Ceuta and Melilla were excluded from previous work of tax imputation on the HBSs because of their specific indirect taxation regime (see Torregrosa, nd), so there are no pre-tax survey data available.

Figure 4: Compliance ratios by income source (obliged taxpayers)



Sources: author's calculations with aggregated tax data of 1971 from Dirección General de Tributos (1980), p. 34; tax return micro-data 1982 and 1990 from IEF; household budget surveys from INE, adjusted in Torregrosa (2014; nd) using aggregate magnitudes from INE (1979; 1993).

Calculations for 1971 are undertaken under the assumption that the share of income of each kind accruing to the households over the threshold is the same as in the HBS of 1973-74.

Labour and total ratios for 1982 are approximated adding subjected pensions to the denominator (data from Ministerio de Trabajo, 1991) and using their distribution by deciles given in Bandrés (1993).

approximation, which may be biased if inside each category the differences in income between filers and non-filers are significant.[26]

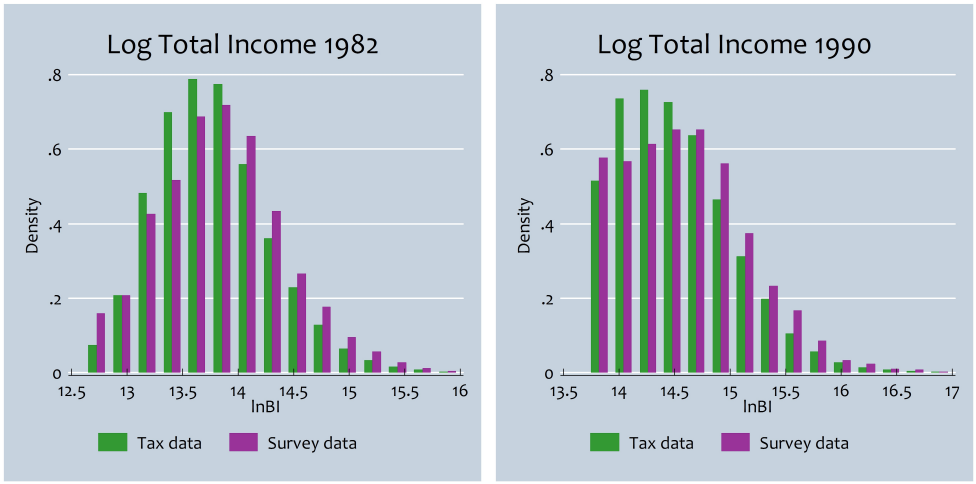
Pensioners have been dropped from the tax data in 1982, since enough information on them is not available in that year's survey (pensions are not present as an explicit variable in the HBS used in the previous imputation work; Torregrosa, nd). In any case, during the first years after the introduction of the tax there was certain discussion as to whether public benefits should be included in the base, which was finally set at the supreme national court: unemployment and disability pensions were excluded in 1983 and 1986 respectively, while regular old age pensions were subject to tax. Recall, however, that these revenues were paid by the state and withheld at source, so fraud in them is not expected.

A comparison of the distribution of the tax bases, shown in figure 5, shows that incomes reported to the tax authorities appear more concentrated than incomes in the survey. In the lower-middle range there is an 'excess mass' of tax data observations, which would correspond to higher income taxpayers under-reporting their incomes (and as a consequence, implying an "excess" of survey observations at the top). At the bottom of the distribution, there are also more observations from the survey, which would signal non-filers (since the opposite direction, over-reporting incomes to the tax administration, does not seem a likely bias).

I follow quite closely the work of Fiorio and D'Amuri (2005) and Matsaganis et al. (2010),

[26] If non-filers have lower incomes than filers *inside a given category*, the estimated compliance will be upward biased (because mean incomes in the survey will be underestimated). And the other way around.

Figure 5: Comparing the distributions in the tax and survey data



Source: author's calculations with IEF panel data and HBSs.
The survey data have been re-weighted to match the population of effective filers.

who represent two different options in the discrepancy method. In both cases, under-reporting is calculated for each income source separately, as a ratio of the means, but the obtention of distinct rates for income levels is done following disparate procedures: Fiorio and d'Amuri assume that there is no re-ranking as a result of income under-reporting and therefore calculate evasion directly by income level, while Matsaganis et al. consider that re-ranking can be important.

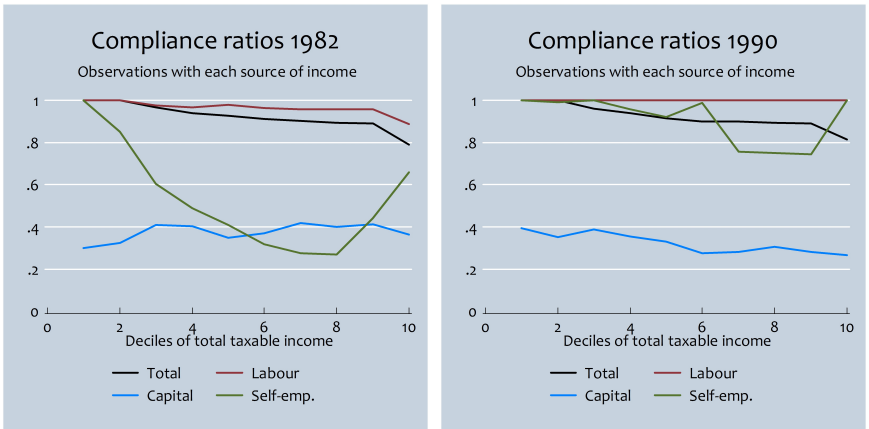
The first calculation corresponds to:

$$C_{sj} = \frac{Y_{Rsj}}{Y_{Ssj}} \tag{1}$$

where C_{sj} stands for compliance ratio of income source s at income level j, Y_R represents average income reported in the tax returns and Y_S average income reported in the HBSs. C_{sj} is expected to be lower than one, indicating the existence of evasion.

The results of these calculations, by deciles, are shown in figure 6.

Figure 6: Estimated compliance ratios by income deciles à la Fiorio & d'Amuri



Source: author's calculations with IEF panel data and HBSs (re-weighted). Following Fiorio & d'Amuri (2005).

This procedure would be unreliable in the presence of significant re-ranking: if taxpayers get ordered differently because of their reporting behaviour, to the extent that they changed their

quantile, it is not consistent to compare the two distributions directly. The compliance ratios are therefore alternatively estimated by Matsaganis et al. (2010) for each income source and region, thus considering that any behavioural difference between taxpayers at different income levels arises totally because of their location and the composition of their income:

$$C_{sk} = \frac{Y_{Rsk}}{Y_{Ssk}} \tag{2}$$

where C_{sk} stands for compliance ratio of income source s at region k, Y_R represents average income reported in the tax returns and Y_S average income reported in the HBSs.

Once these compliance ratios are obtained, they are used to make an estimation of the real incomes of taxpayers in the tax-return database, at the individual level (assuming the mean compliance behaviour):

$$Y_{Eisk} = \frac{Y_{Rsk}}{C_{sk}} \tag{3}$$

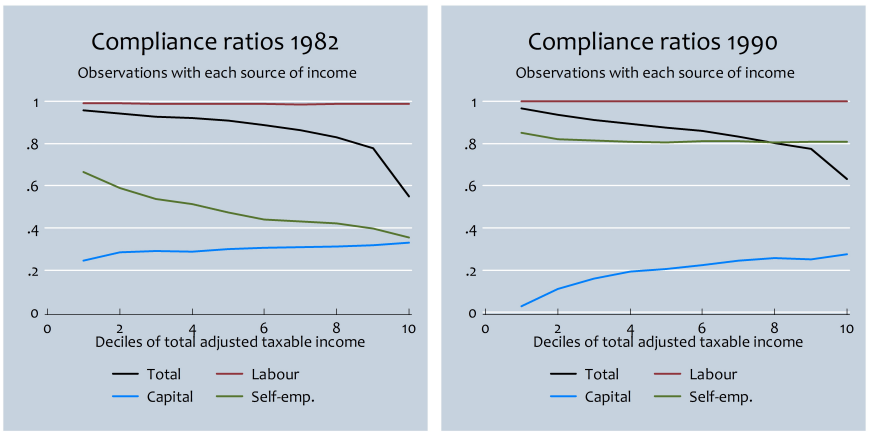
where Y_{Eisk} represents the real estimated income from source s of individual i, living in region k.[27]

Compliance behaviour by income level can then be calculated as:

$$C_{sj} = \frac{Y_{Rsj}}{Y_{Esj}} \tag{4}$$

C_{sj} will differ from that in equation (1) in that the first assumed equal behaviour by source and income level, with no re-ranking, while this alternative calculation assumes equal behaviour by source and region, with the possibility that there is considerable re-ranking caused by the reporting decision. Figure 7 shows the results of these calculations.

Figure 7: Estimated compliance ratios by income deciles à la Matsaganis et al.



Source: author's calculations with IEF panel data and HBSs (re-weighted). Following Matsaganis et al. (2010).

Both alternative estimations show similar results for income from labour (considerable lack of under-reporting, as is expected from their higher control). They also widely agree on decreasing total compliance, although the slope is steeper in the second case: all in all, levels are quite acceptable in the first 5-6 deciles, while behaviour significantly worsens thereafter, and most acutely at

[27] When income of a given category is negative, it is multiplied by the compliance ratio instead of divided, thus assuming symmetric behaviour.

the top 10%, where it is estimated at 60-80% depending on the method. The behaviour of self-employment appears less erratic in figure 7, while compliance in capital incomes –always very low– is increasing in this second calculation. The extent of re-ranking and the validity of the assumptions underlying both procedures rests, however, unknown. Reality probably lies somewhere in between.[28]

There is an improvement between both years in most categories, and the reporting behaviour seems more homogeneous across income levels in 1990 than in 1982. The exception are capital incomes. At this point we need to recall the difference between fixed and movable assets seen in the aggregates, and the flagrant under-valuation in the tax data of income from owner-occupied housing, while in the HBSs we have an estimation as the rent that would have been paid for the house if it was not owned, a more appropiate proxy. Differentiating in the 1990 data between yields from movable capital and fixed capital gives the results displayed in table 3. Compliance in movable capital incomes appears a lot higher than that of fixed capital incomes (in which behaviour is also more homogeneous accross income levels). This would appear counterintuitive if it weren't for the legal understatement of values affecting the latter. The changing composition of capital incomes across the scale of taxpayers, with movable elements gaining importance as we go up, explains the increasing profile in figure 7.

Table 3: Compliance in Capital incomes in 1990

	À la Fiorio & d'Amuri		À la Matsaganis et al	
Deciles	**Movable**	**Fixed**	**Movable**	**Fixed**
1	77%	9%	28%	-7%
2	107%	6%	29%	-5%
3	93%	7%	29%	-4%
4	75%	5%	29%	-4%
5	104%	3%	29%	-3%
6	108%	2%	29%	-3%
7	68%	2%	30%	-1%
8	79%	2%	30%	1%
9	50%	3%	29%	1%
10	26%	7%	29%	3%
Total	30%	4%	29%	1%

Source: author's calculations (equations 1-4).

In all cases, average values of incomes are calculated over the sample of individuals who itemize the particular kind of income in their tax return or survey response.

The different rates obtained for the income deciles are likely to have had a very relevant impact on the progressivity of the tax, as we will see in section 5. Horizontal equity would of course also be affected, but this issue is not analysed here. Even though equity would also be deteriorated if the lowest deciles under-reported the most, the fact that it is the top that specially escaped

[28] In both cases, some compliance ratios over 1 were obtained for labour and self-employment incomes (and have been adjusted to 1). These indicate that the re-weighting applied does not fully account for the impact of non-filers, which would have lower incomes than filers in the given categories (recall the discussion in table 1).

taxation can make fraud more worrisome, since the 10% of wealthiest taxpayers concentrated a much higher percentage of the total taxable base than their share in population (in the years under analysis as well as today). The leaking of a third of the incomes at this level was therefore a vast obstacle for the revenue capacity of the tax – and the fiscal system in general, of which it was at the centre.

4.2 Econometrics: too generous to be true?

The second estimation follows Feldman and Slemrod (2007) and Domínguez et al. (2013), who applied the formers' framework to the Spanish PIT in 2008. The method is based on Pissarides and Weber (1989)'s insight about relative under-reporting in household surveys: they distinguished two categories of households and considered wage-earners to be truthful reporters, while the self-employed could potentially not be so... which was shown by their relative expenditure in food. The truthful category in Feldman and Slemrod's elaboration is no longer an individual type, but an income source: labour; and the "consumption" item, that might be related to the level of income but in principle not to its composition, is here charitable donations. We may think of many characteristics which determine the part of one individual's income she wishes to give to others, but it is plausible that this decision is not influenced by whether the income was obtained from labour or capital.

If we accept these assumptions, we can estimate an equation of the following form:

$$lnDONATIONS_i = \alpha + \beta ln(L_i + k_2 MC_i + k_3 FC_i + k_4 SE_i + k_5 N_i + k_6 O_i) + \gamma X_i + u_i, \quad (5)$$

where X_i is a vector of taxpayer characteristics including her age, marital status, number of dependants, region of residence, type of tax return and differential tax due before the deduction for donations.[29] L stands for labour income, MC for income from movable capital, FC income from fixed capital, SE from self-employment, N represents negative incomes of all kinds and O other incomes (mostly irregular ones). The coefficients of interest are the k, since $1/k$ would indicate the compliance rate of each component of income (labour income is taken to be fully reported, and therefore has no corresponding k).

Again, it should be noted that the coefficients k subsume two different kinds of under-assessment of incomes: actual evasion and legal understatement, arising from tax code's rules about the valuation of taxable bases. This can be potentially important, as we have previously mentioned, in fixed capital and certain economic activities under presumptive assessment.[30]

Notice that, in contrast to Feldman and Slemrod (2007)'s estimation and others in the field, there is no variable representing the 'price' of the donation. This is because in Spain charitable contributions are treated as a tax credit (a given percentage of the donation is deducted from the

[29] Age is not available as such in 1982, so a dummy variable for being retired is used as an approximation. Type of tax return included for years after 1989, when the option of separate filing for couples was introduced.

[30] In 1982 we cannot include these incomes separately in the estimations, because all tax returns with explicit charitable donations were done in the "ordinary" model, which does not include the possibility of presumptive assessment. For 2001, on the contrary, we introduce them separately in the equation, as Domínguez et al. (2013) did.

tax bill), and not as a deduction from the taxable base, which implies that they are not affected by different marginal tax rates.

Another potential issue is the possibility that the taxpayers over-report their donations so as to obtain an excessive tax credit. Slemrod (1989) found an average overestimation of 7.2% in audited tax returns in the US. A problem would arise if the propensity to this behaviour is related to the composition of an individual's income. This is not clear; in fact, Feldman and Slemrod argue that it would not be rational in combination with an under-reporting of income, because it could trigger the attention of the tax administration. It is also possible that the apparent higher charitable inclinations of wealthy taxpayers arise partly because they have better control on their donations and report them more accurately. If this were the case, our calculation would over-estimate fraud (given the correlation between the level of income and certain changes in its composition).

The biggest problem, however, seems to be the possibility of sample selection bias, if we apply this procedure to the data using only the observations which have donations deducted in their returns. This would be specially a problem in Spain, compared to the US, where giving-deducting behaviour has traditionally been more extended. Table 4 shows that returns with itemized donations (s=1) were 3% of the sample in 1982 and 14% in 2001, and that their mean income was significantly higher than that of the whole universe of taxpayers. This casts reasonable doubt on the possibility of obtaining generalizable results from what is a small, particular sub-sample.

Table 4: Composition of the sample regarding itemized donations

	1982			2001		
s	Freq.	Percent	Mean income	Freq.	Percent	Mean income
0	106,890	97.2%	1,065,505	300,069	85.7%	2,090,883
1	3,050	2.8%	2,501,889	50,089	14.3%	3,636,691
Total	109,940	100.0%	1,105,354	350,158	100.0%	2,241,807

Source: author's calculations on the IEF tax return microdata.

Income is in nominal pesetas, and refers to the sum of net revenues from each source (which is higher than the taxable base given legal deductions applied).

This issue can be solved by using a two-stage estimation, following Heckman (1979), as has been done in García and Marcuello (2001) to estimate the giving behaviour in the Spanish household budget survey data for 1990. The first equation is a Probit to explain the 'donating or not' behaviour, run over all observations:

$$Prob(s_i = 1|lnBI_i, Z_i) = \Phi(\alpha + \beta lnBI_i + \gamma Z_i), \tag{6}$$

$s = 1$ meaning the taxpayer made a deductible donation during the year. Φ is the normal cumulative function. Z_i is a vector of taxpayer characteristics which includes all those in X_i but also some extra variables expected to affect the yes/no decision, but not the amount ('exclusion restriction' in the related literature). In this case, city size and regional dummies are used. The rationale for the first one is that in bigger cities the individuals are more likely to face direct appeals for making donations, which may make them more prone to do them, but not necessarily more

generous once they have made the first decision (this exclusion restriction is also applied in García and Marcuello (2001), although they do not provide a theoretical justification). The regional dummies are also used following the intuition that the level of public goods, social cohesion, or other such aspects might affect the perceived need of individuals in different communities to make charitable donations (in that sense, Bradley et al. (2005) include the level of regional public expenditure). Once again, we expect the impact to be through a higher probability of donating, rather than giving more money after having decided to donate, since it is unlikely that the taxpayers in general have a very sophisticated knowledge of the level of need in different locations.

After estimating the Probit equation, we calculate the inverse Mills ratio (λ), which in Heckman (1979)'s procedure accounts for the probability of selection of the observations (more specifically, the 'nonselection hazard'):

$$\lambda_i = \frac{\phi(\alpha + \hat{\beta} lnBI_i + \hat{\gamma} Z_i)}{\Phi(\alpha + \hat{\beta} lnBI_i + \hat{\gamma} Z_i)}, \tag{7}$$

where ϕ and Φ are the normal density function and normal cumulative function of the predicted values in the probit estimation. This new variable λ is included in the second equation, to correct the bias arising from the truncation of the sample (here, we only use the observations with $s = 1$):[31]

$$lnDONATIONS_i = \alpha + \beta ln(L_i + k_2 MC_i + k_3 FC_i + k_4 SE_i + k_5 N_i + k_6 O_i) + \gamma X_i + \delta \lambda_i + u_i, \tag{8}$$

I apply this methodology to the analysis of the years 1982 and 2001. Other years have data problems that preclude successful estimation, so that only approximations for movable capital under-reporting have been obtained.[32] The number of variables and observations available increase between the two years, and some features of the tax had changed (namely, imputed income from owner-occupied housing is no longer included in the taxable base for the first dwelling, and a non-taxable threshold was introduced).[33] In the year 2001 we can separately estimate compliance for different kinds of self-employment income categories, according to the assessment procedure (acountancy-based or presumptive).

The sample includes only observations with positive income (sum of yields from all sources). Some of them were found to apply a tax credit implying donations above the legal limit for the

[31] In principle, a Tobit estimation is another option to deal with this problem. The condition for this strategy, however, is that the two decisions (to give or not to give, and what amount to donate in the first case) are essentially affected in the same direction by the same factors. This is not necessarily true, and in fact different signs are obtained for some variables in the two stages of the estimation, suggesting that there are two qualitatively different decisions involved for the taxpayer. This was found also by García and Marcuello (2001).

[32] Namely, very low number of observations from 1985 to 1991 because deductible donations were restricted, and from 1992 to 1998 the inability to correctly calculate the quantities donated because of the existence of different percentages of deduction (in the micro-data, only the quantity deducted is available, which represented 10-15-20-25% of the donation, depending on the year). A new panel begins in 1999, but in the first two years the variable 'age' is missing for many observations.

[33] This threshold varied according to family needs, so it is from this variable that we approximate the number of dependants in an imperfect way.

deduction. They have been kept in the sample, but imputing them the maximum donation that would be consistent with the limit.[34]

In table 5 some indicators of the goodness-of-fit of the probit equations are shown. The overall performance is good, even though predicting accuracy is low for the observations with s=1. This is not surprising in such an un-balanced sample, according to Greene (2003). It points to the estimated probabilities being generally low. There might be a problem of omitted variable bias because of not including educational level (not available in the tax data), which has been shown to be significant in related studies, including García and Marcuello (2001) for Spain. This feature is, however, expected to be highly correlated with income and other variables in the model, which would reduce the extent of problem. In any case, the results have to be read with caution.

Table 5: Goodness-of-fit measures of the Probit estimation

	1982	2001
Prob>chi2	0.0000	0.0000
Pseudo R2	24.68	11.54
% correctly classified		
Total	97.14%	85.53%
s=1	2.59%	5.38%
s=0	99.84%	98.91%

Source: author's calculations.

In table 6 I show the estimated coefficients. They are generally not at odds with other studies of charitable donations (Domínguez et al., 2013; Brooks, 2003; García and Marcuello, 2001; Backus, 2010; Bradley et al., 2005). The income elasticity of donations is found to be lower than one, except for the two-stage specification in 1982. Demographic variables have the expected signs: older taxpayers and women are more likely to donate, and also those with children. Investment in housing (not shown because of space considerations) seems to be a substitute of charitable donations (it is a very important expenditure item for some households, and also deductible). The variable lntaxdiff corresponds to the differential tax due resulting from the return (not the total of the tax bill, most of which has normally been deducted at source), *before* the application of the tax credit for donations. It intends to control for the incentive to make (or report) donations because of anticipating a high payment at the filing season, which could arise in relation to variability in yearly incomes. The significance of lambda in the two-step estimation shows that there is indeed a sample selection problem, which causes the one-step estimation to be biased.

[34]This limit lied at 20% of the tax base in 1982, and 10% of the net tax base in 2001. To be precise, some of the observations may not be fraudulent in this sense, because donations of certain goods (national heritage, artworks and so on) are rewarded with a higher tax credit. There is, however, no information to discriminate it. I have also estimated the equations with a restricted sample without these observations, and with the extended sample and the original values. As could be expected, the results of the preferred estimate lie in the middle of these two other options. The extended sample with original values yields higher evasion estimates: if donations over the limit are truthful (in spite of presumably applying an excessive tax credit), we could expect our results to be an under-estimation of fraud.

Table 6: Regression results. Dependent variable: log donations (marginal effects in probit)

	1982			2001		
	One-step	Two-step Heckman		One-step	Two-step Heckman	
	Censored nl	Probit	Censored nl	Censored nl	Probit	Censored nl
lnIncome	0.392***	0.030***	1.090***	0.558***	0.0828***	0.318***
	(0.0914)	(0.0007)	(0.185)	(0.00757)	(0.0009)	(0.0223)
Movable capital	7.050*		2.292***	1.784***		2.629***
	(3.724)		(0.459)	(0.127)		(0.349)
Fixed capital	7.526*		2.430***	1.345***		1.799***
	(4.190)		(0.677)	(0.101)		(0.241)
Self-empl.	7.029**		2.172***			
	(3.565)		(0.383)			
SE Dir.				1.182***		1.388***
				(0.0453)		(0.103)
SE Obj.				1.050***		1.177***
				(0.113)		(0.231)
SE Agr.				1.207***		1.276***
				(0.135)		(0.262)
Married	-0.546***	-0.003***	-0.577***	-0.187***	0.0428***	-0.338***
	(0.0875)	(0.0007)	(0.0902)	(0.0246)	(0.0021)	(0.0263)
Female				0.199***	0.0845***	-0.0817**
				(0.0256)	(0.0023)	(0.0323)
Pensioner/Age	0.648**	0.0014	0.666***	-0.0337***	0.0041***	-0.0513***
	(0.262)	(0.0020)	(0.253)	(0.00319)	(0.0003)	(0.00331)
Dependants	0.0645***	0.0006***	0.0830***	0.00353***	0.0024***	-0.00456***
	(0.0181)	(0.0002)	(0.0178)	(0.00134)	(0.0001)	(0.00143)
Citysize1	0.0707	0.0012		0.162***	0.0494***	
	(0.152)	(0.0014)		(0.0350)	(0.0034)	
Citysize2	-0.0378	0.0009		0.154***	0.0357***	
	(0.167)	(0.0015)		(0.0333)	(0.0032)	
Citysize3	-0.0700	0.0032***		0.222***	0.0448***	
	(0.114)	(0.0010)		(0.0256)	(0.0024)	
Citysize4	-0.0643	0.0059***		0.159***	0.0339***	
	(0.0844)	(0.0008)		(0.0169)	(0.0016)	
lambda			0.754***			-0.835***
			(0.167)			(0.0559)
Regions	yes	yes	no	yes	yes	no
Observations	3,050	109,940	3,050	50,089	350,158	50,089
R-squared	0.139		0.126	0.180		0.173

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The one-step procedure corresponds to equation (5), while the two-step calculations follow equations (6) to (8). 'Dependants' captures the needs of the household, which are subsumed in 'lnminpf' in 2001 (exempted income according to family situation). 'lambda' is the inverse Mills ratio. Other controls include 'declconj' (dummy for joint filing of marriages, which was compulsory in 1982), 'lntaxdiff' (differential tax due prior to the deduction for donations), 'lnhousing' (investment in acquiring a house), 'disability' (dummy in 1982 if there is such a tax credit), age squared (only in 2001), the interaction of 'married' with 'female' (only in 2001) and a constant.

The coefficients of interest are the ones associated to the different sources of income, which indicate the presence of under-reporting when they are significantly bigger than one. Table 7 displays the estimated compliance ratios under both estimation strategies, although the 2-step method is considered more accurate while the first one would be biased. Under-reporting was near 50-40% for all non-labour incomes in 1982, when the tax was taking its first steps. Over time, the behaviour of self-employment improved significantly, while fixed capital incomes did so more slightly, and movable capital incomes actually seem to be less accurately reported in the latter year, with still around 60% escaping taxation.

Table 7: Compliance ratios à la Feldman-Slemrod

	1982		2001	
	1-step	2-step	1-step	2-step
Movable capital	14%	44%***	56%***	38%***
Fixed capital	13%	41% **	74%***	56%***
Self-employment	14%*	46%***	-	-
SE Direct	-	-	85%***	72%***
SE Objective	-	-	95%	85%
SE Agrarian	-	-	83%	78%

Source: author's calculations with the coefficients from table 6.

The compliance ratio is $1/k_i$ for each income source. Self-employment activities are separated in 2001 according to the valuation procedure: direct assessment (accountancy-based) or objective, where we further distinguish agrarian activities.
*** Different from 1 at p<0.01, ** p<0.05, * p<0.1.

The behaviour of the self-employed under presumptive taxation (including agrarian activities) in 2001 cannot be statistically distinguished from 100% compliance. This might be shocking for readers familiar with the Spanish context. For an accurate interpretation, nonetheless, the relative character of the estimation has to be brought into attention: the coefficients tell us there is no significant difference with respect to wage earners. Because the activities eligible to objective assessment are personal or very small firms, where labour costs are a huge part of the total, this might make sense. Such is the interpretation of Artavanis et al. (2012) in front of similar results for Greece.

Given that the regressions show the existence of a sample selection effect (significance of λ), the two-step procedure is to be considered more accurate than its simpler counterpart. The estimated compliance ratios are higher in 1982 when we apply Heckman, and lower in 2001. The story thus changes radically. With the first results, we would have concluded that under-reporting lay around 80% in the beginning of the eighties, and was pulled back very significantly during the following two decades. The Heckman estimates, however, tell us that the levels of compliance actually got *worse* for movable capital and improved for fixed capital and self-employment activities but with a still considerable differential to 100%. Is this credible? In particular, does it tally with the aggregate estimations?

5 Discussion of the results

To make an accurate interpretation we need to keep in mind the distinct kinds of evasion present: that of the taxpayers reporting lower incomes than they actually had, and that of 'ghosts' – i.e., those who never even filed a return. We know that filing increased a lot during those decades, attaining the expected levels. The story fits indeed: in 1982, aggregate non-labour incomes were hidden by 74% – but more than half of that fraud was due to non-filers.[35] Those who did file declared non-labour quantities a bit under half of what they actually earned, in average.

Table 8: Estimated compliance ratios by sources of income

	1982				1990		2001	
	Total	Filers			Total	Filers	Filers	
	Discr.	F&d'A	1-step	2-step	Discr.	F&d'A	1-step	2-step
Labour	78%	97%	(100%)	(100%)	95%	106%	(100%)	(100%)
Movable capital	33%	34%	14%	**44%**	59%	30%	56%	**38%**
Fixed capital			13%	**41%**	5%	4%	74%	**56%**
Self-Empl.	24%	38%	14%	**46%**	65%	80%	-	-
S.E. Direct	-	-	-	-	-	-	85%	**72%**
S.E. Objective	-	-	-	-	-	-	*95%*	*85%*
S.E. Agrarian	-	-	-	-	-	-	*83%*	*78%*
Total	57%	89%	-	-	70%	89%	-	-

Source: author's calculations.

Total discrepancy results are those in figure 4, thus subsuming the effect of non-filing. Filers' discrepancy results reflect the Fiorio and d'Amuri method in figure 6. The econometric estimations for filers are obtained from the coefficients in table 6, the compliance ratio being $1/k$ for each income source. Self-employment activities are separated in 2001 according to the valuation procedure: direct assessment (accountancy-based) or presumptive, where we further distinguish agrarian activities. The results shown in italics are not statistically significant at the 10% level, while the two-step estimates are shown in bold because they are the most robust results.

My results in terms of under-reporting by filers have to be compared with those of Domínguez et al. (2013), whose work is closely replicated in the 1-step procedure. They calculated for the year 2008 a rate of compliance of 60% for movable capital, 70% for fixed capital, and 65-78% for self-employment activities (65% corresponds to the returns with direct estimation of the tax base, while 78% was obtained for those under presumptive assessment). These levels are near the ones I get using the same method for 2001, so a lot of the improvement would have taken place in the last decades of the 20th Century.

The favourable evolution in business income can be related to changes in the system of presumptive taxation: given that in the eighties the low incomes reported by this group were of concern to the tax authorities, the 1991 reform of PIT introduced a new model for the standard

[35] Indeed, if we estimate aggregate incomes of filers using the k as up-scaling factors, we find them to be around 60% of the aggregate incomes of those obliged to pay the tax (obtained from the HBS in section 4.1). The rest of the discrepancy is due to non-filers. If we up-scale incomes by the factors obtained in the 1-step estimation, the aggregate is significantly higher than the macro framework.

assessment of these revenues, which seems to have brought up reported yields.[36]

Regarding fixed capital incomes, there were two potentially opposing changes. On the one hand, imputed rents from the first home were no longer subject to tax after a reform in 1998 (this would push down estimated compliance, given that all "loopholes" in the definition of the tax base are included as such). On the other, a retention mechanism was introduced for rental incomes in the same year. The second element might have enhanced compliance and thus would explain the increase in measured compliance for this category. The evolution of cadastral values, which were updated during the 1990s, surely also played a role.

The drop in movable capital, on the other hand, could seem difficult to explain. It can however be interpreted in the context of increasing financial sophistication and avoidance, including the role of international mobility and tax havens. Another possible cause for the downward path is the changing composition of filers, with the "new ones" under-reporting more. The answer is to be given by further research. In any case, under-reporting as a whole seems to have undergone a significant reduction, but it has not yet been eradicated.

I next place the Spanish experience in international perspective. Table 9 presents rates of evasion (1 - compliance) taken from many different studies. My estimates of total tax base concealment are substantially higher than many other available in the literature, which correspond to more developed countries or later periods. Our case appears closer to the results for Italy in 1991-94 and Chile in 1996. Interestingly, the estimates for the US in the 1980s are also of similar magnitude, corresponding to a ratio of personal income in national accounts, so also subsuming the effect of exemptions of different kinds of income.

Evasion rates for self-employment incomes are always higher than those of dependent labour incomes or the general tax base. The behaviour in Spain does not stand out a lot in this respect. Rates of 70-80% are found among small informal business suppliers in the US, suggesting that a significant part of the difference between countries could be due to the business structure (namely, the weight of small enterprises, more frequently informal). The procedures employed for the assessment of the tax base need also be considered. Presumptive taxation of entrepreneurial incomes, as has been said, historically tended to under-estimate these revenues in the Spanish PIT. Similar systems exist in developing countries and also in places like France or Belgium, although they are normally on a downward trend.[37] Presumptive methods are not applied, or very marginally, in developed economies where businesses are deemed capable of managing a basic acountancy. This element, therefore, stands in the middle of the comparison of Spain with countries such as Sweden or the US.

I have not estimated the effects of under-reporting on the tax liability, but nonetheless I present the results in this indicator of other studies. The highest estimates in this case are found for the

[36] In the 1978 law, the method for presumptive taxation was the *Estimación Objetiva Singular*, based on turnover. The 1991 reform introduced a new method, *Estimación por signos, índices y módulos*, which uses parameters such as the number of employees or the situation or size of the business premises. This system seems to have improved the reporting of entrepreneurial incomes, but is still fiercely criticized because of non-neutrality and not following the principle of economic capacity (Navarro, 1993).

[37] The French 'forfait' system, nevertheless, represents a more accurate method than the Spanish one (Thuronyi, 1996).

Table 9: A comparison of Personal Income Tax evasion estimates across countries

Study	Country	Year	Evasion as % of...		
			Tax liability	Tax base	
				Total	Self-empl.
		1982		*43%*	*76*-54%
This study	Spain	1990		*30%*	*35*-...%
		2001			...-28%
Esteller (2011)	Spain	1993-2000		*20%*	
Domínguez et al. (2013)	Spain	2008			35-22%
Klepper and Nagin (1989)	US	1982			32-74-48%*
		1985	14%	*31%*	35-73-31%*
Internal Revenue Service (1996)	US	1988	13%	*26%*	32-81-32%*
		1992	13%		32-81-32%*
Feldman and Slemrod (2007)	US	1999			35-74-78%*
Johns and Slemrod (2010)	US	2001	18%	11%	43%
Kleven et al. (2011)	Denmark	2007	2.4%	1.8%	37%**
Bernardi and Bernasconi (1997)	Italy	1991		26%	63%
Bernardi (1996)	Italy	1994		23%	60%
Fiorio and D'Amuri (2005)	Italy	2000	3.7%***		78-8%
Marino and Zizza (2012)	Italy	2004		14%	56%
	Italy	2002	21%	11%	
Matsaganis et al. (2010)	Greece	2004	26%	10%	
	Hungary	2005	19%	11%	
Engel et al. (1999)	Chile	1996	*54%*	*23%*	
	Chile	2003	*46%*		
	Ecuador	2005	*58%*		
	El Salvador	2005	*36%*		
Jiménez et al. (2010)	Guatemala	2006	*70%*		
	Mexico	2004	*38%*		
	Peru	2006	*33%*		
	Argentina	2005	*50%*		

Income tax evasion is presented as % of the estimated total in each case (tax liability or tax base). Most of these studies apply different variants of the discrepancy method. The estimates for the US and Denmark, on the other hand, are based on audit data (except for Feldman & Slemrod, 2007).

Numbers in italics refer to total evasion (including the effects of non-filing and underpayment).

* Refers respectively to Non-farm proprietor income, Informal supplier income and Farm income.

** Refers to all self-reported income, as opposed to that subject to third-party information.

*** Refers only to labour incomes (dependent and self-employed).

Latin American countries included, ranging between 33 and 70% for the early 21st Century – something which studies also relate to high informality.

Intuitively, it is easy to imagine that the distributional pattern of under-reporting necessarily has an impact on progressivity estimations. To know the extent to which we are miscalculating these indicators, we would need to work with audited tax returns, which had reported income and income estimated by the inspector for each observation. Because these data are not available for the moment in Spain and in many other countries, it is possible to make a back-of-the-envelope calculation where we assign the obtained k for each income source to each individual in the sample. The implications can be seen in table 10.

Table 10: Impact of under-reporting on progressivity estimations

	1982			2001		
	Original	Corrected	Diff.	Original	Corrected	Diff.
Pre-tax Gini	0.3296	0.3653	11%	0.3747	0.3939	5%
Post-tax Gini	0.3035	0.3515	16%	0.3254	0.3552	9%
Average tax rate	0.1169	0.0967	-17%	0.1537	0.1372	-11%
Reynolds-Smolensky	0.0261	0.0138	-47%	0.0494	0.0387	-22%
Kakwani	0.2029	0.1367	-33%	0.2777	0.1372	-51%
Av. Tax rate top 10%	15.89	11.84	-25%	29.30	23.64	-19%
Av. Tax rate top 1%	23.04	13.03	-43%	31.04	23.71	-24%

Source: author's calculations.

In all cases, instead of the legal tax base, the sum of net revenues from all sources has been used (which is closer to the concept of "pre-tax income"). The 'corrected' scenario shows the real behaviour of the tax if evasion was distributed as hypothesized, while the 'original' scenario is the estimate readily obtained from the data, affected by under-reporting.

Reynolds-Smolensky is a redistribution index, corresponding to the difference between the Gini of pre-tax and post-tax incomes. Kakwani is a progressivity indicator, calculated as the difference between pre-tax Gini and concentration of tax payments. The tax rates for the top 10 and 1% have been calculated using the distribution of corrected incomes.

If under-statement of incomes were uniformly distributed for each income source, inequality would be around 5-16% higher than it looks in the tax data, and the average tax rate around 11-17% lower. The redistribution estimates are the ones most affected: the index would be 47% lower than apparent in 1982, and 22% in 2001; while progressivity was 33-51% overestimated. This is a very significant impact, which would be a lower bound if under-reporting were increasing within income source (as was found for some cases in section 4.1). On the other hand, the negative impact would have decreased between both estimations, suggesting changes in the distributional patterns of fraud.

The results seem to confirm Comín's insight that, at least for some time, *"the regressivity of the tax system, however, has not been banished in practice, because fraud is still very flagrant in incomes with no withholding at source. Widespread evasion in high-income taxpayers and non-labour revenues has made PIT a tax on labour incomes"* (Comín et al., 1995).

6 Final comments

Tax evasion is a very popular topic in public debate in Spain today. Folk wisdom has it that it is very pervasive, and unequally distributed – concentrating among the rich and the self-employed. Its existence would render the tax system unfair, and there is much claim for fighting against it, specially under the *zeitgeist* brought about by the economic crisis. How accurate are these impressions?

This paper has reviewed the slow and twisted path toward generality in income taxation in the country. The principle that all citizens should contribute according to their economic capacities has not been followed. During most of the 20th century, the threshold for PIT was so high that it was only directed at the very top households, so for most of the income scale there was no progressivity (and hardly for the top, given the discussed incidence of non-filing). With the reforms in the seventies and the introduction of the modern tax in 1978, the nature of the problem changed: it was now supposed to capture all incomes and treat them equally... but resistances were hard. A high percentage of individuals did not even file a tax return, and those who did reported incomes well below their real value on average. The new tax was severely affected by lack of compliance. Administrative and legal developments aimed at improving the functioning of the tax system during the next decades. Were they successful?

I have estimated under-assessment of incomes in tax returns, considering non-filing, legal under-valuation and under-reporting by filers. Discrepancy between macro aggregates gives us an approximation to the total impact of these elements, which lies around 43-30% evasion in 1982 and 1990 respectively for the total tax base, and ranging from the only 20-5% difference in wages to around 70% in other yields – with decrease in self-employment incomes, reaching 35% in the last year. As a second step, restricting the attention to the behaviour of filers, I try to assess how reporting compliance changed across income sources and the income scale. To do that, I have followed two proposals in the literature. The first is a discrepancy analysis between tax return microdata and survey data (where these had been previously adjusted to National Accounts for each income source). At this point, both Fiorio and D'Amuri (2005) and Matsaganis et al. (2010)'s methodologies have been applied, allowing a comparison of the resulting profiles.

The second approach is an econometric estimation with tax return micro-data, exploiting the relation between reported charitable donations and the composition of income (under the assumption that donations should not be affected by the latter, only by the level). This idea was developed by Feldman and Slemrod (2007) and applied to Spain for 2008 by Domínguez et al. (2013). Nevertheless, here I have slightly modified the procedure to correct for a plausible sample selection problem using Heckman's estimation method, because returns with charitable donations are a small –and distinct – part of the total.

The discrepancy analysis shows very high levels of compliance in labour incomes, while they are much lower for self-employment and, specially, capital yields. As a result both of composition and of differing rates of compliance across deciles within income source, evasion in the total tax base is found to be increasing as we move towards the top of the income distribution. The donation equations confirm the different behaviours of incomes from disparate sources. Taking labour as fully compliant, all other yields would only be reported at near 40-50% of their real

value in 1982. Nineteen years later, at our second estimation, compliance had gone up slightly in fixed capital incomes (lying now at 56%), specially for self-employment activities (72%), but down in the case of movable capital (38%).

Because of the varying composition of incomes across the distribution, we expected a negative impact of these results on progressivity. The estimations we get from the reported data concerning redistribution and progressivity would be flawed, upwards biased. This is confirmed by a back-of-the-envelope calculation that gives an estimate of the bias at around 50-20% for the redistribution index and between one third and one half for the progressivity indicator, depending on the year.

The bad news is that undermined progressivity of PIT, which was – and is – the only real progressive tax with some weight in the system, calls into question the image of the ensemble of taxation and the joint tax-and-transfer scheme. Evasion has proven pervasive in the country. The good news, however, is that efforts to reduce it, despite being slow, have reaped some rewards, specially with regards to self-employment incomes. A lot is left to be done, judging by the results in this paper and the ones from Domínguez et al. (2013), but at least we know where the big tax gaps are.

Further work would benefit from access to audit data, as has been possible in the US, yielding the development of rich research in the area (Bishop et al., 2000; Feldman and Slemrod, 2007; Johns and Slemrod, 2010), and also in Denmark (Kleven et al., 2011). This would allow obtaining much more precise estimations. They are without a doubt interesting not only for economic history, but also for societal awareness and policy design.

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